

2020 State Energy Report

The following report is provided by the Iowa Economic Development Authority (IEDA) as a summary of key energy data and trends from 2020. The State Energy Office, housed at IEDA, implements a variety of programs providing grant and loan assistance, produces reports and studies to further energy innovation and advancements, and serves as a resource to public and private stakeholders.

The 2020 report consists of the following sections:

Appendix 1 Iowa State Energy Profile: Excerpts from a database sponsored by the U.S. Energy Information Administration (EIA), a division within the U.S. Department of Energy that serves as a comprehensive source of energy information. EIA collects, analyzes, and disseminates a wide range of energy information that is updated periodically and available through the following website: <https://www.eia.gov/state/analysis.php?sid=IA>.

Appendix 2 Additional Sources of Energy Related Data: A listing of other sources of information relevant to energy supply and demand in the State.

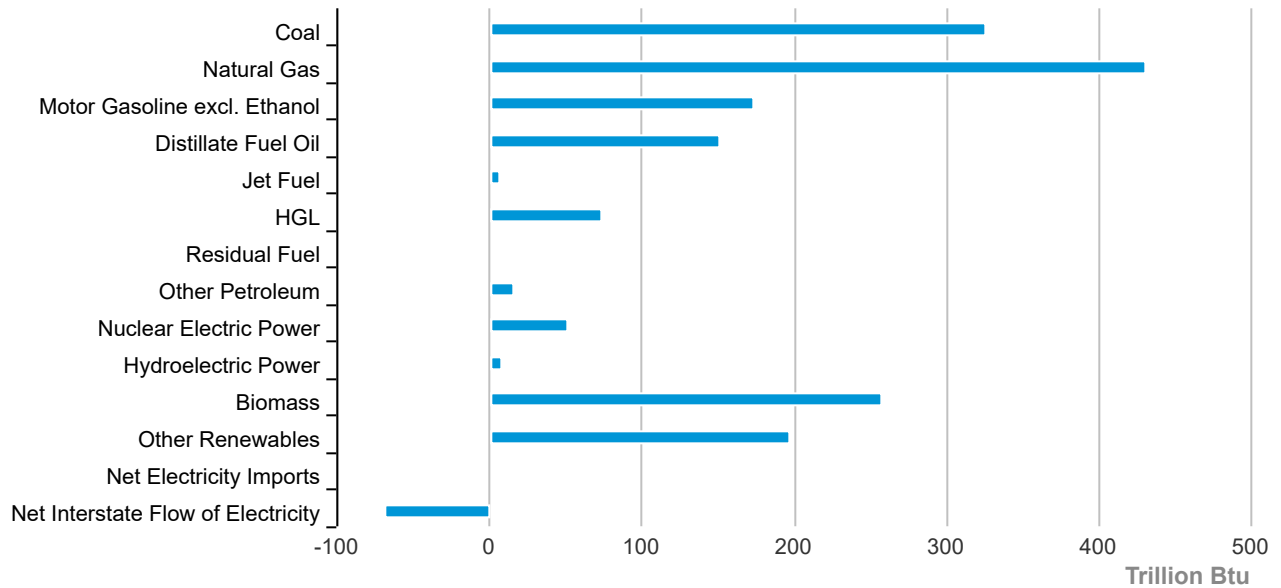
Appendix 1: Iowa State Energy Profile

Iowa Quick Facts

- Iowa is the nation's largest fuel ethanol and biodiesel producer, accounting for one-fourth of U.S. fuel ethanol production capacity and one-fifth of biodiesel manufacturing capacity.
- Iowa's nearly 5,100 wind turbines generated 42% of the state's electricity in 2019, the highest wind power share for any state.
- In 2019, wind turbines generated more electricity in Iowa than coal-fired power plants for the first time, as coal's share of net generation in the state declined by more than half over the past decade to 35%.
- Iowa is the only non-crude oil-producing state among the top 5 energy-consuming states on a per capita basis, due to Iowa's relatively small population along with its energy-intensive manufacturing and agricultural sectors.
- In 2018, Iowa was the fourth-largest consumer of hydrocarbon gas liquids, mostly propane--which is used for drying the state's large harvested corn crop and for heating one in eight Iowa households.

Last Updated: May 21, 2020

Iowa Energy Consumption Estimates, 2018



Source: Energy Information Administration, State Energy Data System

Data

Last Update: December 17, 2020 | **Next Update:** January 21, 2021

Energy Indicators

Demography	Iowa	Share of U.S.	Period
Population	3.2 million	1.0%	2019
Civilian Labor Force	1.6 million	1.0%	Nov-20
Economy	Iowa	U.S. Rank	Period
Gross Domestic Product	\$ 194.8 billion	30	2019
Gross Domestic Product for the Manufacturing Sector	\$ 33,926 million	25	2019
Per Capita Personal Income	\$ 52,636	27	2019
Vehicle Miles Traveled	33,282 million miles	31	2018
Land in Farms	30.6 million acres	10	2017
Climate	Iowa	U.S. Rank	Period
Average Temperature	46.8 degrees Fahrenheit	34	2019
Precipitation	41.6 inches	30	2019

Prices

Petroleum	Iowa	U.S. Average	Period	find more
Domestic Crude Oil First Purchase	--	\$ 36.46 /barrel	Oct-20	
Natural Gas	Iowa	U.S. Average	Period	find more
City Gate	\$ 3.23 /thousand cu ft	\$ 3.47 /thousand cu ft	Oct-20	find more
Residential	\$ 9.72 /thousand cu ft	\$ 12.35 /thousand cu ft	Oct-20	find more
Coal	Iowa	U.S. Average	Period	find more
Average Sales Price	--	\$ 36.07 /short ton	2019	
Delivered to Electric Power Sector	\$ 1.46 /million Btu	\$ 1.91 /million Btu	Oct-20	
Electricity	Iowa	U.S. Average	Period	find more
Residential	12.51 cents/kWh	13.60 cents/kWh	Oct-20	find more
Commercial	8.89 cents/kWh	10.73 cents/kWh	Oct-20	find more
Industrial	5.53 cents/kWh	6.72 cents/kWh	Oct-20	find more

Reserves

Reserves	Iowa	Share of U.S.	Period	find more
Crude Oil (as of Dec. 31)	--	--	2019	find more
Expected Future Production of Dry Natural Gas (as of Dec. 31)	--	--	2019	find more
Expected Future Production of Natural Gas Plant Liquids	--	--	2019	find more
Recoverable Coal at Producing Mines	--	--	2019	find more
Rotary Rigs & Wells	Iowa	Share of U.S.	Period	find more
Natural Gas Producing Wells	--	--	2019	find more
Capacity	Iowa	Share of U.S.	Period	
Crude Oil Refinery Capacity (as of Jan. 1)	--	--	2019	
Electric Power Industry Net Summer Capacity	20,861 MW	1.9%	Oct-20	

Supply & Distribution

Production	Iowa	Share of U.S.	Period	find more
Total Energy	888 trillion Btu	0.9%	2018	find more
Crude Oil	--	--	Oct-20	find more
Natural Gas - Marketed	--	--	2019	find more
Coal	--	--	2019	find more
Total Utility-Scale Net Electricity Generation	Iowa	Share of U.S.	Period	find more
Total Net Electricity Generation	4,715 thousand MWh	1.5%	Oct-20	
Utility-Scale Net Electricity Generation (share of total)	Iowa	U.S. Average	Period	
Petroleum-Fired	NM	0.3 %	Oct-20	find more
Natural Gas-Fired	11.0 %	41.9 %	Oct-20	find more
Coal-Fired	17.0 %	19.0 %	Oct-20	find more
Nuclear	0 %	18.9 %	Oct-20	find more
Renewables	71.4 %	19.3 %	Oct-20	
Stocks	Iowa	Share of U.S.	Period	find more

Supply & Distribution

Motor Gasoline (Excludes Pipelines)	255 thousand barrels	1.4%	Oct-20	
Distillate Fuel Oil (Excludes Pipelines)	1,562 thousand barrels	1.2%	Oct-20	find more
Natural Gas in Underground Storage	272,563 million cu ft	3.3%	Oct-20	find more
Petroleum Stocks at Electric Power Producers	106 thousand barrels	0.4%	Oct-20	find more
Coal Stocks at Electric Power Producers	7,106 thousand tons	5.3%	Oct-20	find more
Fueling Stations	Iowa	Share of U.S.	Period	
Motor Gasoline	1,745 stations	1.5%	2018	
Propane	34 stations	1.2%	2020	
Electricity	143 stations	0.6%	2020	
E85	294 stations	8.2%	2020	
Compressed Natural Gas and Other Alternative Fuels	20 stations	1.7%	2020	

Consumption & Expenditures

Summary	Iowa	U.S. Rank	Period	
Total Consumption	1,616 trillion Btu	24	2018	find more
Total Consumption per Capita	513 million Btu	5	2018	find more
Total Expenditures	\$ 15,603 million	28	2018	find more
Total Expenditures per Capita	\$ 4,956	6	2018	find more
by End-Use Sector	Iowa	Share of U.S.	Period	
Consumption				
» Residential	247 trillion Btu	1.2%	2018	find more
» Commercial	198 trillion Btu	1.1%	2018	find more
» Industrial	868 trillion Btu	2.6%	2018	find more
» Transportation	303 trillion Btu	1.1%	2018	find more
Expenditures				
» Residential	\$ 2,819 million	1.1%	2018	find more
» Commercial	\$ 1,816 million	0.9%	2018	find more
» Industrial	\$ 4,607 million	2.2%	2018	find more

Consumption & Expenditures

» Transportation	\$ 6,361 million	1.1%	2018	find more
by Source	Iowa	Share of U.S.	Period	
Consumption				
» Petroleum	89 million barrels	1.2%	2018	find more
» Natural Gas	437 billion cu ft	1.4%	2019	find more
» Coal	19 million short tons	2.7%	2018	find more
Expenditures				
» Petroleum	\$ 8,531 million	1.1%	2018	find more
» Natural Gas	\$ 2,291 million	1.5%	2019	find more
» Coal	\$ 556 million	1.9%	2018	find more
Consumption for Electricity Generation	Iowa	Share of U.S.	Period	find more
Petroleum	15 thousand barrels	0.9%	Oct-20	find more
Natural Gas	3,434 million cu ft	0.4%	Oct-20	find more
Coal	452 thousand short tons	1.3%	Oct-20	find more
Energy Source Used for Home Heating (share of households)	Iowa	U.S. Average	Period	
Natural Gas	60.6 %	47.8 %	2019	
Fuel Oil	0.4 %	4.4 %	2019	
Electricity	23.7 %	39.5 %	2019	
Propane	12.9 %	4.8 %	2019	
Other/None	2.4 %	3.5 %	2019	

Environment

Renewable Energy Capacity	Iowa	Share of U.S.	Period	find more
Total Renewable Energy Electricity Net Summer Capacity	11,013 MW	4.4%	Oct-20	
Ethanol Plant Nameplate Capacity	4,519 million gal/year	26.0%	2020	
Renewable Energy Production	Iowa	Share of U.S.	Period	find more
Utility-Scale Hydroelectric Net Electricity Generation	49 thousand MWh	0.3%	Oct-20	

Environment

Utility-Scale Solar, Wind, and Geothermal Net Electricity Generation	3,303 thousand MWh	8.7%	Oct-20	
Utility-Scale Biomass Net Electricity Generation	16 thousand MWh	0.4%	Oct-20	
Small-Scale Solar Photovoltaic Generation	16 thousand MWh	0.5%	Oct-20	
Fuel Ethanol Production	100,127 thousand barrels	26.1%	2018	
Renewable Energy Consumption	Iowa	U.S. Rank	Period	find more
Renewable Energy Consumption as a Share of State Total	29.0 %	8	2018	
Fuel Ethanol Consumption	4,239 thousand barrels	28	2018	
Total Emissions	Iowa	Share of U.S.	Period	find more
Carbon Dioxide	76.0 million metric tons	1.5%	2017	
Electric Power Industry Emissions	Iowa	Share of U.S.	Period	find more
Carbon Dioxide	28,989 thousand metric tons	1.7%	2019	
Sulfur Dioxide	27 thousand metric tons	2.1%	2019	
Nitrogen Oxide	24 thousand metric tons	1.8%	2019	

Analysis

Last Updated: May 21, 2020

Located between the Mississippi and Missouri rivers, Iowa's gently rolling plains have some of the richest farmland in the nation and significant renewable energy resources. The state's climate, with rainfall in the growing season and dry air at harvest, together with Iowa's deep topsoils, produce abundant grain crops.¹ The state leads the nation in the production of both corn and ethanol.^{2,3} Unobstructed winds blow across Iowa's open prairie, giving the state significant wind energy resources.⁴ With many days of sunshine each year, Iowa has solar energy potential as well.^{5,6} However, the state has few fossil energy reserves and no crude oil, natural gas or coal production.^{7,8,9,10}

On a per capita basis, Iowa is the only non-crude oil producing state among the top 5 total energy-consuming states. Iowa ranks fifth in the nation in energy use per capita, mainly because of the state's small population and its large industrial sector.¹¹ The industrial sector leads Iowa's end-use energy consumption, accounting for more than half of the state total.¹² Agriculture, food production, biofuels production, and manufacturing are key Iowa industries.¹³ Iowa ranks among the top 10 states in the nation in the share of gross domestic product (GDP) from manufacturing. Iowa's manufactured products include food and beverages; machinery; chemicals; computers and electronics; fabricated metals; motor vehicles and transportation equipment; and plastics and rubber

Manufacturing and agriculture help make Iowa the fifth-largest energy-consuming state

products.^{14,15} The transportation sector is the second-largest end-use energy consumer, accounting for about one-fifth of the state's total. Energy consumption is almost equally divided between the residential and commercial sectors, which together account for about one-fourth of the total state energy use.¹⁶

Renewable energy

Iowa is the leading ethanol-producing state in the nation and has one-fourth of U.S. fuel ethanol production capacity. The state's ethanol plants can produce nearly 4.5 billion gallons per year. Iowa's fertile cornfields provide the feedstock for most of the state's 42 ethanol plants.^{17,18,19} Iowa also leads the nation in biodiesel production. Its 10 biodiesel plants use soy oil, corn oil, vegetable oils, and animal fats as feedstocks. Those plants have a combined production capacity of 445 million gallons per year, which is almost one-fifth the nation's total capacity and the largest biodiesel production capacity of any state.^{20,21,22}

More than two-fifths of Iowa's electricity net generation comes from renewable resources, almost all of it from wind.²³ In 2019, the state was the third-largest wind power producer, after Texas and Oklahoma. Wind energy from about 5,100 turbines powered 42% of Iowa's net generation, the highest share of any state, as more wind power generating capacity came online.^{24,25,26} The strongest winds occur in northwestern Iowa, and although there are wind power generating sites

across the state, most of the wind farms are located in the state's northern and western areas.^{27,28}

In 2019, about 2% of Iowa's electricity net generation came from renewable energy resources other than wind. Biomass and solar energy each contributed a small amount the state's electricity, and almost all of the remaining renewable generation came from hydroelectric power.²⁹ The largest of Iowa's three hydroelectric power plants—the Keokuk plant with 15 turbine-generator units and 142 megawatts of generating capacity—is more than 100 years old and the largest privately-owned and operated dam and hydroelectric plant on the Mississippi River.^{30,31} The state's biomass resources include landfill gas and agricultural biodigesters that produce methane gas that fuels generating facilities. Iowa's biomass resources also provide feedstock to the state's one wood pellet plant, which can process wood waste into up to 15,000 tons of pellets annually.^{32,33,34,35} A small, but growing, amount of solar power in the state mostly comes from customer-sited, small-scale generating systems.³⁶ Iowa's best solar power resource potential is found in the southwestern corner of the state.³⁷

In 1983, Iowa became the first state in the nation to adopt a renewable portfolio standard (RPS). State regulators required Iowa's two investor-owned electric utilities to own or to contract for a combined total of 105 megawatts of generating capacity that was powered by renewable energy.³⁸ Capacity from eligible renewable resources has far exceeded the RPS goals. At the beginning of 2020, Iowa had about 10,400 megawatts of generating capacity fueled by renewable sources at utility-scale power facilities.³⁹

In 2008, state regulators also established energy efficiency standards for each regulated electric and natural gas utility in the state. Municipal and cooperative utilities were required to set their own energy efficiency goals. The utilities could increase efficiency and reduce consumption with improved infrastructure or through customer programs.⁴⁰ Since 2004, all electric utilities operating in the state have been required to offer their customers the option of purchasing alternative electricity supplies generated by wind, solar and other renewables. This program was designed to enable customers to support the development of renewable energy sources in the state.⁴¹

on a per capita basis.

Iowa produces more fuel ethanol and biodiesel than any other state in the nation.

About 42% of Iowa's electric net generation comes from wind, the largest share of any state.

Electricity

In 2019, wind turbines in Iowa generated more electricity than the state's coal-fired power plants for the first time. Coal generated 35% of the state's net electricity, down from 59% five years earlier. During the same period, wind power grew from 29% of the state's net generation to 42% in 2019. However, five of Iowa's 10 largest power plants by generating capacity are coal-fired, and only one wind farm is in the top 10.^{42,43}

Natural gas-fired power plants contributed 13% of Iowa's in-state generation in 2019, with total generation from natural gas reaching a record high. Nuclear power provided nearly 8% of the state's electricity generation.⁴⁴ Iowa's only nuclear power plant, the 601-megawatt Duane Arnold power plant, is the fourth-smallest operating nuclear power reactor in the nation.⁴⁵ The state's remaining 2% of generation came from hydropower, biomass, petroleum, and solar.⁴⁶

Since 2008, Iowa has generated more electricity each year than the state consumed.⁴⁷ Almost half of electricity retail sales in Iowa go to the industrial sector, nearly three-tenths of power sales are to the residential sector, and the commercial sector accounts for about one-fourth.⁴⁸ Iowa's average electricity price for all sectors is below the median price for the states.⁴⁹ About one in five Iowa households rely on electricity for home heating.⁵⁰

Petroleum

Iowa is not a crude oil-producing state and does not have any proved oil reserves.^{51,52} Of the more than 100 exploratory wells drilled in the state, only a handful ever produced oil. Those wells are no longer producing, and their combined production was less than 500 barrels of crude oil.^{53,54} Iowa does not have any oil refineries and relies on pipelines to bring petroleum products from other states.⁵⁵ Nearly 12,000 miles of petroleum product pipelines cross the state.⁵⁶

About two-fifths of the petroleum consumed in Iowa is used as motor gasoline.⁵⁷ Conventional motor gasoline without ethanol can be sold statewide in Iowa, although almost all U.S. gasoline is blended with at least 10% ethanol.^{58,59} Nearly 300 fueling stations in Iowa dispense E85, a blend of motor gasoline with 85% ethanol.^{60,61}

Iowa ranks fourth among the states in hydrocarbon gas liquids (HGL) consumption. About two-thirds of the HGL is consumed by the state's industrial sector, where propane is used by farmers to dry their corn after harvest in wet years.^{62,63} About one in eight Iowa households heats with propane, almost triple the national rate.⁶⁴

Iowa's residential sector consumption of propane is almost triple the national rate.

Coal

Coal mining began in Iowa in the 1840s and continued until the 1990s. Most of the coal mines were located in the southern half of the state and supplied the coal needed to run the railroads that first reached Iowa in the 1860s.⁶⁵ Today, there are no active coal mines in Iowa, but the state still has more than 1.1 billion tons of estimated recoverable coal reserves, located primarily in south-central Iowa.^{66,67}

Almost all of the coal consumed in Iowa is subbituminous coal brought by rail from Wyoming and delivered to power plants. A few small coal shipments from Wyoming and several other states are also delivered to Iowa's industrial, commercial, and institutional users.^{68,69} In 2018, Iowa ranked 15th among the states in the most coal use for electricity generation.⁷⁰

Natural gas

Iowa does not have any natural gas reserves or production, but the state is crossed by several interstate natural gas pipeline systems and has four natural gas storage fields that together account for about 3% of U.S. storage capacity.^{71,72,73,74} Natural gas enters Iowa by pipelines primarily from Minnesota, Nebraska, and Missouri. About four-

fifths of the natural gas that enters Iowa exists the state, and continues on to Illinois and Minnesota on its way to markets in those states and farther east.^{75,76,77}

Natural gas accounts for almost one-fifth of the total energy consumed in Iowa.⁷⁸ In 2018, 59% of the natural gas delivered to users in the state was consumed in the industrial sector. The residential sector, where 6 out of 10 households use natural gas as their primary heating fuel, accounted for about 16% of the natural gas delivered to consumers in Iowa. The commercial sector used 13%, and 11% of the natural gas consumed in Iowa was used for electric power generation.^{79,80}

Endnotes

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Other Resources

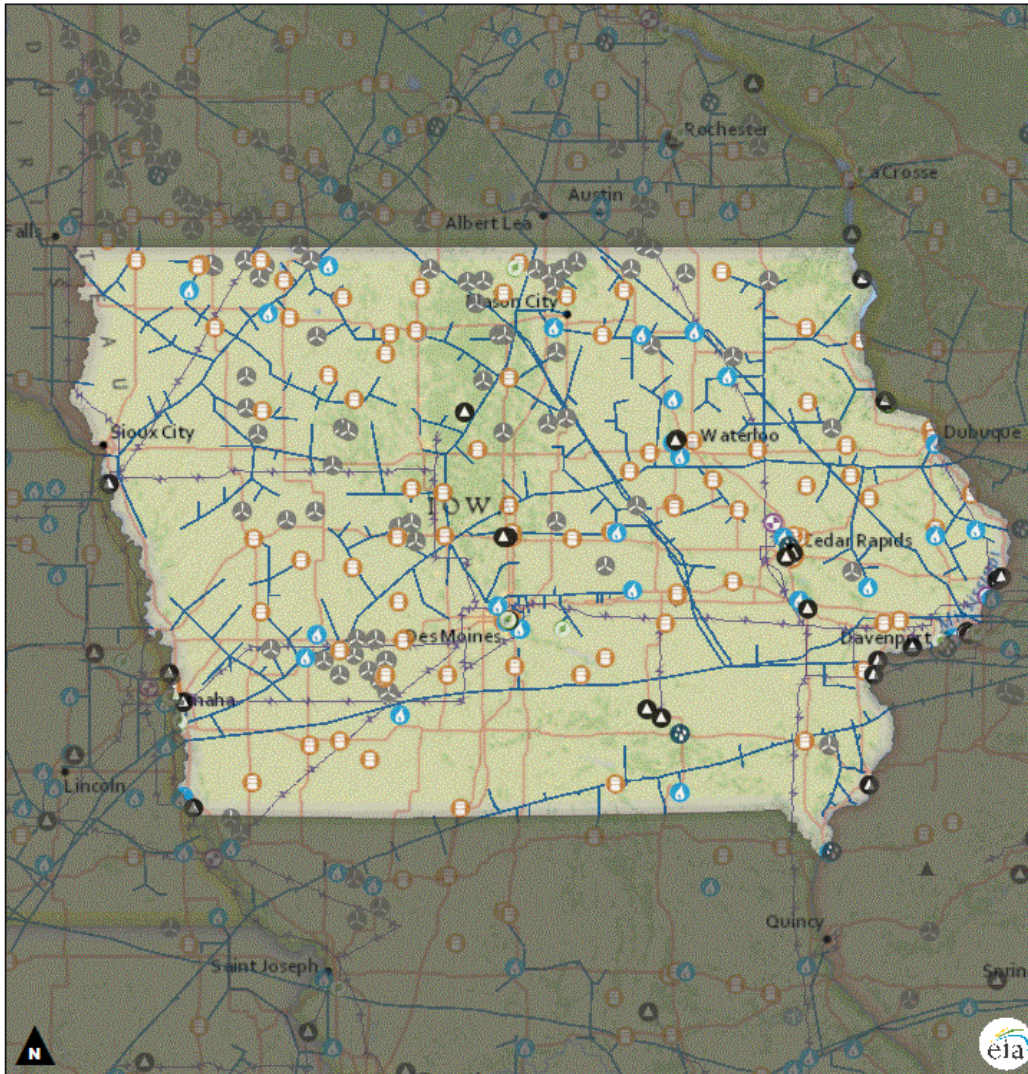
Energy-Related Regions and Organizations

- [Petroleum Administration for Defense District \(PADD\): 2](#)
- [North American Electric Reliability Corporation \(NERC\) Regional Entity: Midwest Reliability Organization \(MRO\)](#)
- [Regional Transmission Organization \(RTO\)/Independent System Operator \(ISO\): Midcontinent Independent System Operator \(MISO\), Southwest Power Pool \(SPP\)](#)

Other Websites

- [Iowa Economic Development, Energy Office](#)
- [Iowa Utilities Board](#)
- [Iowa Department of Human Rights, Division of Community Action Agencies, Low-Income Home Energy Assistance \(LIHEAP\)](#)
- [Iowa Department of Human Rights, Division of Community Action Agencies, Weatherization Assistance Program](#)
- [Iowa Department of Agriculture and Land Stewardship, Iowa Renewable Fuels Infrastructure Program](#)
- [Iowa Department of Natural Resources, Underground Storage Tanks](#)
- [Iowa Department of Natural Resources, Oil & Gas Regulation](#)
- [EIA Iowa Flickr Album](#)

- U.S. Department of Health and Human Services, Administration for Children and Families, Office of Community Services, Low Income Home Energy Assistance Program (LIHEAP)
- Alternative Fuels Data Center, Federal and State Laws and Incentives
- Benefits.Gov, Housing and Public Utilities
- NC Clean Technology Center, Database of State Incentives for Renewables and Efficiency (DSIRE)
- National Association of Regulatory Utility Commissioners (NARUC)
- National Association of State Energy Officials (NASEO)
- National Conference of State Legislatures (NCSL), Energy
- National Renewable Energy Laboratory (NREL), Geospatial Data Science
- U.S. Geological Survey (USGS), Publications
- Western Area Power Administration
- U.S. Geological Survey, Maps
- Lawrence Livermore National Laboratory, Energy Flow Charts
- EIA Status of U.S. Nuclear Outages
- U.S. Department of Energy, State and Local Energy Data (SLED)
- EIA Natural Gas Storage Dashboard



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

0 20 40 80 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/>

Appendix 2: Additional Sources of Energy Related Data

Weekly Fuel Report: The Iowa Department of Agriculture and Land Stewardship issues a weekly fuel report with data on current and trending prices of crude oil, motor fuels and heating fuels. To subscribe to the email release, contact Keely Coppess at Keely.Coppess@iowaagriculture.gov.

Propane Dashboard: The Iowa Propane Trends and Statistics website provides access to interactive dashboards and statistics as a public resource to increase visibility into key metrics that impact the current state of the propane supply chain in Iowa. It is designed to support effective communication between public and private sector stakeholders, to help identify potential risks with the supply chain and take proactive action to mitigate those risks and/or avoid a potential emergency. The website was launched as a result of the [Iowa Propane Supply Chain Optimization Strategy and Industry Working Group](#), and made available in cooperation with Iowa Department of Transportation and Iowa Department of Agriculture and Land Stewardship. See www.iowapropanestats.com.

Iowa Utilities Board (IUB): The IUB has regulatory authority over investor-owned utility (IOU) rates and other service issues. IUB authority is mostly limited to service, safety, and engineering issues for the rural electric cooperative (REC) and the municipal electric (Muni) utilities in Iowa. The IUB has very limited authority for non-utility generators.

Iowa Utility Electric Profile (2019)

UTILITY TYPE	# OF UTILITIES	# OF CUSTOMERS	% CUSTOMERS	MWH SALES ¹	% SALES
IOU	2	1,187,752	72.72%	38,250,383	73.91%
Muni	136	219,942	13.47%	6,036,853	11.66%
REC ²	43	225,703	13.82%	7,467,862	14.43%
Total	181	1,633,397	100.00%	51,755,098	100.00%

Notes: (1) IOU, Muni and REC totals exclude sales for resale. REC totals exclude sales to Generation & Transmission (G&T). (2) Amana Society Service Company is an investor-owned utility but it is not rate-regulated due to the number of customers it serves.

Source: [2019 Annual Utility Reports](#) (Form IE-1, Form EC-1, & Form ME-1)

For more information, see <https://iub.iowa.gov/iowas-electric-profile>

Electric Service Map: A map of electric service territories in the state is available at <https://iowadot.gov/maps/digital-maps/electrical/electrical>.

Database of State Incentives for Renewables and Efficiency: DSIRE is a comprehensive source of information on incentives and policies that support renewable energy and energy efficiency in the United States. <https://programs.dsireusa.org/system/program/ia>