



U.S. Energy Information  
Administration

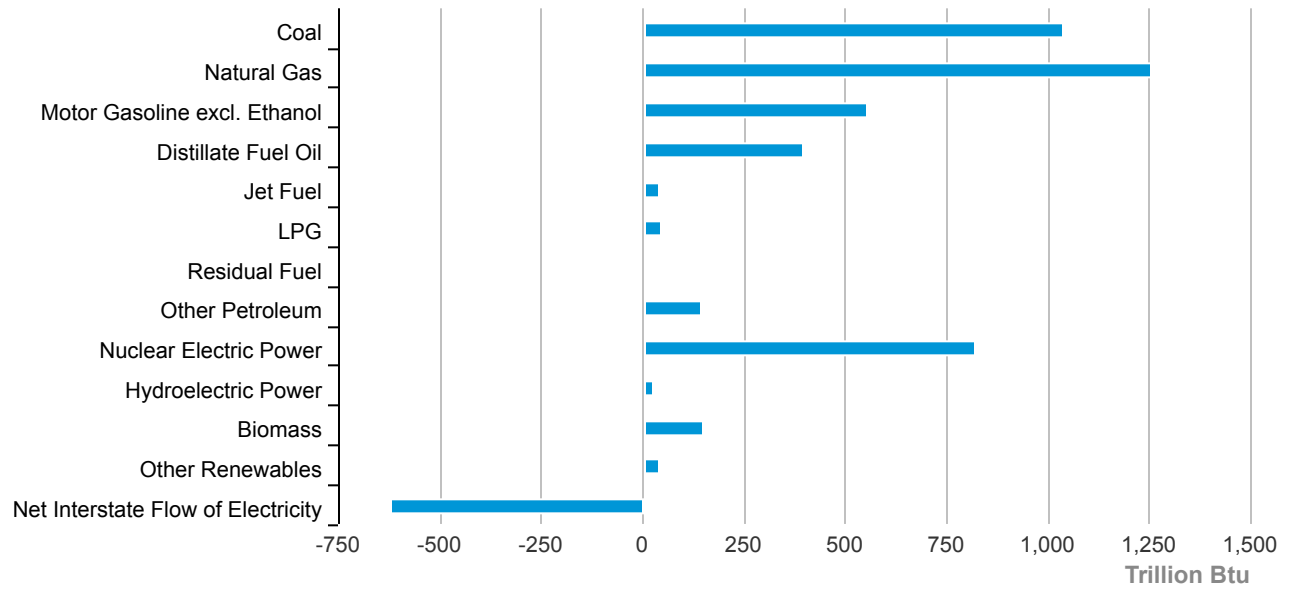
## Pennsylvania State Energy Profile

### Pennsylvania Quick Facts

- Pennsylvania's annual gross natural gas production, primarily from the Marcellus Shale, exceeded 4 trillion cubic feet in 2014, doubling the state's 2012 production and making Pennsylvania the nation's second-largest natural gas producer.
- Pennsylvania was the fourth-largest coal-producing state in the nation in 2014 and the only state producing anthracite coal, which has a higher heat value than other kinds of coal.
- In 2015, Pennsylvania ranked second in the nation in electricity generation from nuclear power. The state obtained 37.2% of its net electricity generation from nuclear power, more than from any other source.
- Pennsylvania's Alternative Energy Portfolio Standards require 18% of electricity sold by 2021 to come from approved renewable or alternative sources, including at least 0.5% solar photovoltaic power. In 2015, renewable energy accounted for 4% of Pennsylvania's net electricity generation.
- As of 2014, 51% of Pennsylvania households used natural gas as their primary home heating fuel, while 21% depended on electricity for heat and 19% relied on fuel oil. Other heating fuels used in the state included propane, wood, and coal.

Last Updated: July 21, 2016

### Pennsylvania Energy Consumption Estimates, 2014



Source: Energy Information Administration, State Energy Data System

## Data

**Last Update:** September 15, 2016 | **Next Update:** October 20, 2016

### Energy Indicators

Demography	Pennsylvania	Share of U.S.	Period
Population	12.8 million	4.0%	2014
Civilian Labor Force	6.5 million	4.1%	Jul-16
Economy	Pennsylvania	U.S. Rank	Period
Gross Domestic Product	\$ 689.2 billion	6	2015
Gross Domestic Product for the Manufacturing Sector	\$ 85,125 million	8	2015
Per Capita Personal Income	\$ 49,180	18	2015
Vehicle Miles Traveled	99,882 million miles	9	2014
Land in Farms	7.7 million acres	35	2012
Climate	Pennsylvania	U.S. Rank	Period
Average Temperature	49.4 degrees Fahrenheit	33	2015
Precipitation	43.2 inches	23	2015

### Prices

Petroleum	Pennsylvania	U.S. Average	Period	<a href="#">find more</a>
<a href="#">Domestic Crude Oil First Purchase</a>	\$ 43.94 /barrel	\$ 43.96 /barrel	Jun-16	
Natural Gas	Pennsylvania	U.S. Average	Period	<a href="#">find more</a>
<a href="#">City Gate</a>	\$ 6.10 /thousand cu ft	\$ 3.91 /thousand cu ft	Jun-16	<a href="#">find more</a>
<a href="#">Residential</a>	\$ 15.62 /thousand cu ft	\$ 14.49 /thousand cu ft	Jun-16	<a href="#">find more</a>
Coal	Pennsylvania	U.S. Average	Period	<a href="#">find more</a>
<a href="#">Average Sales Price</a>	\$ 61.82 /short ton	\$ 34.83 /short ton	2014	
<a href="#">Delivered to Electric Power Sector</a>	\$ 1.79 /million Btu	\$ 2.09 /million Btu	Jun-16	
Electricity	Pennsylvania	U.S. Average	Period	<a href="#">find more</a>

**Prices**

<a href="#">Residential</a>	14.03 cents/kWh	12.73 cents/kWh	Jun-16	<a href="#">find more</a>
<a href="#">Commercial</a>	9.12 cents/kWh	10.58 cents/kWh	Jun-16	<a href="#">find more</a>
<a href="#">Industrial</a>	6.82 cents/kWh	7.03 cents/kWh	Jun-16	<a href="#">find more</a>

**Reserves & Supply**

<b>Reserves</b>	<b>Pennsylvania</b>	<b>Share of U.S.</b>	<b>Period</b>	<a href="#">find more</a>
<a href="#">Crude Oil (as of Dec. 31)</a>	22 million barrels	0.1%	2014	<a href="#">find more</a>
<a href="#">Dry Natural Gas (as of Dec. 31)</a>	59,873 billion cu ft	16.2%	2014	<a href="#">find more</a>
<a href="#">Expected Future Production of Natural Gas Plant Liquids</a>	398 million barrels	2.6%	2014	<a href="#">find more</a>
<a href="#">Recoverable Coal at Producing Mines</a>	1,256 million short tons	6.5%	2014	<a href="#">find more</a>
<b>Rotary Rigs &amp; Wells</b>	<b>Pennsylvania</b>	<b>Share of U.S.</b>	<b>Period</b>	<a href="#">find more</a>
Rotary Rigs in Operation	56 rigs	3.0%	2014	
<a href="#">Natural Gas Producing Wells</a>	70,400 wells	13.7%	2014	<a href="#">find more</a>
<b>Production</b>	<b>Pennsylvania</b>	<b>Share of U.S.</b>	<b>Period</b>	<a href="#">find more</a>
<a href="#">Total Energy</a>	7,087 trillion Btu	8.1%	2014	<a href="#">find more</a>
<a href="#">Crude Oil</a>	476 thousand barrels	0.2%	Jun-16	<a href="#">find more</a>
<a href="#">Natural Gas - Marketed</a>	4,214,643 million cu ft	15.4%	2014	<a href="#">find more</a>
<a href="#">Coal</a>	60,910 thousand short tons	6.1%	2014	<a href="#">find more</a>
<b>Capacity</b>	<b>Pennsylvania</b>	<b>Share of U.S.</b>	<b>Period</b>	
<a href="#">Crude Oil Refinery Capacity (as of Jan. 1)</a>	596,000 barrels/calendar day	3.3%	2015	
<a href="#">Electric Power Industry Net Summer Capacity</a>	42,775 MW	4.0%	Jun-16	
<b>Total Utility-Scale Net Electricity Generation</b>	<b>Pennsylvania</b>	<b>Share of U.S.</b>	<b>Period</b>	<a href="#">find more</a>
<a href="#">Total Net Electricity Generation</a>	17,974 thousand MWh	4.9%	Jun-16	

**Reserves & Supply**

<b>Utility-Scale Net Electricity Generation (share of total)</b>	<b>Pennsylvania</b>	<b>U.S. Average</b>	<b>Period</b>	
<a href="#">Petroleum-Fired</a>	0.1 %	0.3 %	Jun-16	<a href="#">find more</a>
<a href="#">Natural Gas-Fired</a>	34.7 %	35.9 %	Jun-16	<a href="#">find more</a>
<a href="#">Coal-Fired</a>	26.1 %	31.5 %	Jun-16	<a href="#">find more</a>
<a href="#">Nuclear</a>	35.5 %	18.2 %	Jun-16	<a href="#">find more</a>
<a href="#">Renewables</a>	3.1 %	13.4 %	Jun-16	
<b>Stocks</b>	<b>Pennsylvania</b>	<b>Share of U.S.</b>	<b>Period</b>	<a href="#">find more</a>
<a href="#">Motor Gasoline (Excludes Pipelines)</a>	24 thousand barrels	0.1%	Jun-16	
<a href="#">Distillate Fuel Oil (Excludes Pipelines)</a>	4,661 thousand barrels	3.9%	Jun-16	<a href="#">find more</a>
<a href="#">Natural Gas in Underground Storage</a>	623,378 million cu ft	8.2%	Jun-16	<a href="#">find more</a>
<a href="#">Petroleum Stocks at Electric Power Producers</a>	1,298 thousand barrels	4.1%	Jun-16	<a href="#">find more</a>
<a href="#">Coal Stocks at Electric Power Producers</a>	W	W	Jun-16	<a href="#">find more</a>
<b>Production Facilities</b>	<b>Pennsylvania</b>			
<a href="#">Major Coal Mines</a>	Bailey Mine / Consol Pennsylvania Coal Company, Enlow Fork Mine / Consol Pennsylvania Coal Company, Cumberland Mine / Cumberland Coal Resources LP, Blacksville No 2 / Consolidation Coal Company			<a href="#">find more</a>
<a href="#">Petroleum Refineries</a>	American Refining Group (Bradford), Philadelphia Energy Solutions (Philadelphia), United Refining (Warren), Monroe Energy (Trainer)			<a href="#">find more</a>
<a href="#">Major Non-Nuclear Electricity Generating Plants</a>	Bruce Mansfield (FirstEnergy Generation Corp) ; Homer City Station (Midwest Generations EME LLC) ; Keystone (RRI Energy NE Management Co) ; Conemaugh (RRI Energy NE Management Co) ; PPL Martins Creek (PPL Martins Creek LLC)			
<a href="#">Nuclear Power Plants</a>	PPL Susquehanna (PPL Susquehanna LLC), Limerick (Exelon Generation Co LLC), Peach Bottom (Exelon Generation Co LLC), Beaver Valley (FirstEnergy Nuclear Operating Company), Three Mile Island (AmerGen Energy Co LLC)			<a href="#">find more</a>

**Distribution & Marketing**

<b>Distribution Centers</b>	<b>Pennsylvania</b>

**Distribution & Marketing**

Petroleum Ports	Philadelphia, Marcus Hook, Pittsburgh.			<a href="#">find more</a>
Natural Gas Market Hubs	Dominion Hub (Market Center)			
<b>Major Pipelines</b>	<b>Pennsylvania</b>			<a href="#">find more</a>
Crude Oil	Enbridge			
Petroleum Product	Enterprise, Colonial Pipeline, Marathon Pipeline, Sunoco, Buckeye partners			
Natural Gas Liquids	Buckeye Partners, Enterprise Products			
Interstate Natural Gas Pipelines	Blacksville Oil and Gas Company, Central New York Oil and Gas Company, Columbia Gas Transmission Corporation, Dominion Transmission Inc, Eastern Shore Natural Gas Company, Empire Pipeline, Equitrans LP, National Fuel Gas Supply Corporation, Pike County Light and Power, Tennessee Gas Pipeline Company, Texas Eastern Transmission LP, Transcontinental Gas Pipeline			
<b>Fueling Stations</b>	<b>Pennsylvania</b>	<b>Share of U.S.</b>	<b>Period</b>	
Motor Gasoline	3,842 stations	3.4%	2014	
Liquefied Petroleum Gases	108 stations	2.8%	2016	
Electricity	288 stations	1.9%	2016	
Ethanol	43 stations	1.4%	2016	
Compressed Natural Gas and Other Alternative Fuels	70 stations	2.8%	2016	

**Consumption & Expenditures**

Summary	Pennsylvania	U.S. Rank	Period	
<a href="#">Total Consumption</a>	3,902 trillion Btu	6	2014	<a href="#">find more</a>
<a href="#">Total Consumption per Capita</a>	305 million Btu	28	2014	<a href="#">find more</a>
<a href="#">Total Expenditures</a>	\$ 55,666 million	5	2014	<a href="#">find more</a>
<a href="#">Total Expenditures per Capita</a>	\$ 4,351	29	2014	<a href="#">find more</a>
<b>by End-Use Sector</b>	<b>Pennsylvania</b>	<b>Share of U.S.</b>	<b>Period</b>	
Consumption				
» <a href="#">Residential</a>	972 trillion Btu	4.5%	2014	<a href="#">find more</a>

**Consumption & Expenditures**

» <a href="#">Commercial</a>	653 trillion Btu	3.6%	2014	<a href="#">find more</a>
» <a href="#">Industrial</a>	1,375 trillion Btu	4.3%	2014	<a href="#">find more</a>
» <a href="#">Transportation</a>	903 trillion Btu	3.3%	2014	<a href="#">find more</a>

Expenditures

» <a href="#">Residential</a>	\$ 13,630 million	5.2%	2014	<a href="#">find more</a>
» <a href="#">Commercial</a>	\$ 6,553 million	3.4%	2014	<a href="#">find more</a>
» <a href="#">Industrial</a>	\$ 10,873 million	4.4%	2014	<a href="#">find more</a>
» <a href="#">Transportation</a>	\$ 24,610 million	3.6%	2014	<a href="#">find more</a>

**by Source      Pennsylvania      Share of U.S.      Period**

Consumption

» <a href="#">Petroleum</a>	230.8 million barrels	3.3%	2014	<a href="#">find more</a>
» <a href="#">Natural Gas</a>	1,200.7 billion cu ft	4.5%	2014	<a href="#">find more</a>
» <a href="#">Coal</a>	46.5 million short tons	5.1%	2014	<a href="#">find more</a>

Expenditures

» <a href="#">Petroleum</a>	\$ 32,754 million	3.8%	2014	<a href="#">find more</a>
» <a href="#">Natural Gas</a>	\$ 8,819 million	5.1%	2014	<a href="#">find more</a>
» <a href="#">Coal</a>	\$ 3,006 million	6.7%	2014	<a href="#">find more</a>

**Consumption for Electricity Generation      Pennsylvania      Share of U.S.      Period      [find more](#)**

<a href="#">Petroleum</a>	42 thousand barrels	2.6%	Jun-16	<a href="#">find more</a>
<a href="#">Natural Gas</a>	47,379 million cu ft	4.7%	Jun-16	<a href="#">find more</a>
<a href="#">Coal</a>	2,242 thousand short tons	3.5%	Jun-16	<a href="#">find more</a>

**Energy Source Used for Home Heating (share of households)      Pennsylvania      U.S. Average      Period**

Natural Gas	51.1 %	48.5 %	2014
Fuel Oil	17.6 %	5.5 %	2014
Electricity	22.0 %	37.4 %	2014
Liquefied Petroleum Gases	4.0 %	4.8 %	2014
Other/None	5.5 %	4.0 %	2014

**Environment**

<b>Renewable Energy Capacity</b>	<b>Pennsylvania</b>	<b>Share of U.S.</b>	<b>Period</b>	<a href="#">find more</a>
<a href="#">Total Renewable Energy Electricity Net Summer Capacity</a>	2,854 MW	1.5%	Jun-16	
Ethanol Plant Operating Capacity	110 million gal/year	0.7%	2016	
<b>Renewable Energy Production</b>	<b>Pennsylvania</b>	<b>Share of U.S.</b>	<b>Period</b>	<a href="#">find more</a>
<a href="#">Utility-Scale Hydroelectric Electricity Generation</a>	139 thousand MWh	0.6%	Jun-16	
<a href="#">Utility-Scale Solar Photovoltaic, Wind, and Geothermal Electricity Generation</a>	225 thousand MWh	1.1%	Jun-16	
<a href="#">Utility-Scale Biomass Electricity Generation</a>	202 thousand MWh	3.9%	Jun-16	
<a href="#">Distributed (Small-Scale) Solar Photovoltaic Generation</a>	26 thousand MWh	1.5%	Jun-16	
<a href="#">Ethanol Production</a>	2,757 Thousand Barrels	0.8%	2014	
<b>Renewable Energy Consumption</b>	<b>Pennsylvania</b>	<b>U.S. Rank</b>	<b>Period</b>	<a href="#">find more</a>
<a href="#">Renewable Energy Consumption as a Share of State Total</a>	5.5 %	38	2014	
<a href="#">Ethanol Consumption</a>	11,410 thousand barrels	6	2014	
<b>Total Emissions</b>	<b>Pennsylvania</b>	<b>Share of U.S.</b>	<b>Period</b>	<a href="#">find more</a>
<a href="#">Carbon Dioxide</a>	244.0 million metric tons	4.6%	2013	
<b>Electric Power Industry Emissions</b>	<b>Pennsylvania</b>	<b>Share of U.S.</b>	<b>Period</b>	<a href="#">find more</a>
<a href="#">Carbon Dioxide</a>	102,022 thousand metric tons	4.7%	2014	
<a href="#">Sulfur Dioxide</a>	270 thousand metric tons	7.7%	2014	
<a href="#">Nitrogen Oxide</a>	128 thousand metric tons	5.9%	2014	

**Analysis**

Last Updated: July 21, 2016



## Overview

Pennsylvania is a leading East Coast supplier of coal, natural gas, nuclear power, and refined petroleum products to its own industries and to the nation. The Appalachian Mountains have rich coal resources and run southwest to northeast through Pennsylvania, dividing the Ohio River valley in the west from the Susquehanna River and Delaware River valleys in the east.<sup>1</sup> Pennsylvania's largest metropolitan areas are Philadelphia on the Delaware River and Pittsburgh on the Ohio River.<sup>2</sup> The Marcellus Shale, the largest U.S. natural gas field, underlies about three-fifths of the state in an arc reaching from the southwest to the northeast.<sup>3,4</sup>

Pennsylvania's temperate climate varies from the southeast, where it is influenced by the Atlantic Ocean, to cooler areas near the Great Lakes in the northwest, where weather fronts often come from Canada.<sup>5</sup> Precipitation in the state is plentiful and evenly distributed throughout the year. Temperatures vary significantly among the four seasons.<sup>6</sup>

Pennsylvania's gross domestic product ranked sixth among the states in 2014.<sup>7</sup> The state is among the top 10 consumers of coal, natural gas, petroleum products, and electricity,<sup>8</sup> but its total energy consumption per capita is in the lower half of states nationwide.<sup>9</sup> The industrial sector leads energy consumption in the state.<sup>10</sup> Major energy-consuming industries include mining; steel, metals, and machinery manufacturing; chemical products; agriculture and food processing; and tourism.<sup>11,12,13</sup>

## Petroleum

Pennsylvania has long been the leading petroleum-refining state in the Northeast. Until 2011, the state's three largest refineries, clustered on the Delaware River around Philadelphia, represented half of the East Coast's refining capacity, supplying more than half the Northeast's ultra-low sulfur diesel (ULSD) and nearly half its heating oil and motor gasoline. Pipelines from the refineries transported products to other parts of Pennsylvania and to western New York state.<sup>14</sup> But the refineries processed primarily imported crude oil and struggled to compete when world crude oil prices rose. In 2012, new owners took over the two larger refineries and improved their economics with less expensive feedstock derived from U.S. shale, brought in mainly by rail.<sup>15,16,17,18</sup> The refineries now have infrastructure to take either railed or shipped crude oils.<sup>19</sup> One refinery, at Marcus Hook, was shut down, and the facility is being used as a refined products terminal.<sup>20</sup> Natural gas liquids storage and processing capability were added at that terminal.<sup>21</sup> Two small refineries are located in northwestern Pennsylvania. One processes crude oil received by pipeline from Canada,<sup>22,23</sup> and the other processes crude oils from Pennsylvania and neighboring states.<sup>24,25</sup>

Pennsylvania, site of the first commercial oil well in 1859, continues to produce modest amounts of crude oil, mainly paraffin-based crude oil used for lubricants.<sup>26</sup> In addition to petroleum products from local refineries, Pennsylvania receives refined products by the Colonial Pipeline from Texas and by tanker and rail from the Gulf of Mexico.<sup>27</sup> Refined products are also imported from Canada, Latin America, Europe, and Africa.<sup>28</sup>

Nearly one in five Pennsylvania households rely on distillate fuel oils for home heating, making Pennsylvania,<sup>29</sup> like much of the U.S. Northeast, potentially vulnerable to distillate fuel oil shortages and price spikes. After severe weather threatened regional shortages during the winter of 2000, the federal government created the Northeast Home Heating Oil Reserve to avert future shortages in the Mid-Atlantic and New England states. In 2011, the government converted the reserve to ULSD, which has less than 15 parts per million (ppm) of sulfur, to correspond with decisions made by several northeastern states to begin requiring either low-sulfur diesel, with 15 ppm to 500 ppm sulfur, or ULSD for heating.<sup>30</sup> In 2012, Pennsylvania delayed its ULSD requirements because of uncertainty about operations at state refineries that were

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a major ULSD source,<sup>31</sup> but, in 2016, the state joined most of the Northeast in requiring low-sulfur heating oil.<sup>32</sup>

To reduce emissions of smog-forming pollutants, motorists in the heavily populated areas of southeastern Pennsylvania, including Philadelphia, are required to use reformulated motor gasoline blended with ethanol. Drivers in the Pittsburgh, Pennsylvania, area must use a low-vapor-pressure motor gasoline blend in summer.<sup>33</sup>

## Natural gas

Pennsylvania's natural gas production was more than eight times larger in 2015 than in 2010 because of development of the Marcellus Shale.<sup>34</sup> Gross natural gas production exceeded 4.7 trillion cubic feet in 2015 and made the state the second largest natural gas producer in the nation, after Texas.<sup>35</sup> Pennsylvania is also second only to Texas in estimates of proved natural gas reserves, which quadrupled from 2010 to 2014.<sup>36</sup> The Marcellus Shale, which extends under parts of Pennsylvania, West Virginia, New York, Ohio, and Maryland, has the largest estimated proved reserves of any U.S. natural gas field.<sup>37</sup>

Until recently, Pennsylvania depended on interstate pipelines from the Gulf Coast to supply natural gas, but, with Marcellus Shale production, the state can meet its own demand. Pipelines are being reconfigured to send natural gas from Pennsylvania to the Midwest and the Gulf Coast.<sup>38,39,40</sup> New infrastructure, mainly pipelines to transport Marcellus output from wells to interstate natural gas transmission systems, is also being built.<sup>41</sup> The state has some transmission pipeline infrastructure in the west, the legacy of an earlier era when western Pennsylvania, western New York, and West Virginia comprised the nation's largest natural gas-producing region.<sup>42</sup> Pennsylvania's underground natural gas storage capacity is among the largest in the nation.<sup>43</sup>

Pennsylvania is experiencing parallel growth in the production of natural gas liquids (NGL), including ethane and propane.<sup>44,45</sup> Natural gas processing in the state grew more than five-fold from 2010 to 2014,<sup>46</sup> and producers are building both processing plants to extract NGLs and pipelines to transport them to domestic and Canadian markets and to ports on the East Coast and Gulf Coast for export.<sup>47,48,49,50</sup> Pennsylvania's first ethane cracker, which makes feedstocks for plastics manufacturing from ethane, is in development.<sup>51</sup>

Half of all households in Pennsylvania use natural gas as their primary heating fuel,<sup>52</sup> but electric power sector consumption has grown rapidly in recent years to surpass the residential sector as the state's largest natural gas consumer. The electric power sector uses nearly two-fifths of all natural gas consumed in the state. The residential sector and the industrial sector each consume slightly less than one-fourth.<sup>53</sup>

## Coal

Pennsylvania is one of the five largest coal-producing states in the nation.<sup>54</sup> The state hosts the two most productive coal mines east of the Mississippi River.<sup>55</sup> Pennsylvania has been home to coal mining for more than 200 years and, in the western half of the state, still has substantial reserves of bituminous coal, which is used to generate electricity and to produce coke for steelmaking.<sup>56,57,58</sup>

Although northeast Pennsylvania has virtually all the nation's reserves of anthracite coal, anthracite accounts for a minimal share of the state's total coal production.<sup>59,60</sup> Anthracite, which has a higher heat value than other kinds of coal and burns with little soot, is used primarily in space heating.<sup>61</sup>

Pennsylvania is also among the nation's major coal consumers.<sup>62</sup> Nearly five-sixths of the coal consumed in the state is

*The Marcellus Shale has made Pennsylvania the nation's second-largest natural gas-producing state.*

burned for electricity generation, and the remaining one-sixth is consumed for steelmaking and other industrial uses.<sup>63</sup> Large volumes of coal are moved by rail, barge, and truck into and out of Pennsylvania and around the state. In 2014, about 80% of Pennsylvania-mined coal was used domestically for electricity generation, about two-fifths in-state and three-fifths in other states throughout the East and Midwest.<sup>64</sup> Pennsylvania electricity generators and industries brought in nearly half of the coal they consumed from nearby states.<sup>65</sup> In 2014, about one-eighth of the coal mined in Pennsylvania was exported to other nations, but, in recent years, exports have reached as much as one-fourth of state output. Pennsylvania is among the nation's leading coal exporting states.<sup>66,67</sup>

## Electricity

Pennsylvania is one of the top three electricity-generating states in the nation, along with Texas and Florida. Electricity generation regularly exceeds in-state consumption, making the state an important electricity supplier to the Mid-Atlantic region.<sup>68</sup> Per capita electricity consumption is below the national average.<sup>69</sup> The residential sector is the largest consumer of electricity, using more than one-third of the power consumed in the state.<sup>70,71</sup> One in five Pennsylvania households use electricity as their primary heating source.<sup>72</sup>

The regional electricity grid is managed by the PJM Interconnection,<sup>73</sup> and the state wholesale power market is supplied with electricity almost entirely by independent power producers.<sup>74</sup> With the increased availability of economic natural gas, the proportion of Pennsylvania's net generation from coal is declining, and the share from natural gas is growing. In 2005, coal provided more than half of the state's net generation, and natural gas, less than 5%.<sup>75</sup> By 2015, coal had declined to three-tenths of net generation, and natural gas generated more than one-fourth.<sup>76</sup>

Pennsylvania ranks second in the nation, after Illinois, in nuclear generating capacity, and nuclear power is the state's largest source of generation. The state's five nuclear stations have provided more than one-third of net electricity generation in recent years.<sup>77</sup> Pennsylvania is the site of the first commercial U.S. nuclear power plant, which came online at Shippingport in 1957. It operated for 25 years and was shut down in 1982.<sup>78</sup> The state is also the site of the nation's most serious nuclear power accident, a partial core meltdown at Three Mile Island Unit 2 in 1979. That accident led to sweeping changes in U.S. nuclear regulation and operating standards.<sup>79</sup>

## Renewable energy

Pennsylvania obtains about 4% of its net electricity generation from renewable sources.<sup>80</sup> Until recently, renewable electricity came mostly from hydroelectric and biomass power plants,<sup>81</sup> but wind power has grown to provide two-fifths of renewable electricity generation, making it the state's largest renewable source.<sup>82</sup> Appalachian Mountain crests, mainly in Pennsylvania's southwest but also in the northeast, have wind resources suitable for commercial power production.<sup>83</sup> Pennsylvania's first commercial wind farm started generating electricity in 2000, and the state now has 24 operating wind farms.<sup>84,85</sup>

Hydropower and biomass each provide about three-tenths of Pennsylvania's renewable electricity.<sup>86</sup> The state's hydroelectric facilities average nearly 60 years old.<sup>87</sup> Some of them have been modernized and upgraded for more efficient operation.<sup>88,89</sup> Biomass generation comes mainly from municipal solid waste and landfill gas.<sup>90</sup> Pennsylvania is among the top dozen states in the nation using biomass for electricity generation.<sup>91</sup>

*Pennsylvania is one of the top three generators of electricity in the nation.*

*Wind generation has surpassed hydropower to become Pennsylvania's largest source of renewable energy.*

Although solar energy still produces substantially less than 1% of the state's net electricity generation, the number of solar photovoltaic (PV) installations in Pennsylvania is increasing. Solar PV is the choice of most customers generating power into the Pennsylvania electric grid.<sup>92</sup> In 2015, more than two-thirds of net solar generation came from distributed (customer-sited) generating facilities, such as rooftop solar PV, with capacities smaller than 1 megawatt.<sup>93</sup> A number of large businesses have turned to rooftop solar PV for their power supplies.<sup>94</sup> The state's largest solar PV facility is 10 megawatts.<sup>95</sup>

Pennsylvania's alternative energy portfolio standards (AEPS), being phased in from 2007 to 2021, require 18% of electricity provided by generation and distribution companies to come from renewable sources by 2021, with at least 0.5% from solar power.<sup>96</sup> Among the resources Pennsylvania recognizes as meeting part of its AEPS requirements are byproducts of pulping and wood manufacturing, coal mine methane, and waste coal.<sup>97</sup> The state also requires investor-owned utilities doing business in the state to undertake energy efficiency measures to reduce peak demand and electricity consumption, which may include helping customers to install solar and geothermal technologies. The Pennsylvania Public Utility Commission reviews efficiency progress and adjusts goals as needed.<sup>98,99</sup>

## Endnotes

- <sup>1</sup> NETSTATE, Pennsylvania, The Geography of Pennsylvania, updated February 25, 2016.
- <sup>2</sup> U.S. Census Bureau, American FactFinder, Table: PEPANNRES, State: Pennsylvania, Population Estimate by Counties, Annual Estimates of the Resident Population: April 1, 2010 to July 1, 2015, 2015 Population Estimates.
- <sup>3</sup> U.S. Energy Information Administration, Top 100 U.S. Oil and Gas Fields (March 2015), p. 4.
- <sup>4</sup> Pennsylvania Independent Oil & Gas Association, The Marcellus Shale: Pennsylvania's Home-Grown Energy Source, accessed June 8, 2016.
- <sup>5</sup> City-data.com, Pennsylvania Climate, accessed June 8, 2016.
- <sup>6</sup> Knight, Paul, "Pennsylvania: Where It Can Rain on Everyone's Parade..." Community Collaborative Rain, Hail & Snow Network, State Climate Series, accessed June 8, 2016.
- <sup>7</sup> U.S. Bureau of Economic Analysis, Regional Data, GDP & Personal Income, Begin using the data, GDP in current dollars, NAICS, All industries total, Alabama to Wyoming, 2014.
- <sup>8</sup> U.S. Energy Information Administration, State Energy Data System, Table C11, Energy Consumption Estimates by Source, Ranked by State, 2014.
- <sup>9</sup> U.S. Energy Information Administration, State Energy Data System, Table C13, Energy Consumption Estimates Per Capita by End-Use Sector, Ranked by State, 2014.
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## Other Resources

### Energy-Related Regions and Organizations

- [Coal Region: Appalachian](#)
- [Regional Transmission Organization \(RTO\): PJM Interconnection \(PJM\)](#)
- [Petroleum Administration for Defense District \(PADD\): 1B](#)
- [North American Electric Reliability Corporation \(NERC\) Region: Reliability First Corporation \(RFC\)](#)

### Other Websites

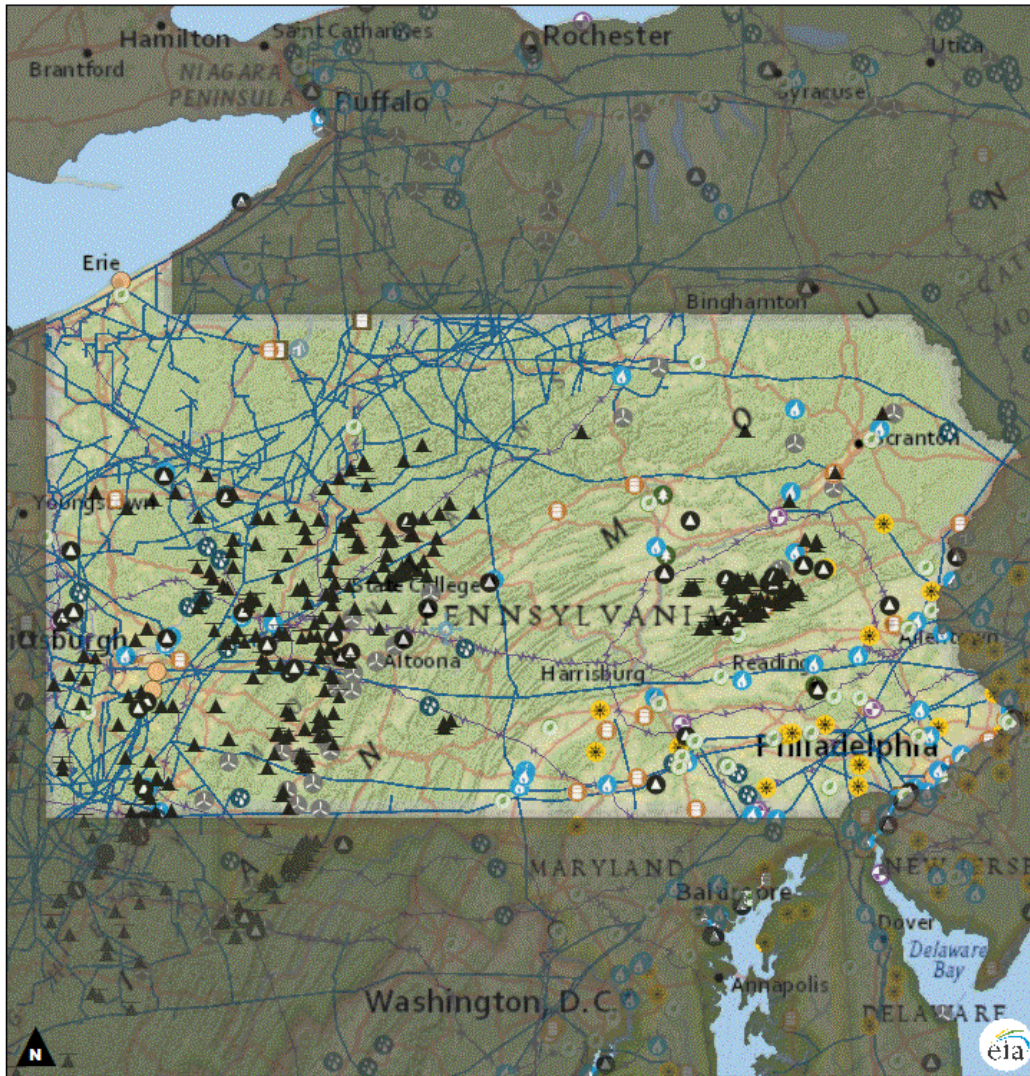
- [Pennsylvania Public Utility Commission](#)
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- [Pennsylvania Governor's Green Government Council](#)
- [Alternative Fuels and Advanced Vehicle Data Center - Federal and State Incentives and Laws](#)
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- [DSIRE - Database of State Incentives for Renewables and Efficiency](#)
- [National Association of Regulatory Utility Commissioners \(NARUC\)](#)
- [National Association of State Energy Officials \(NASEO\)](#)
- [National Conference of State Legislatures \(NCSL\)-Issues and Research - News Highlights: Issues and Research - Energy](#)
- [National Renewable Energy Laboratory \(NREL\)-Dynamic Maps, Geographic Information System \(GIS\) Data and Analysis Tools - Maps](#)
- [U.S. Geological Survey \(USGS\) Maps, Imagery, and Publications - Maps](#)

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States:Electricity Transmission Lines - Ventyx, Velocity Suite;Grey Base:National

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|--------------------------|----------------------------------|-------------------------------|
| ■ 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 |

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