



2010

Wisconsin Energy Statistics

Highlights

Wisconsin Office of Energy Independence

Acknowledgements

Wisconsin's State Energy Office, the Office of Energy Independence, has produced the annual *Wisconsin Energy Statistics* publication since 1976. This publication serves as a foundation for evaluating energy activities and trends in Wisconsin.

The Wisconsin Office of Energy Independence relies on many organizations, agencies and private businesses for the information needed to compile the statistics in this report. They include the Wisconsin Division of the American Automobile Association, the U.S. Department of Agriculture/National Agriculture Statistics Service, the U.S. Department of Commerce, and the U.S. Department of Energy/Energy Information Administration, Wisconsin's electric and gas utilities and the Public Service Commission of Wisconsin, the Wisconsin Departments of Administration; Agriculture Trade and Consumer Protection; Commerce; Workforce Development; Natural Resources; Revenue; and Transportation. Private businesses that have contributed data toward this publication include airport fixed base operators, Focus on Energy, landfill and wastewater treatment facilities, railroads, schools, and natural gas pipelines.

In producing this publication, overall leadership and guidance were provided by OEI's Executive Director, Judy Ziewacz. Holly Laux O'Higgins was responsible for natural gas, petroleum and transportation data, U.S. data, renewable energy, and expenditures. She also coordinated production of this publication. Jim Mapp prepared coal data and provided expertise from years of experience working with energy data. O'Higgins and Mapp worked together on electricity and energy efficiency data. The design and layout of this publication was created by Kari Hamann Design in Madison, Wisconsin.

Picture 1

The wind turbines are owned and operated by We Energies and are located at Blue Sky Green Field Wind Energy Center in Fond du Lac County. www.we-energies.com/environmental/bluesky_greenfield.htm. The photo is courtesy of We Energies.

Picture 2

Pellets made from biomass represent Wisconsin's biggest opportunity for renewable energy for all economic sectors. Photo courtesy of the Biomass Energy Resource Center.

Picture 3

The photo is of the Kingsford hydroelectric project, located on the Menominee River in Florence County, Wisconsin and Dickinson County, Michigan, with installed capacity of 7,200 kilowatts. Photo courtesy of We Energies.

Picture 4

The United Community Center's (UCC) 13-kilowatt, fixed-rack solar electric system includes more than 70 solar panels on the roof of the main administration building. The panels produce more than 16,000 kilowatt-hours each year. Students of Bruce-Guadalupe Community School at UCC can track energy savings online. The photo is courtesy of UCC.

Picture 5

The grazing cows represent an energy source compliments of Wisconsin's Dairy State status—cow manure. Manure digesters create methane burned to create electricity. Photo courtesy of the Wisconsin Farm Bureau Federation.

Picture 6

The vehicle being refuelled with E85 ethanol represents Wisconsin's largest home-grown contribution to renewable transportation fuels. Photo courtesy of the Office of Energy Independence.

2010 Wisconsin Energy Statistics

Office of Energy Independence

201 West Washington Avenue, 3rd Floor

Madison, WI 53703



Green Sector Makes “Green” for Wisconsin

Wisconsin has no natural gas, no coal, and no oil. Every year, we send \$12.5 billion out of state to power our homes, businesses and fuel our cars. Fortunately, through the efforts of the Wisconsin Office of Energy Independence, more of these dollars remain in-state resulting in economic growth, job creation and reduced dependence on imported fuels.

Since the inception of the Wisconsin Office of Energy Independence in 2007, significant progress has been made to: capture 10 percent of the emerging renewable energy and bioindustry market in Wisconsin by 2030; generate 25 percent of power and 25 percent of transportation fuels from renewable resources by 2025; and make Wisconsin a national leader in alternative energy research, with the assistance of Wisconsin's four-year university and technical college system.

In 2009, OEI received \$55 million in American Recovery and Reinvestment Act, State Energy Program funding to help Wisconsin businesses become more energy-efficient, assist factories to retool their lines to produce green energy products, and for the creation/retention of jobs. The funding definitely stimulated Wisconsin's economy—by leveraging more than \$145 million in private investments and creating/retaining more than 5,400 jobs in the state.

Plus, the growing number of green energy manufacturers and products, has increased the number of people trained in green technology production, installation and maintenance—a long-term investment in Wisconsin's green job sector.

When it comes to research, Wisconsin is on-track to becoming a leader. The Wisconsin Energy Institute (WEI) is currently under construction on the University of Wisconsin-Madison campus. The WEI will house the Wisconsin Bioenergy Institute, the Great Lakes Bioenergy Research Center, and will have space designated for alternative fuel research. In fact, the work conducted at WEI will unlock the potential of cellulosic biofuels, a clean renewable transportation fuel that could one day replace fossil fuels.

Wisconsin is reducing its dependence on imported fuels, increasing investments in business efficiencies and putting the people of this great state to work. The green sector is making “green” for the state of Wisconsin.

Businesses participating in the program include:

- **Montchevre´-Betin** in Belmont installed a whey and waste water digester.
- **Frito-Lay** in Beloit installed a biomass boiler.
- **Helios USA** in Milwaukee manufactures photovoltaic panels.
- **Idle Free Systems** in Watertown manufactures hybrid idling technology.
- **Orion Energy Systems** in Manitowoc produces large-scale solar generation.
- **Renewegy** in Oshkosh manufactures mid-size 20 kW wind turbines.
- **Sun Power Biodiesel** in Cumberland expanded their biodiesel production.
- **ZBB** in Menomonee Falls produces advanced batteries.

Harvesting Energy Along Wisconsin's Roads



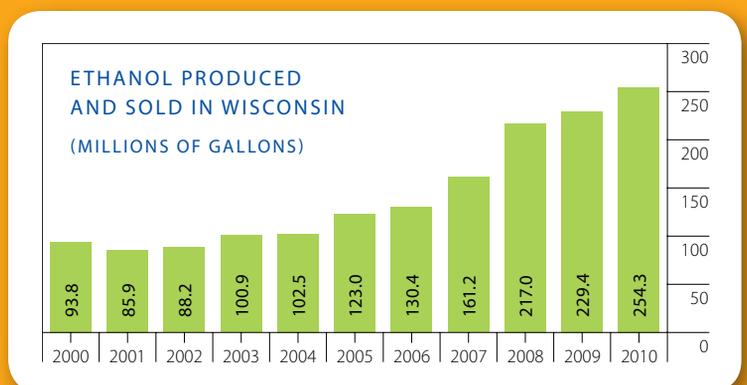
THE DITCHMASS PROJECT IS BEING UNDERTAKEN BY TWO AREA FARMERS, JAMIE DERR AND ROBERT DERR, THE FATHER-AND-SON OWNERS OF DERR SOLARMASS, LLC. THE PROJECT IS CURRENTLY IN OPERATION ALONG A THREE-MILE STRETCH OF HIGHWAY 151, BETWEEN SUN PRAIRIE AND COLUMBUS.

Grasses and weeds growing along highways and county roads are a common sight in Wisconsin. This plant growth is a costly hassle to maintain. However, depending on the results of a pilot project being jointly funded by Wisconsin's Office of Energy Independence and Department of Transportation, it could become a source of energy and revenue. Ditchmass, as these crops have been nicknamed, could potentially contribute to the state's usable biomass without competing for space with existing food crops.

A total of 35 large bales were harvested in November yielding approximately 2.07 tons/acre or 5.6 tons/mile. Core samples were taken from the bales and submitted for energy and chemical analysis. If this project is successful, the practice could be expanded to roadways around the state, adding to Wisconsin's biomass and biofuels production and creating a new revenue stream.

Biofuels Production

Biofuels production in Wisconsin has soared since 2002. Wisconsin is 9th in the nation in ethanol production. In 2010, of the 254.3 million gallons of ethanol sold in Wisconsin, 80.4 percent was produced in Wisconsin. Also in 2010, 94.7 percent of all gasoline sold in the state was blended with at least 10 percent ethanol. Wisconsin is home to four biodiesel production facilities producing an estimated 8 million gallons in 2010.



Conserve Wisconsin

LEADERSHIP IN ENERGY EFFICIENCY &

Leadership in Energy and Environmental Design (LEED) Ratings of State Facilities

LEED—Leadership in Energy and Environmental Design—is a green building program that is an internationally recognized system for providing third-party verification that a building was designed, built and maintained using strategies aimed at improving performance in energy savings, water efficiency, CO₂ emissions reduction, improved indoor environmental quality, among other metrics.

LEED uses a rating system to classify different levels of efficiency. From most to least efficient, the ratings are: Platinum, Gold, Silver and Certified and covers new construction (NC) and existing buildings operations and maintenance (EBOM).

Twenty-three state building projects are under evaluation for a LEED-NC Silver or higher rating, as well as two existing state buildings (LEED-EBOM): the DNR headquarters in Madison and the state office building in LaCrosse.

Overall Energy Performance

The 71.5 million gross square feet owned and leased by the State of Wisconsin saw a 10 percent energy reduction in Btu/GSF for the period of July 1, 2009 through June 30, 2010. The reduction uses a baseline set during the July 1, 2004 to June 30, 2005 period. The University of Wisconsin–Green Bay was a high achiever with a 30 percent gross energy reduction.

Renewable Energy

The Division of State Facilities (DSF) has purchased 10 percent, 92,400 MWhs, of the state's electricity from renewable sources allowing the State of Wisconsin to be an EPA Green Power Partner. In December 2010, the state added another 64,000 MWh from the new Shirley Wind Farm, increasing the state's renewable energy purchase to 16 percent of overall electricity purchases. Construction of this new wind farm generated approximately 200 local jobs.



PHOTO COURTESY OF MADISON GAS & ELECTRIC.

Other renewable energy efforts in state facilities include:

- 10 kW solar photovoltaic system on the State Capitol and a solar hot water system at the Executive Residence.
- 25 kW solar photovoltaic system at the University of Wisconsin–Parkside and 30 kW solar photovoltaic system at State Fair Park.
- Solar hot water systems installed at two correctional institutions and an additional four solar hot water systems are planned for the University of Wisconsin–Oshkosh.
- DSF is studying the development of a large wind project at the University of Wisconsin–River Falls and a small anaerobic digester at the University of Wisconsin–Platteville.

THE GOAL OF CONSERVE WISCONSIN IS TO WORK WITH STATE AGENCIES AND THE UW SYSTEM TO MAXIMIZE ENERGY EFFICIENCY AND RENEWABLE ENERGY APPLICATIONS AT THEIR FACILITIES. THE ENERGY EFFICIENCY EFFORTS DESCRIBED HERE ARE INCLUDED ANNUALLY IN THE *STATE ENERGY USE REPORT* WHICH TRACKS STATE AGENCY ENERGY USE BACK TO 1973.

RENEWABLE ENERGY IN STATE FACILITIES

Sustainable Facilities Standards

DSF developed and implemented Sustainable Facilities Standards which mirror LEED – Leadership in Energy and Environmental Design with additional Wisconsin priorities such as the use of forest products. To keep staff current on the new Sustainable Facilities Standards, DSF conducted statewide training for all state agency staff. Agency staff will use an electronic worksheet to support its new Standards, which also require commissioning for all state projects.

Performance Contracting

To date, performance contracting is projected to save \$9 million—450,000 MMBtu and 37 million kWh annually. Efforts include:

- Lighting and steam trap upgrades at 79 state armories to save \$300,000 in annual energy costs.
- The University of Wisconsin–Madison has a six-phase approach to upgrading existing buildings and is projected to save \$5.7 million in annual energy costs.
- The University of Wisconsin–Milwaukee will upgrade 10 buildings for a projected annual energy savings of \$1.35 million.
- The University of Wisconsin–Oshkosh is planning multiple building upgrades for an estimated savings of \$195,000.

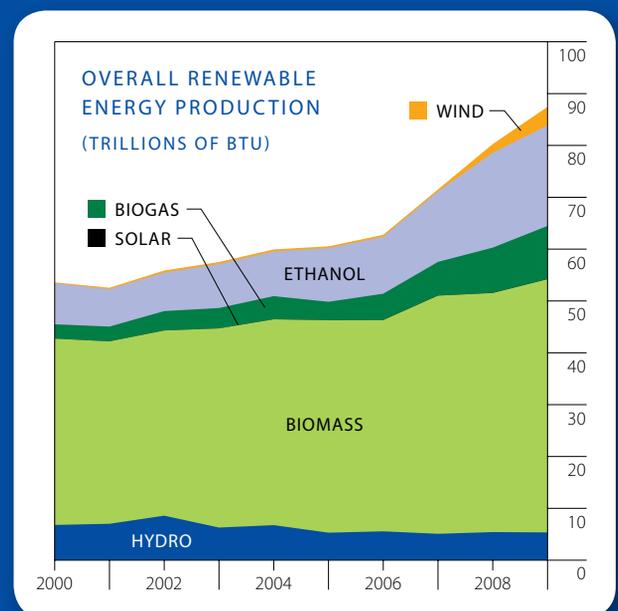
Other Energy Efficiency Projects

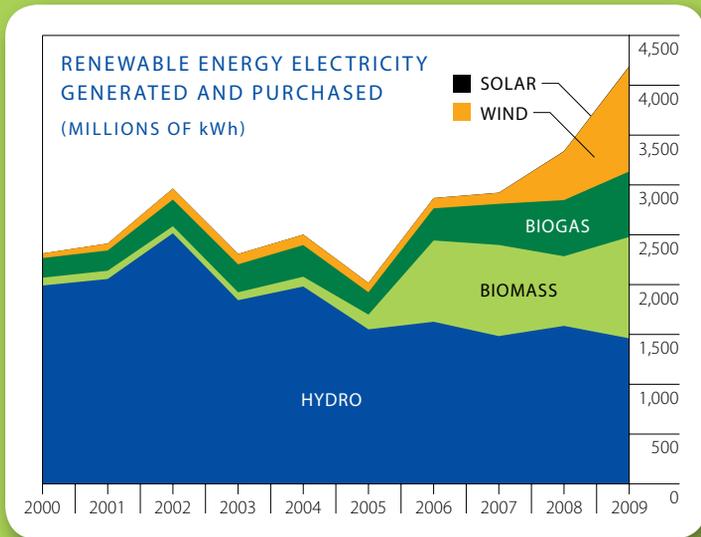
Additional energy efficiency efforts include:

- The PC Energy Management Software implemented at DOA resulted in a 10 percent reduction in computer electrical consumption, approximately \$4,000 per year in savings.
- All the lighting in the State Capitol and the Governor’s Residence was converted to Compact Fluorescent Lighting (CFLs), and motion sensors were installed in DOA parking garages.

Total Renewable Energy Use in Wisconsin

Total renewable energy use in Wisconsin has grown rapidly in the last 10 years. Even though Wisconsin has no coal, oil, or natural gas, our state does have cropland, fields, and forests from which we can develop energy sources, creating jobs in our state. In 2009, Wisconsinites spent almost \$18.7 billion on energy, of which an estimated \$12.5 billion left the state. By investing in our own energy supplies, Wisconsin will keep more of those energy dollars, and the jobs that come with it.





Wisconsin's Renewable Electricity Production

In 2009, Wisconsin's generation of electricity from renewable sources increased by 25.5 percent over 2008, approximately 6.36 percent of total electric sales in the state. The primary renewable energy source is hydropower (34.8 percent), followed by wind (25.1 percent), biomass (24.3 percent), biogas (15.7 percent) and solar (0.1 percent).

Shining New Light into Milwaukee's Menomonee Valley



HELIOS SOLAR PANEL MANUFACTURING FACILITY

With help from a \$1 million low-interest ARRA loan, Helios USA officially opened the first mono-crystalline solar panel factory in Wisconsin, placing the 21st-century industry on the map for Wisconsin.

Even before its manufacturing facility was up and running, Helios had a receptive market locally, nationally and internationally. Here in Wisconsin, Convergence Energy—which is building a solar project in Walworth County—contracted with Helios for their panels. Plus, other regional and national companies placed orders for panels even before the doors

opened. In fact, the global market for solar panels is so strong, that nearly half of all U.S.-built panels in 2009 and 2010 went overseas.

Helios' solar panels are made with high-impact tempered glass, meaning they are able to withstand a hailstone up to 1.5 inches in diameter. The panels also use super mono-crystalline solar cells, high performance technology that is appropriate for residential, commercial, industrial, and utility-based solar electric system applications. The panels are available in two sizes that can generate either 250 or 300 watts. Later this year, the company will produce a panel that generates 400 watts.



HELIOS IS PROUD TO BE BREATHING NEW LIFE INTO MILWAUKEE'S MEMOMONEE VALLEY—A THRIVING MEAT PROCESSING AND PACKING STOCKYARD IN THE LATE 1800s—AND TO USHER IN HIGH QUALITY, CLEAN ENERGY JOBS TO THE MARKET. CURRENTLY, 18 PEOPLE WORK IN THE MANUFACTURING FACILITY, AND HELIOS ANTICIPATES 50 FULL-TIME EMPLOYEES WILL BE ON BOARD ONCE THE SITE IS FULLY OPERATIONAL.

Renewegy Makes Wind Energy a Breeze

In 2010, Oshkosh-based Renewegy, introduced an innovative commercial wind turbine to the renewable energy market and the Wisconsin landscape.

With help from a \$500,000 loan from the U.S. Department of Energy's State Energy Program (SEP), administered by the Wisconsin Office of Energy Independence and the Wisconsin Department of Commerce, Renewegy has placed itself on the leading edge of wind turbine technology. What makes the Renewegy commercial turbine unique is its ability to be installed in a more urban environment such as in front of a business, school, university or farm to generate on-site power. Plus, the turbine never needs a crane. Instead, an advanced hydraulic system is able to raise and lower the 115-foot tower within eight minutes, saving costs and making installation and maintenance less complicated.

This convenience and high visibility is drawing interest from many Wisconsin businesses who want to illustrate their environmental commitment. SCA Tissue, JJ Keller & Associates, Bergstrom Automotive and Orion Energy Systems have installed Renewegy's wind turbines during the second half of 2010. Plus, an additional 13 units are scheduled for installation in northeastern Wisconsin.

This investment in renewable energy is leading to sales and more jobs for Wisconsin. In fact, two-year old Renewegy has grown to employ 16 workers and sources a majority of their components from Wisconsin suppliers who are benefiting from the growth in renewable energy.



Improving Air Quality One Fleet at a Time

To improve air quality in the ozone non-attainment area in southeastern Wisconsin, the Wisconsin Clean Transportation Program (WCTP) is funding 16 alternative fuel transportation projects in the region worth more than \$12 million.

The 16 projects located in Milwaukee, Waukesha, Ozaukee, Kenosha and Sheboygan counties consist of purchasing light-duty and heavy-duty alternative fuel vehicles such as: diesel hybrid-electric; plug-in hybrid-electric; compressed natural gas; propane and E85. In Milwaukee County, 35 light-duty hybrid vehicles are now on the road and are projected to save more than 4,400 gallons of petroleum, reduce 130 tons of greenhouse gas emissions and save more than \$14,000 in refueling costs per year.

By deploying more fuel-efficient and alternative fueled vehicles into the region, two of the primary sources that contribute to poor air quality—gasoline vapors and vehicle exhaust—will diminish. Plus, by replacing fossil-fuel vehicles with cleaner technology, the region is reducing its reliance on petroleum, supporting American jobs and saving money.

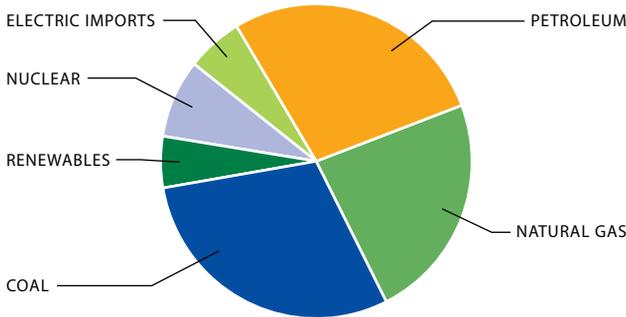
Wisconsin Resource Energy Consumption

Resource energy consumption decreased by 4.8 percent in 2009. Resource energy includes all energy resources used to generate electricity, including the energy content of the coal, petroleum, nuclear and renewable fuels.

TOTAL RESOURCE ENERGY CONSUMPTION: 1,681.1 TRILLION BTU

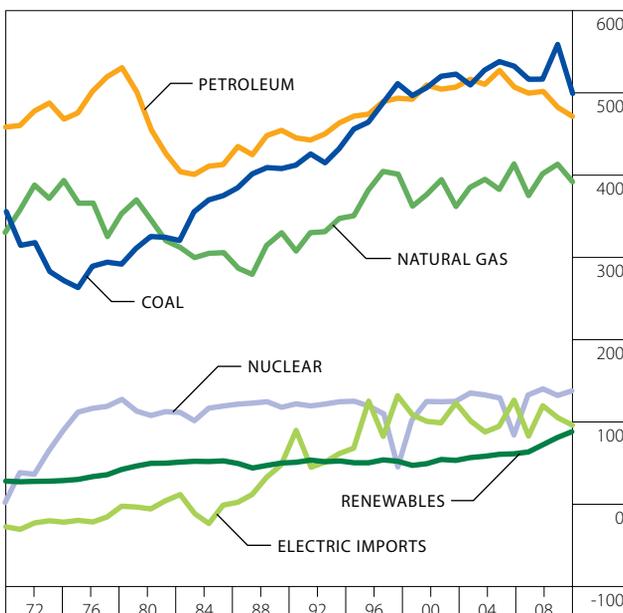
By Type of Fuel

2009 TRILLIONS OF BTU AND PERCENT OF TOTAL



Type of Fuel	2009 Trillions of Btu	2009 Percent of Total
Renewables	87.4	5.2%
Electric Imports	95.5	5.7%
Nuclear	137.0	8.1%
Natural Gas	391.4	23.3%
Petroleum	470.8	28.0%
Coal	499.0	29.7%

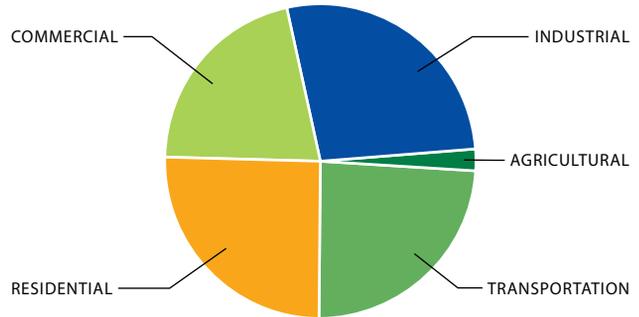
1970-2009 TRILLIONS OF BTU



Source: Wisconsin Office of Energy Independence.

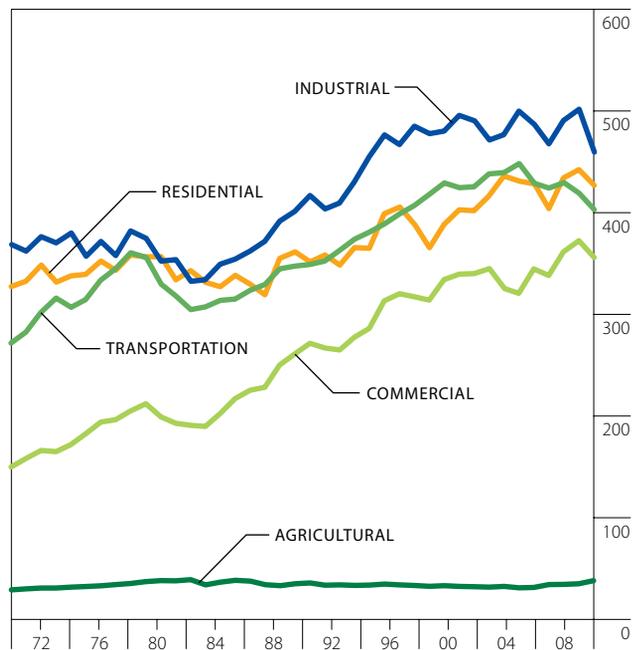
By Economic Sector

2009 TRILLIONS OF BTU AND PERCENT OF TOTAL



Economic Sector	2009 Trillions of Btu	2009 Percent of Total
Agricultural	37.5	2.2%
Commercial	355.4	21.1%
Transportation	402.6	23.9%
Residential	426.4	25.4%
Industrial	459.3	27.3%

1970-2009 TRILLIONS OF BTU



Source: Wisconsin Office of Energy Independence.

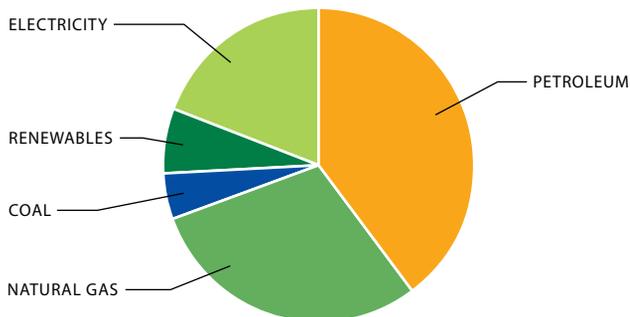
Wisconsin End-Use Energy Consumption

End-use energy increased by 4.0 percent overall in 2009. End-use energy is a measure of the energy content of fuels at the point of consumption.

TOTAL END-USE ENERGY CONSUMPTION: 1,177.3 TRILLION BTU

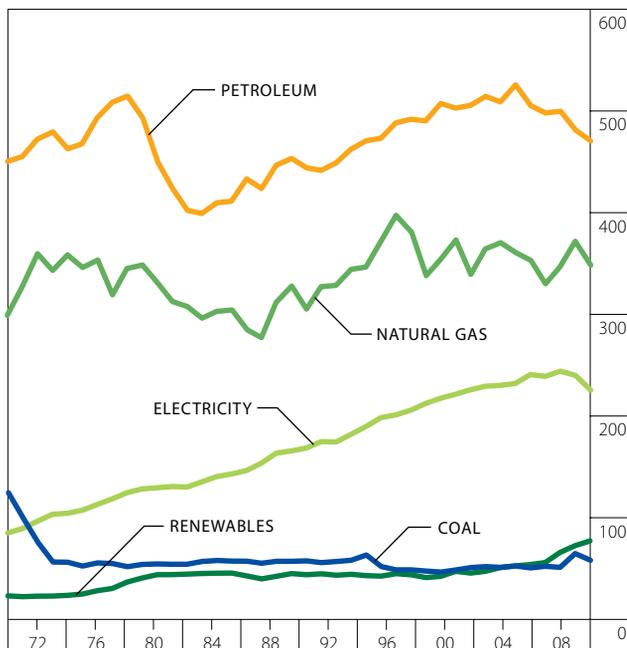
By Type of Fuel

2009 TRILLIONS OF BTU AND PERCENT OF TOTAL



Type of Fuel	2009 Trillions of Btu	2009 Percent of Total
Coal (non-utility)	57.6	4.9%
Renewables	76.6	6.5%
Electricity	225.0	19.1%
Natural Gas	348.0	29.6%
Petroleum	470.1	39.9%

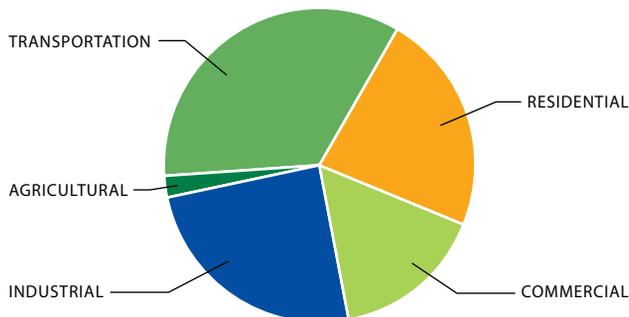
1970-2009 TRILLIONS OF BTU



Source: Wisconsin Office of Energy Independence.

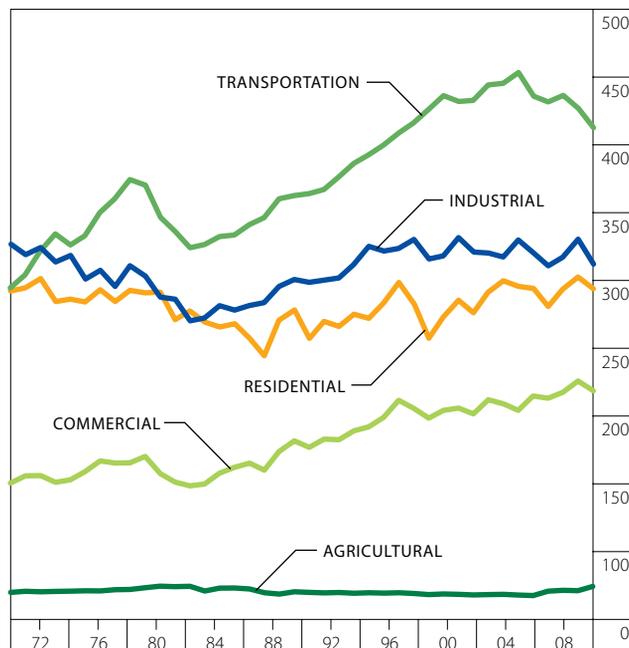
By Economic Sector

2009 TRILLIONS OF BTU AND PERCENT OF TOTAL



Economic Sector	2009 Trillions of Btu	2009 Percent of Total
Agricultural	26.5	2.2%
Commercial	186.9	15.9%
Residential	270.5	23.0%
Industrial	290.9	24.7%
Transportation	402.6	34.2%

1970-2009 TRILLIONS OF BTU



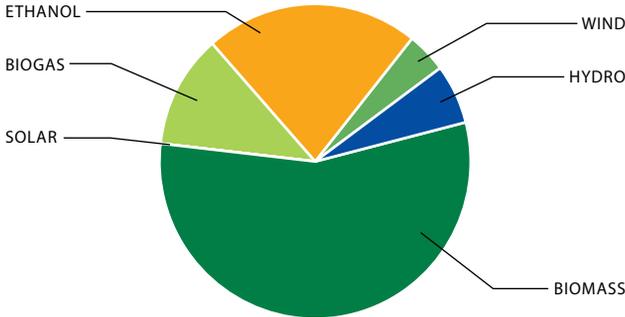
Source: Wisconsin Office of Energy Independence.

Wisconsin Renewable Energy Production

Overall renewable energy use in Wisconsin increased 8.9 percent in 2009. Renewable energy production includes *all* renewable energy used in Wisconsin for generating electricity and for other applications that displace fossil fuels (e.g., space heating, transportation fuel).

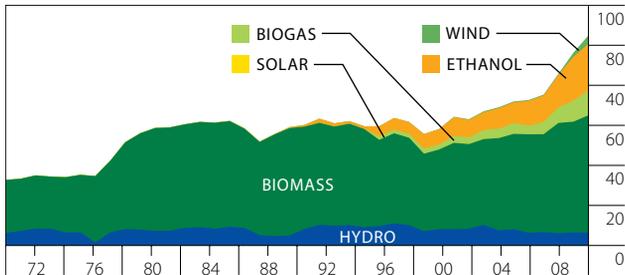
By Type of Fuel

2009 TRILLIONS OF BTU AND PERCENT OF TOTAL



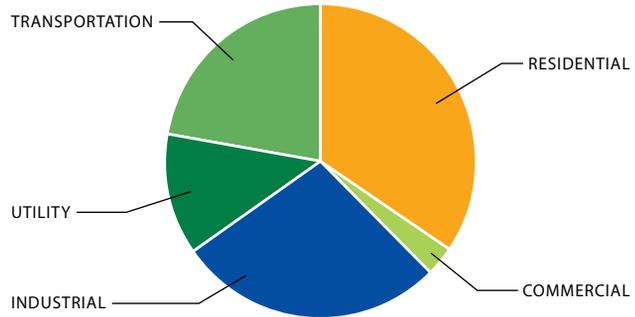
Type of Fuel	2009 Trillions of Btu	2009 Percent of Total
Solar	0.035	0.0%
Wind	3.6	4.1%
Hydro	5.4	6.1%
Biogas	10.2	11.7%
Ethanol	19.4	22.2%
Biomass	48.9	55.9%

1970-2009 TRILLIONS OF BTU



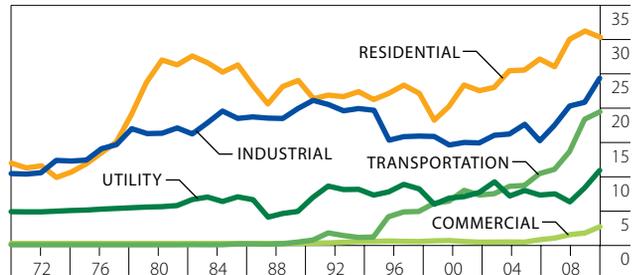
By Economic Sector

2009 TRILLIONS OF BTU AND PERCENT OF TOTAL



Economic Sector	2009 Trillions of Btu	2009 Percent of Total
Commercial	2.7	3.0%
Utility	10.9	12.4%
Transportation	19.4	22.2%
Industrial	24.3	27.8%
Residential	30.2	34.6%

1970-2009 TRILLIONS OF BTU

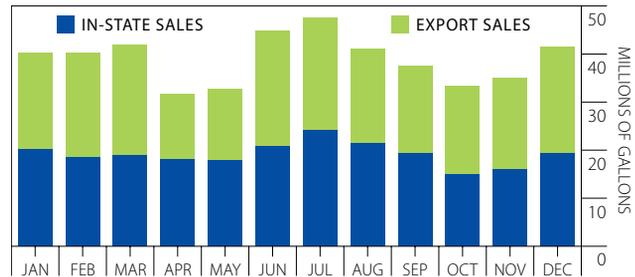


Ethanol Production in Wisconsin

Ethanol use in the transportation sector increased 5.8 percent. Ethanol, a renewable energy resource primarily distilled from corn, is used as an oxygenate in reformulated gasoline and in the blending of E10 (10 percent ethanol, 90 percent gasoline) and E85 (85 percent ethanol, 15 percent gasoline). Ethanol is Wisconsin's sole exported fuel.

Source: Wisconsin Office of Energy Independence.

2009 ETHANOL SALES BY WISCONSIN PRODUCERS

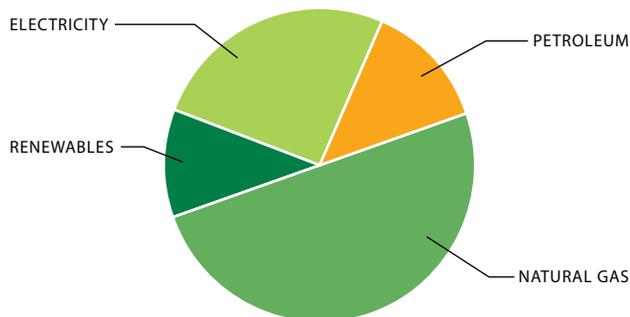


Wisconsin Residential Energy Use

Residential resource energy consumption decreased 3.4 percent while end-use consumption decreased 3.3 percent. Natural gas is the dominant fuel used in Wisconsin homes—natural gas use decreased 5.3 percent. Electricity use per customer decreased 2.6 percent. The decrease in natural gas relates to the decrease in Heating Degree Days (HDD) in 2009—a 3.4 percent decrease from 2008.

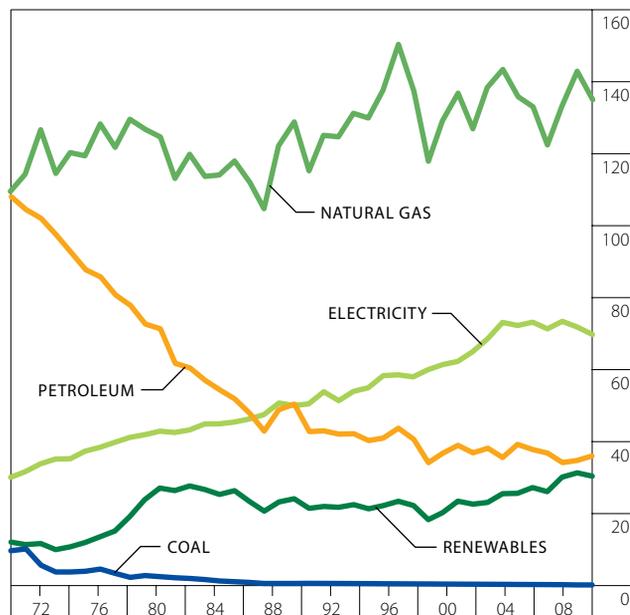
By Type of Fuel

2009 TRILLIONS OF BTU AND PERCENT OF TOTAL



Type of Fuel	2009 Trillions of Btu	2009 Percent of Total
Coal (non-utility)	0.0	0.0%
Renewables ^a	30.2	11.2%
Petroleum	35.8	13.2%
Electricity	69.6	25.7%
Natural Gas	134.9	49.9%

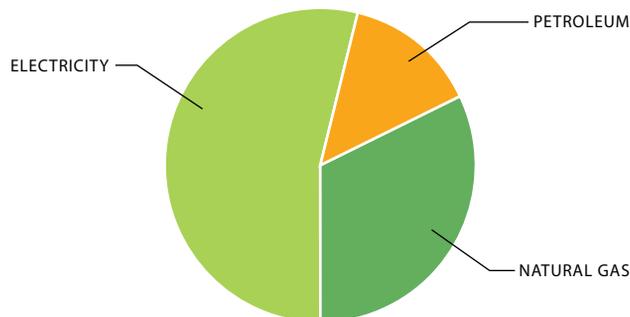
1970-2009 TRILLIONS OF BTU



^a Renewables includes wood, solar, wind and biogas.
 Source: Wisconsin Office of Energy Independence.

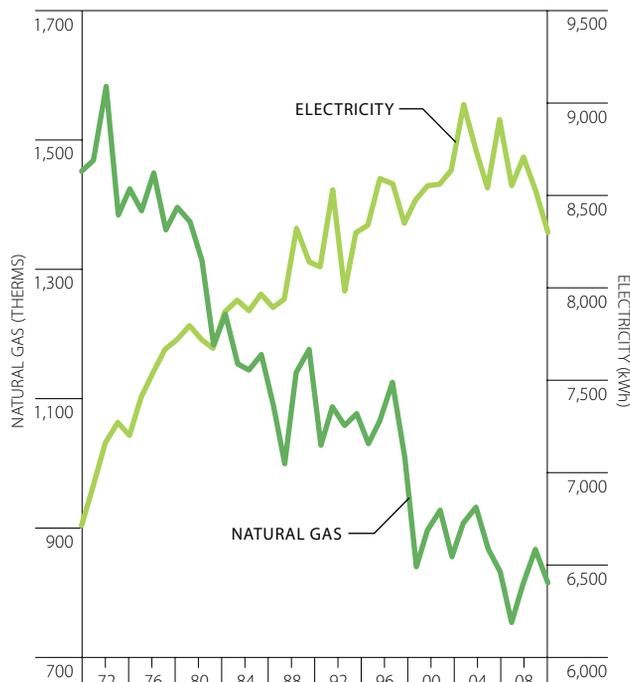
Expenditures and Per Customer Usage

2009 MILLIONS OF DOLLARS AND PERCENT OF TOTAL



Type of Fuel	2009 Millions of Dollars	2009 Percent of Total
Petroleum	630.7	14.0%
Natural Gas	1,448.8	32.1%
Electricity	2,428.4	53.9%

1970-2009 ELECTRICITY AND NATURAL GAS USE PER CUSTOMER



Source: Wisconsin Office of Energy Independence.

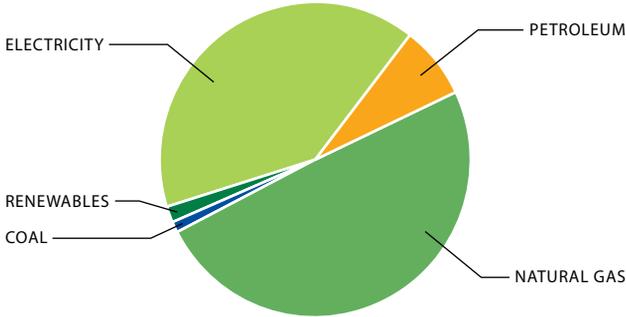
Wisconsin Commercial and Industrial Energy Use

Commercial sector end-use energy decreased 4.0 percent, while industrial sector end-use decreased 6.4 percent.

In the commercial and industrial sectors natural gas remains the major energy source, providing 49.7 percent of commercial sector energy and 41.3 percent in the industrial sector.

Commercial by Type of Fuel

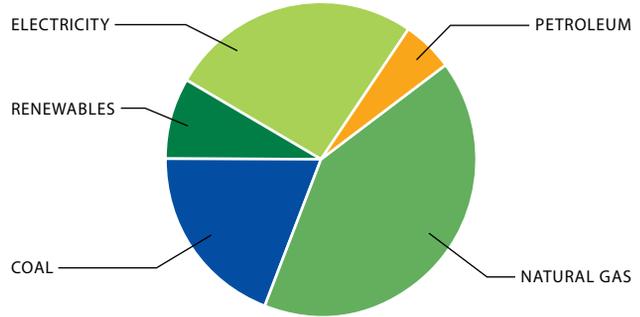
2009 TRILLIONS OF BTU AND PERCENT OF TOTAL



Type of Fuel	2009 Trillions of Btu	2009 Percent of Total
Coal (non-utility)	2.0	1.1%
Renewables	2.7	1.4%
Petroleum	14.1	7.5%
Electricity	75.3	40.3%
Natural Gas	92.9	49.7%

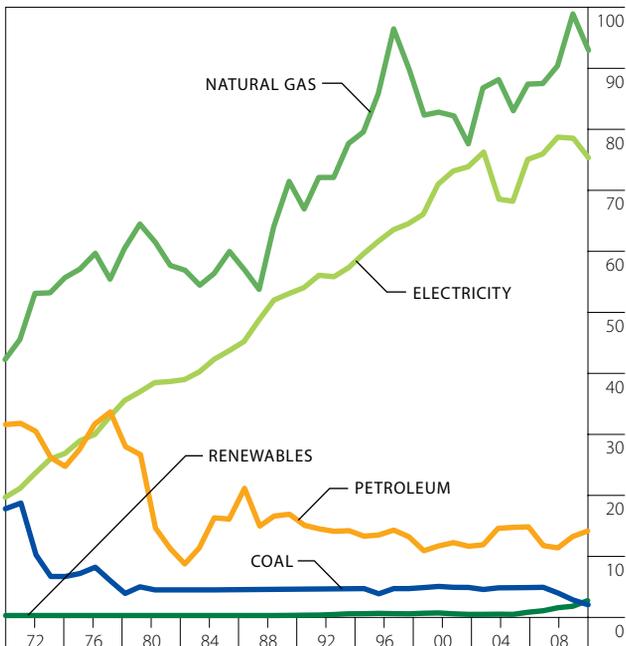
Industrial by Type of Fuel

2009 TRILLIONS OF BTU AND PERCENT OF TOTAL



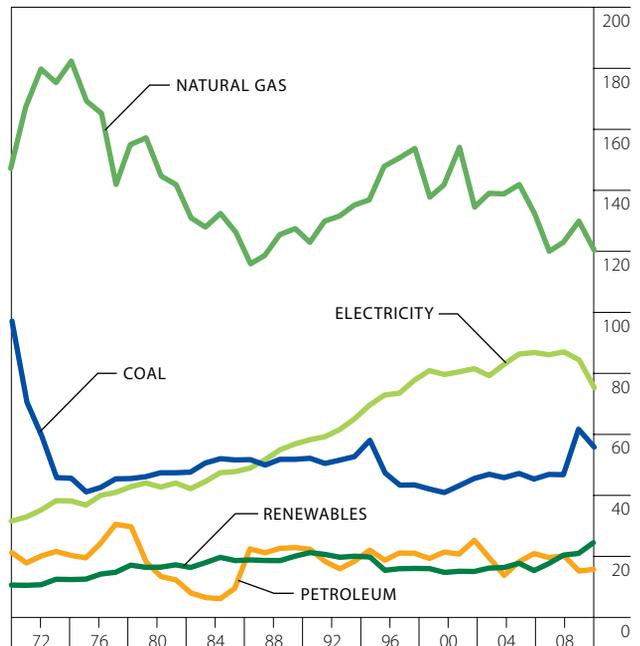
Type of Fuel	2009 Trillions of Btu	2009 Percent of Total
Petroleum	15.5	5.3%
Renewables	24.3	8.4%
Coal (non-utility)	55.7	19.1%
Electricity	75.2	25.8%
Natural Gas	120.2	41.3%

1970-2009 TRILLIONS OF BTU



Source: Wisconsin Office of Energy Independence.

1970-2009 TRILLIONS OF BTU



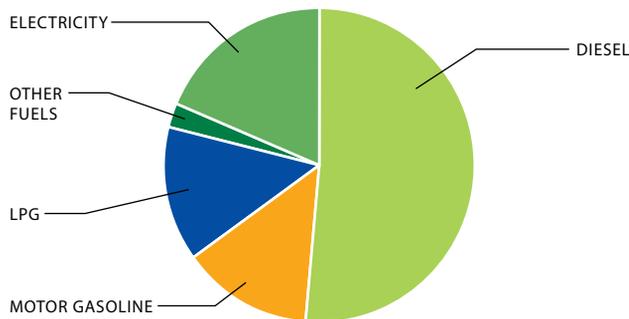
Source: Wisconsin Office of Energy Independence.

Wisconsin Agricultural and Transportation Energy Use

Agricultural end-use petroleum consumption increased 15.2 percent in 2009, while electricity decreased by 2.9 percent. Using 2009 dollars, the real, average statewide price of gasoline decreased by \$0.915 a gallon, to \$2.374 a gallon.

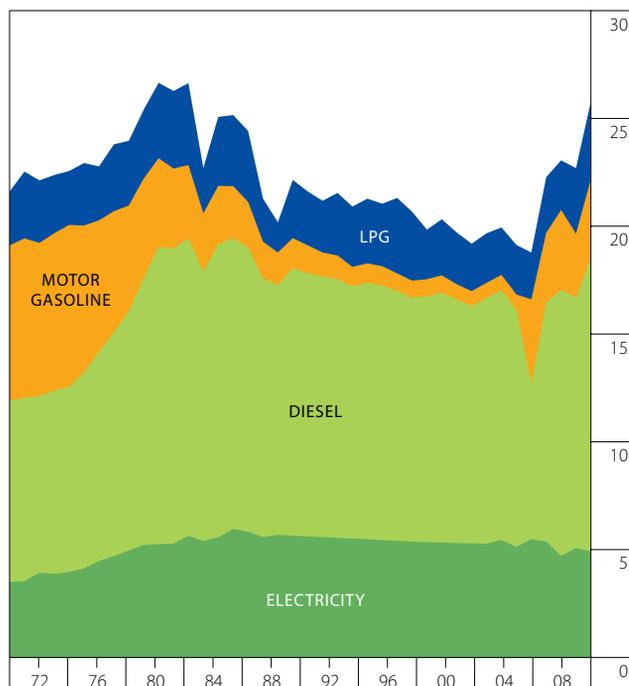
Agricultural by Type of Fuel

2009 TRILLIONS OF BTU AND PERCENT OF TOTAL



Type of Fuel	2009 Trillions of Btu	2009 Percent of Total
LPG	3.6	13.6%
Motor Gasoline	3.7	14.0%
Electricity	4.9	18.6%
Diesel	13.6	51.5%

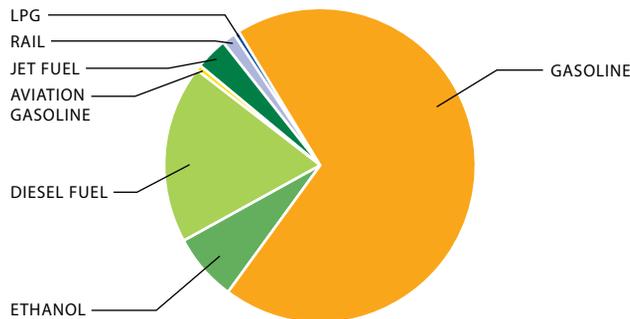
1970-2009 TRILLIONS OF BTU



Source: Wisconsin Office of Energy Independence.

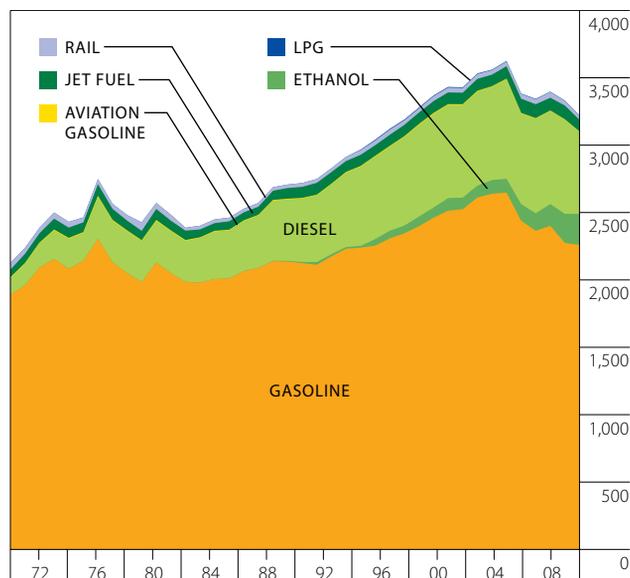
Transportation by Type of Fuel

2009 MILLIONS OF GALLONS AND PERCENT OF TOTAL



Type of Fuel	2009 Millions of Gallons	2009 Percent of Total
LPG	2.2	0.1%
Aviation Gasoline	2.4	0.1%
Rail	30.1	0.9%
Jet Fuel	87.0	2.7%
Ethanol	229.7	7.1%
Diesel Fuel	608.7	18.9%
Gasoline	2,260.3	70.2%

1970-2009 MILLIONS OF GALLONS



Source: Wisconsin Office of Energy Independence.

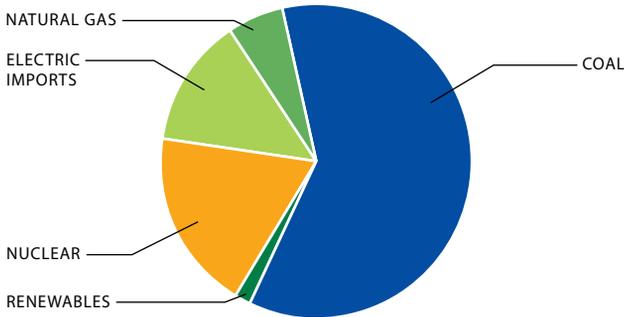
Wisconsin Energy Use for Electricity Generation and Electric Utility Sales

Wisconsin's energy use for electric generation decreased by 6.5 percent in 2009, while total electricity sales decreased 6.4 percent.

In 2009 electricity sales decreased in all sectors.

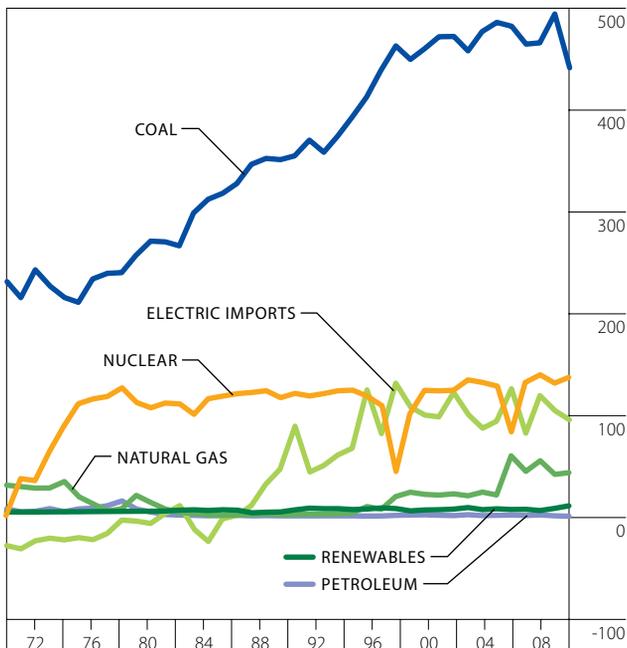
Energy Use for Electricity Generation by Type of Fuel

2009 TRILLIONS OF BTU AND PERCENT OF TOTAL



Type of Fuel	2009 Trillions of Btu	2009 Percent of Total
Renewables	10.9	1.5%
Natural Gas	43.4	6.0%
Electric Imports	95.5	13.1%
Nuclear	137.0	18.8%
Coal	441.4	60.6%

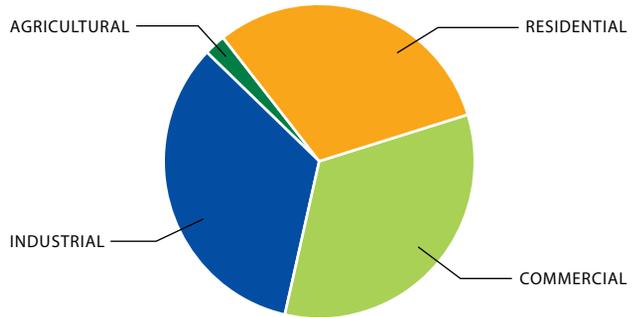
1970-2009 TRILLIONS OF BTU



Source: Wisconsin Office of Energy Independence.

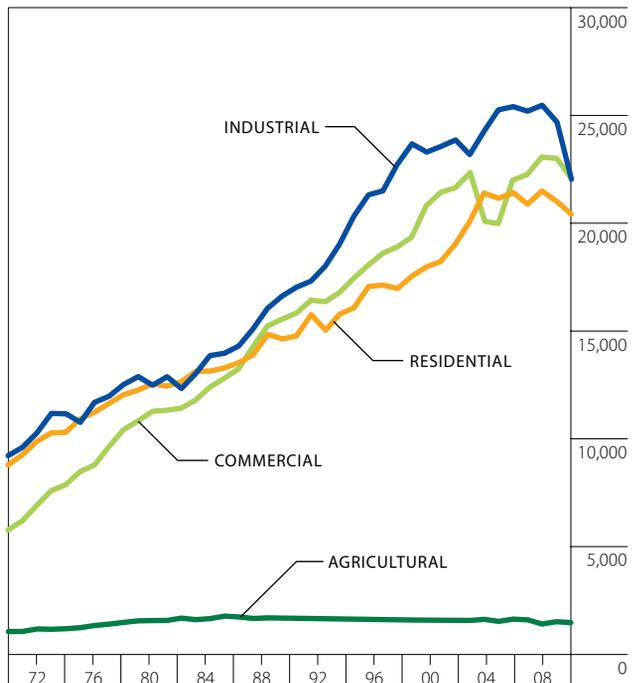
Electric Utility Sales by Economic Sector

2009 MILLIONS OF kWh AND PERCENT OF TOTAL



Economic Sector	2009 Millions of kWh	2009 Percent of Total
Agricultural	1,443	2.2%
Residential	20,390	30.9%
Industrial	22,029	33.4%
Commercial	22,055	33.5%

1970-2009 MILLIONS OF kWh



Source: Wisconsin Office of Energy Independence.

Wisconsin End-Use Energy Expenditures

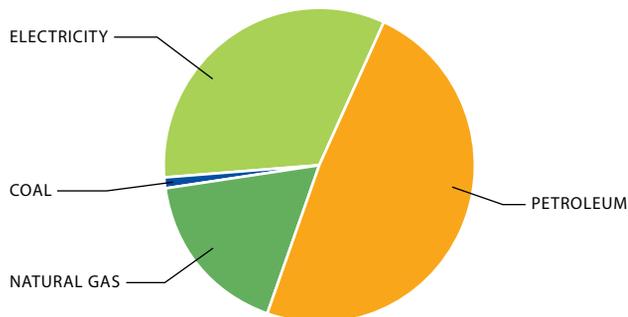
In 2009, Wisconsin's overall energy bill dropped by \$5.19 billion (21.7 percent) from 2008.

Expenditures decreased for all fuels.

Since 2000, Wisconsin's total energy expenditures increased by \$6.5 billion (53.5 percent increase).

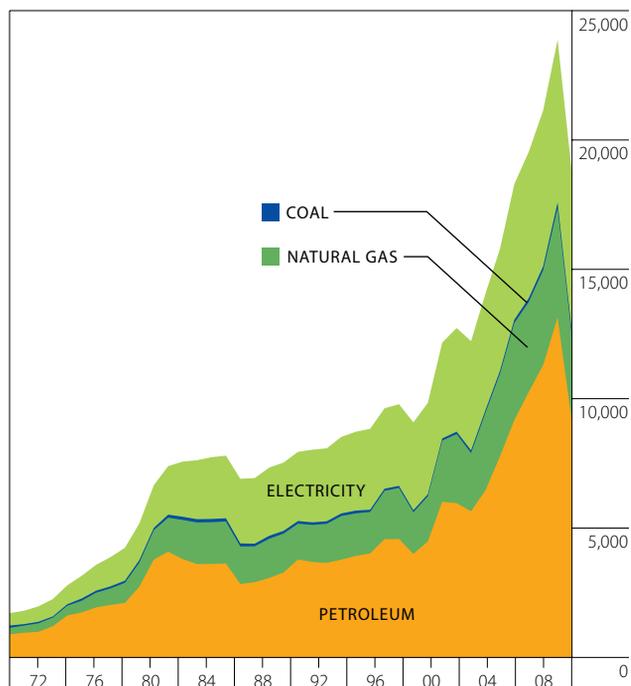
By Type of Fuel

2009 MILLIONS OF DOLLARS AND PERCENT OF TOTAL



Type of Fuel	2009 Millions of Dollars	2009 Percent of Total
Coal (non-utility)	200.0	1.1%
Natural Gas	3,254.2	17.4%
Electricity	6,136.7	32.8%
Petroleum	9,093.3	48.7%

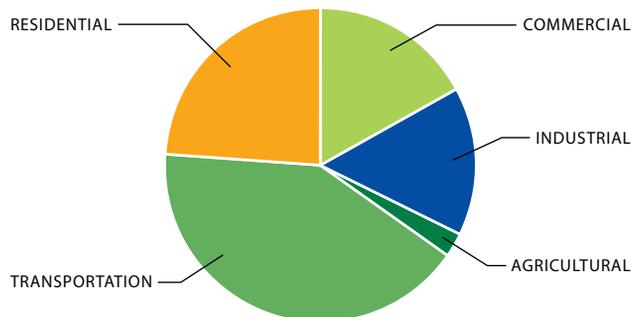
1970-2009 MILLIONS OF DOLLARS



Source: Wisconsin Office of Energy Independence.

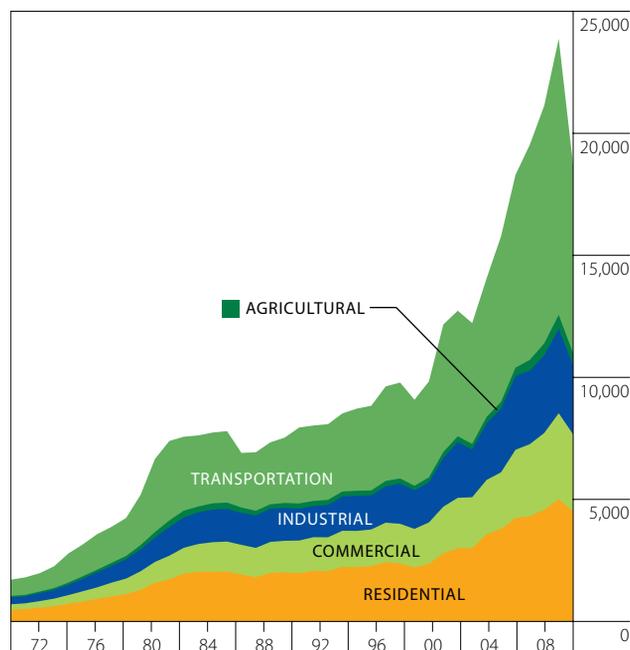
By Economic Sector

2009 MILLIONS OF DOLLARS AND PERCENT OF TOTAL



Economic Sector	2009 Millions of Dollars	2009 Percent of Total
Agricultural	494.2	2.6%
Industrial	2,825.4	15.1%
Commercial	3,154.3	16.9%
Residential	4,507.9	24.1%
Transportation	7,702.4	41.2%

1970-2009 MILLIONS OF DOLLARS



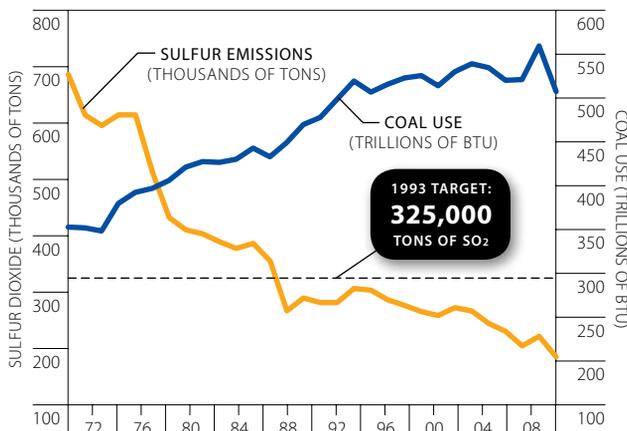
Source: Wisconsin Office of Energy Independence.

Wisconsin Emissions

Utility sulfur dioxide emissions decreased 18.9 percent from 2008 to 2009. SO₂ emissions are pollutants and are measured for air quality monitoring. CO₂ is a greenhouse gas which contributes to global warming. Wisconsin's CO₂ emissions from energy decreased 2.2 percent in 2009. Since 1990, total CO₂ emissions have increased 16.8 percent.

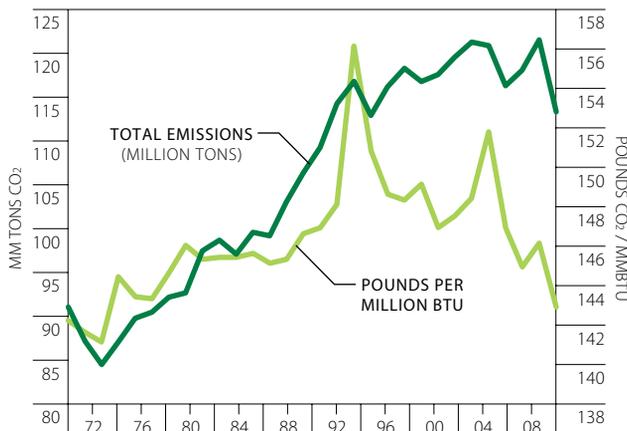
Sulfur Dioxide Emissions and Coal Use

1980-2009



Carbon Dioxide Emissions from Energy Use

1980-2009 MILLIONS OF TONS AND POUNDS PER MILLION BTU^a



^a Does not include electric imports.

Source: Wisconsin Office of Energy Independence.

2010 Transportation and Heating Fuels

Transportation Fuel Prices

Wisconsinites spent \$9.5 billion³ on transportation fuel in 2010, an increase of \$1.7 billion over 2009. The increase in expenditures is due primarily to an increase in prices.

Transportation Fuels Prices per Gallon ^{1,2}		
	2009	2010
Gasoline	\$2.374	\$2.791
Diesel	\$2.518	\$3.032

Household transportation expenditure figures include a wide variety of transportation costs from the price of fuel at the pump and the price of heating fuels, to property taxes, and the delivery costs built into the price of household products.

Transportation Expenditures per Household		
	2009	2010
Annually	\$3,369	\$4,117
Monthly	\$281	\$343

Transportation Fuel Consumption

Wisconsin used 70.15 million **more** gallons of gasoline than during 2009, an increase of 2.8 percent.

Transportation Fuels Consumed		
	2009	2010
Gasoline	2.52 billion gallons	2.59 billion gallons
Diesel	706.8 million gallons	744.8 million gallons

Wisconsin used 38.0 million **more** gallons of diesel than during 2009, an increase of 5.4 percent.

Heating Fuels Prices

2010 saw increases in all fuel prices⁴, including electricity and those used for space heating.

Fuel	% Change	2009 Price	2010 Price
Heating Oil	▲ 22.3%	\$2.20 per gallon	\$2.69 per gallon
LP Gas	▲ 3.9%	\$1.78 per gallon	\$1.85 per gallon
Natural Gas	▲ 3.3%	\$7.91 per MMBtu	\$8.17 per MMBtu
Residential Electricity	▲ 8.3%	\$0.12 per kWh	\$0.13 per kWh

Ethanol – E10 and E85 in Wisconsin

- Ethanol use in 2010 **increased** by 10.7 percent from 229.7 million gallons in 2009 to 254.3 million gallons in 2010.
- A larger percentage of Wisconsin's gasoline is mixed with ethanol. In 2010, 94.7 percent of Wisconsin's gasoline was an ethanol blend, compared to 90.5 percent in 2009.

¹ From the American Automobile Association, Daily Fuel Gauge Report. <http://www.fuelgauge.report.aaa.com/>

² This includes fuel usage in the agriculture sector, but does not include rail or aviation fuel.

³ 2010 transportation expenditures were \$7.2 billion for motor gasoline including ethanol and \$2.3 billion for diesel fuel for a total of \$9.5 billion.

⁴ All prices are statewide averages for the calendar year. Heating fuel and LP rates are gathered from fuel retailers across the state as part of an OEI telephone survey funded by the U.S. Department of Energy. Electricity price averages are compiled from rates reported to the Public Service Commission of Wisconsin. Natural gas rates are compiled from residential rates reported by Wisconsin's natural gas utilities.

Table of Contents

21	CHAPTER 1 – Total Energy Use
22	Wisconsin Resource Energy Consumption, by Type of Fuel
23	Wisconsin Resource Energy Consumption, by Type of Fuel, 1970-2009
24	Wisconsin Resource Energy Consumption, by Economic Sector
25	Wisconsin Resource Energy Consumption, by Economic Sector, 1970-2009
26	Wisconsin End-Use Energy Consumption, by Type of Fuel, 1970-2009
27	Wisconsin End-Use Energy Consumption, by Economic Sector, 1970-2009
28	Wisconsin Residential Energy Use, by Type of Fuel, 1970-2009
29	Wisconsin Commercial Energy Use, by Type of Fuel, 1970-2009
30	Wisconsin Industrial Energy Use, by Type of Fuel, 1970-2009
31	Wisconsin Energy Use for Electricity Generation, in Btu, by Type of Fuel, 1970-2009
32	Wisconsin Agricultural Energy Use, in Btu, by Type of Fuel, 1970-2009
33	Wisconsin Agricultural Energy Use, in Gallons and kWh, by Type of Fuel, 1970-2009
34	Wisconsin Transportation Energy Use, in Btu, by Type of Fuel, 1970-2009
35	Wisconsin Transportation Energy Use, in Gallons, by Type of Fuel, 1970-2009
36	CHAPTER 2 – Energy Use by Type of Fuel
37	Wisconsin Petroleum Use, by Economic Sector, 1970-2009
38	Wisconsin Petroleum Use, by Economic Sector
39	Wisconsin Petroleum Use, in Btu, by Type of Product, 1970-2009
40	Wisconsin Petroleum Use, in Gallons, by Type of Product, 1970-2009
41	Petroleum Product Deliveries to Wisconsin, by Month, 2009
42	Wisconsin Production and Use of Ethanol in Reformulated Gasoline, E10 and E85, 1994-2009
43	Wisconsin Liquefied Petroleum Gas Use, by Economic Sector, 1970-2009
44	Wisconsin Natural Gas Use, by Economic Sector, 1970-2009
45	Wisconsin Natural Gas Use, by Economic Sector
46	Wisconsin Natural Gas Sales, by Public Service Commission of Wisconsin Sector, 1970-2009
47	Wisconsin Natural Gas Sales, by Month
48	Average Number of Natural Gas Customers in Wisconsin, by Public Service Commission of Wisconsin Sector, 1970-2009
49	Wisconsin Natural Gas Sales Per Customer, by Public Service Commission of Wisconsin Sector, 1970-2009
50	Wisconsin Natural Gas Deliveries, by Pipeline Company, 1970-2009
51	Wisconsin Coal Use, in Btu, by Economic Sector, 1970-2009
52	Wisconsin Coal Use, by Economic Sector
53	Wisconsin Coal Use, in Tons, by Economic Sector, 1970-2009
54	Wisconsin Electric Utility Coal Use, by Plant, 1975-2009
55	Wisconsin Manufacturing Industry Coal Purchases, by Industry Group, 1971-2009
55	Coal Deliveries to Wisconsin Industries, by Region of Origin, 1975-2009
56	Coal Deliveries to Wisconsin, by Transportation Mode and Type of Receiving Facility, 1975-2009
57	Coal Deliveries to Wisconsin Power Plants, by Region of Origin, 1975-2009
57	Coal Deliveries to Wisconsin Power Plants, by State of Origin, 1975-2009
58	Wisconsin Electric Utility Sales, by Economic Sector, 1970-2009

Table of Contents

59	Wisconsin Electric Utility Sales, by Economic Sector
60	Wisconsin Electricity Sales to Ultimate Customers, by Private and Municipal Utilities and Power Cooperatives, 1970-2009
61	Eastern Wisconsin Electric Utility Power Load and Non-Coincident Peak Demand, 1970-2009
62	Eastern Wisconsin Electric Utility Non-Coincident Peak Demand, 1970-2009
62	Eastern Wisconsin Electric Utility Power Load and Non-Coincident Peak Demand, by Month, 2009
63	Wisconsin Electric Generating Capacity, by Type of Plant, 1990-2009
64	Wisconsin Electric Generating Capacity, by Type of Plant and Type of Producer, 1990-2009
65	Wisconsin Electric Power Generation, by Type of Plant, 1970-2009
66	Wisconsin Electric Utility Fuel Costs of Power Generation, by Type of Plant, 1970-2009
67	Utility Annual Variable Costs of Power Generation, by Type of Plant and Cost of Purchased Power, 1970-2009
68	Electric Utility Sulfur Dioxide Emissions, 1980-2009
69	Electric Utility Nitrogen Oxides Emissions, 1989-2009
70	Wisconsin Emissions and Coal Use
71	Wisconsin Utility Power Plant Inventory, 2009
72	CHAPTER 3 – Renewable Energy
73	Wisconsin Renewable Energy Production, by Type of Fuel, 1970-2009
74	Wisconsin Renewable Energy Production, by Economic Sector, 1970-2009
75	Wisconsin Wood Use, by Economic Sector, 1970-2009
76	Wisconsin Manufacturing Industry Use of Wood Fuel, by Industry Group, 1972-2009
77	Wisconsin Electric Utility Use of Wood Fuel, 1970-2009
78	Wisconsin Electric Utility and Non-Utility Hydroelectric Generation, 1970-2009
79	U. S. Photovoltaic Modules and Cell Shipments and Conversion Efficiency, 1982-2008
80	U. S. Photovoltaic Modules and Cell Prices, 1989-2008
81	U. S. Solar Thermal Collector Shipments and Prices, 1999-2008
82	Wisconsin Renewable Energy Electricity Generated and Purchased, 1990-2009
83	CHAPTER 4 – Energy Efficiency Indices
84	Indices of Wisconsin Energy Efficiency, 1970-2009
85	Indices of Wisconsin Energy Efficiency, 1970-2009
86	Indices of Wisconsin Energy Expenditures, 1970-2009
87	Wisconsin Per Capita Resource Energy Consumption, by Type of Fuel, 1970-2009
88	Wisconsin Residential Electricity and Natural Gas Use Per Customer, 1970-2009
89	Wisconsin Commercial Electricity and Natural Gas Use Per Customer, 1970-2009
90	Focus on Energy Tracked Energy Savings, 2001-2009
91	Focus on Energy Ranked Energy Savings Measures, 2001-2009
92	Energy Consumption by Major New Household Appliances, 1972-2009
93	Energy Use in State Owned Buildings, 1974-2009
94	Low Income Units Weatherized Through State- and Utility-Supported Programs, 1980-2009
95	Reported Building Activity Affected by Wisconsin Energy Codes, 1979-2009
96	Wisconsin Carbon Dioxide Emissions from Energy Use, 1980-2009
97	Average Miles Driven Per Auto and Average Auto Miles Per Gallon of Gasoline, Wisconsin and United States, 1970-2008

Table of Contents

98 CHAPTER 5 – United States Energy Use

- 99 United States Resource Energy Consumption, by Type of Fuel, 1970-2009
- 100 United States Resource Energy Consumption, by Economic Sector, 1970-2009
- 101 Sources of U.S. Crude Oil and Petroleum Products, 1975-2009
- 102 2009 U.S. Petroleum Use Domestically Produced and Imported
- 102 U.S. Petroleum Use, Production, Imports and Exports, 1973-2009
- 103 World Crude Oil Production, 1973-2009
- 104 United States Natural Gas Production, Imports, Consumption and Storage, 1973-2009
- 105 United States Monthly Natural Gas Production, Imports, Consumption and Storage, 2009
- 106 United States Coal Production, Net Exports, Consumption and Sector Usage, 1973-2009
- 107 United States Per Capita Resource Energy Consumption, by Type of Fuel, 1970-2009
- 108 Wisconsin Per Capita Resource Energy Consumption as Percent of United States, by Type of Fuel, 1970-2009
- 109 U.S. Per Capita Resource Energy Consumption, by State, 2008
- 110 U.S. Resource Energy Consumption, by State, 2008
- 111 Primary Energy Intensity, by Country and Region, 2003-2008
- 112 Primary Energy Usage and GDP, by Country and Region, 2008

113 CHAPTER 6 – Wisconsin and United States Prices and Average Costs of Fuels

- 114 Wisconsin Energy Prices, 1970-2009
- 115 Wisconsin Residential Energy Prices, by Type of Fuel, 1970-2009
- 116 Wisconsin Residential Energy Prices, by Type of Fuel, 2009-2010 Winter Heating Season
- 117 Wisconsin Commercial Energy Prices, by Type of Fuel, 1970-2009
- 118 Wisconsin Industrial Energy Prices, by Type of Fuel, 1970-2009
- 119 Wisconsin Motor Gasoline and Diesel Fuel Retail Prices, by Grade and Type of Service, 1970-2009
- 120 Wisconsin Retail and Wholesale Self-Service Unleaded Motor Gasoline Prices, by Month, 2007-2009
- 121 Wisconsin Electric Utility Average Costs of Fuel, 1970-2009
- 122 Wisconsin Electric Utility Coal Costs and Sulfur Content of Coal, by Utility Plant, 2009
- 123 Wisconsin Natural Gas Prices, by Economic Sector, 1970-2009
- 124 Wisconsin Natural Gas Prices, by Public Service Commission of Wisconsin Sector, 1970-2009
- 125 Wisconsin Electricity Prices, by Economic Sector, 1970-2009
- 126 Average Utility Electricity and Natural Gas Prices, by Economic Sector, for Selected Midwestern States, 2009
- 127 U.S. Energy Prices, 1973-2009
- 128 U.S. Spot Market Prices of Crude Oil & Natural Gas, 2006-2009
- 129 National Indices of Price Inflation, 1970-2009

130 CHAPTER 7 – Wisconsin Expenditures for Energy

- 131 Wisconsin End-Use Energy Expenditures, by Type of Fuel
- 132 Wisconsin End-Use Energy Expenditures, by Type of Fuel, 1970-2009
- 133 Wisconsin End-Use Energy Expenditures, by Economic Sector
- 134 Wisconsin End-Use Energy Expenditures, by Economic Sector, 1970-2009
- 135 Wisconsin Resource Use Energy Expenditures, Estimated Dollars Leaving Wisconsin, 1970-2009
- 136 Wisconsin Expenditures for Residential Energy, by Type of Fuel, 1970-2009

Table of Contents

137	Wisconsin Expenditures for Commercial Energy, by Type of Fuel, 1970-2009
138	Wisconsin Expenditures for Industrial Energy, by Type of Fuel, 1970-2009
139	Wisconsin Expenditures for Agricultural Energy, by Type of Fuel, 1970-2009
140	Wisconsin Expenditures for Transportation Energy, by Type of Fuel, 1970-2009
141	CHAPTER 8 – Miscellaneous
142	United States Energy Use and Gross Domestic Product, 1970-2009
143	Wisconsin Population, Households, Gross State Product and Personal Income, 1970-2009
144	Wisconsin Employment, by Type, 1970-2009
145	Wisconsin Occupied Dwelling Units, by Type of Fuel for Space Heating, 1970, 1980, 1990, 2000, 2005 and 2008
145	Wisconsin Occupied Dwelling Units, by Type of Fuel for Water Heating, 1970, 1980, 1990, 2000, 2005 and 2009
146	Wisconsin Motor Vehicle Registrations, by Type of Vehicle, 1970-2009
147	Wisconsin New Single and Two Family Building Permits, 1990-2009
148	Wisconsin Appliance Shipments, by Type, Cooling Degree Days and Gross National Product, 1970-2009
149	Wisconsin Degree Day Zones
150	Wisconsin Normal Heating Degree Days, by Zone and Month
150	Wisconsin Normal Cooling Degree Days, by Zone and Month
151	Wisconsin Population-Weighted Heating Degree Days 1970-2009
152	2008 Wisconsin Heating Degree Days, by Zone and Month
152	2009 Wisconsin Heating Degree Days, by Zone and Month
153	Wisconsin Population-Weighted Cooling Degree Days, 1980-2009
154	2008 Wisconsin Cooling Degree Days, by Zone and Month
154	2009 Wisconsin Cooling Degree Days, by Zone and Month
155	DEFINITIONS AND CONVERSIONS APPENDIX
155	Energy Definitions
156	Conversion Factors
157	MAP APPENDIX
157	Wisconsin Petroleum Pipelines
158	Wisconsin Natural Gas Company Territories and Major Pipelines
159	Coal Transportation Routes in Wisconsin and Major Coal-Fired Power Plants, 2010
160	Major Electric Lines and Service Territories
161	Hydroelectric Generation Sites in Wisconsin, 2010
162	Estimated Wind Power Energy Potential (at 70 meters) and Existing Wind Development Locations, 2010
163	Biomass Resources Available in the United States
164	Estimated Solar Insulation for the United States, Two-Axis Tracker

CHAPTER 1

Total Energy Use

There are two common ways to account for energy use:

resource
energy consumption
and
end-use
energy consumption.

End-use refers to the energy content of electricity and other fuels at the point of use by customers. **Resource energy** includes all energy resources used to generate electricity, including the energy content of the coal, petroleum, nuclear and renewable fuels. Resource energy also includes the energy used to produce the electricity imported into Wisconsin from other states and Canada. Because about 70 percent of the energy used to generate and distribute electricity to its point of use is lost as waste heat, resource consumption figures are greater than end-use consumption figures.

Prior to 1997, petroleum was Wisconsin's leading energy source, but its share of resource energy use has fallen from a peak of 40 percent in 1977 to 28.0 percent in 2009. Coal is the leading resource energy source in Wisconsin, comprising 29.7 percent of all resource energy use. Coal surpassed natural gas as the state's second largest energy source in 1981, and in 1997 coal surpassed petroleum as the state's leading source of resource energy.

Renewables increased by 8.9 percent to 5.2 percent of Wisconsin's overall use of resource energy consumption. This includes hydroelectric generation, solar (photovoltaic and solar thermal), biomass (e.g., wood and wood by-products), biogas (e.g., agricultural manure digesters, landfill gas), and wind.

Nuclear power in Wisconsin is no longer owned by utilities, but by independent power producers who sell the power to customers in Wisconsin.

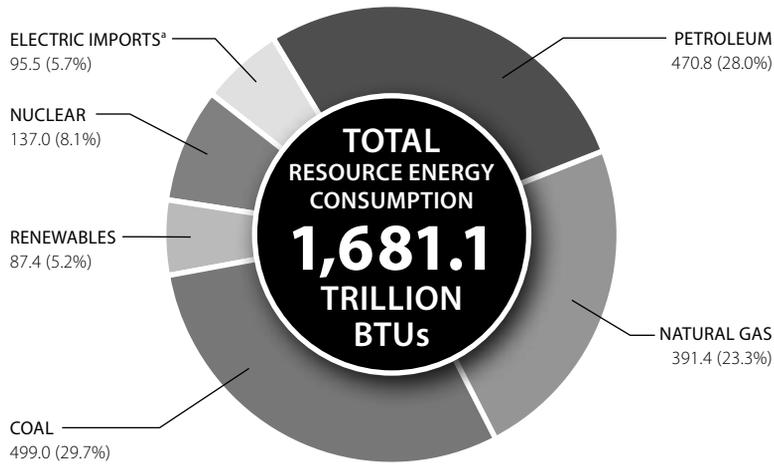
In general, the residential (25.4 percent) and industrial (27.3 percent) sectors each account for about one-quarter of Wisconsin's resource energy consumption. The transportation sector used 23.9 percent of the state's resource energy while the commercial and agricultural sectors accounted for 21.1 percent and 2.2 percent, respectively. In 2009, residential end-use energy consumption decreased 3.3 percent, commercial energy use decreased 4.0 percent, industrial energy use decreased 6.4 percent, agricultural energy use increased 15.2 percent and transportation energy use decreased 3.8 percent.

RESOURCE Energy Consumption	2009	Percent of Wisconsin's Resource Energy Consumption
Resource Energy Consumption	↓ 4.8% overall	
BY FUEL		
Coal Consumption, Utilities	↓ 10.3%	29.7%
Petroleum Consumption	↓ 2.3%	28.0%
Natural Gas Consumption	↓ 5.1%	23.3%
Electricity Imports	↓ 8.6%	5.7%
Renewables	↑ 8.9%	5.2%
BY ECONOMIC SECTOR		
Transportation	↓ 3.8%	23.9%
Residential	↓ 3.4%	25.4%
Industrial	↓ 8.3%	27.3%
Commercial	↓ 4.4%	21.1%
Agricultural	↑ 8.9%	2.2%

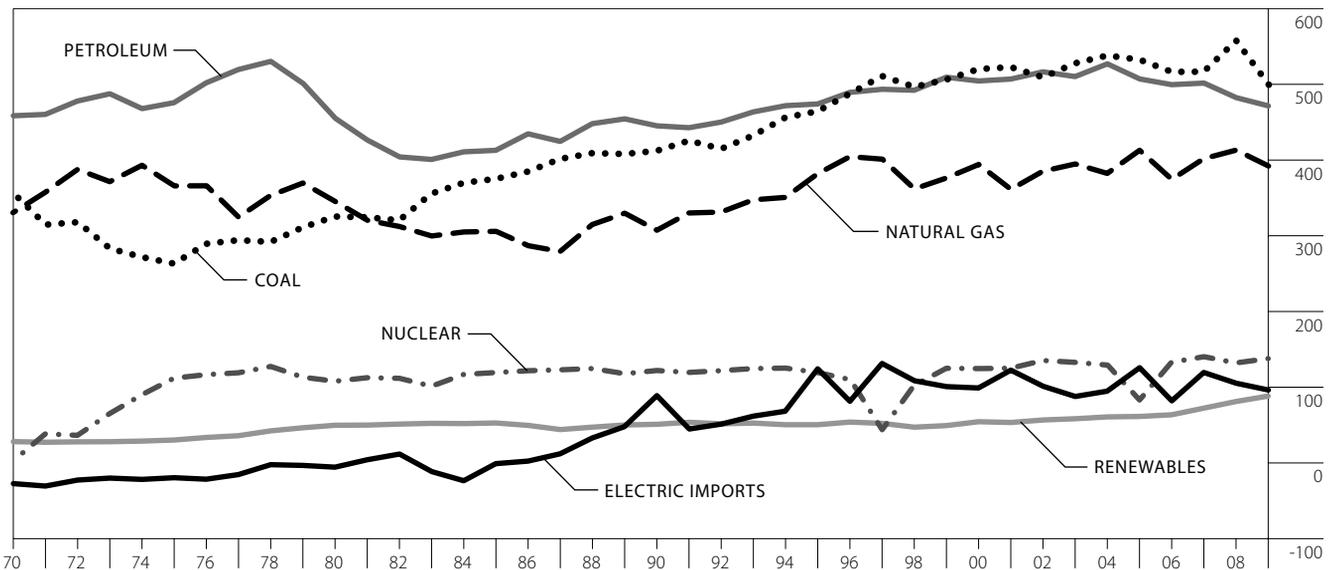
END-USE Energy Consumption	2009	Percent of Wisconsin's End-Use Energy Consumption
End-Use Energy Consumption	↓ 4.0% overall	
BY FUEL		
Petroleum Consumption	↓ 2.2%	39.9%
Natural Gas Consumption	↓ 6.1%	29.6%
Electricity Consumption	↓ 6.0%	19.1%
Renewables Consumption	↑ 6.4%	6.5%
Coal Consumption, Non-Utilities	↓ 10.0%	4.9%
BY ECONOMIC SECTOR		
Transportation	↓ 3.8%	34.2%
Industrial	↓ 6.4%	24.7%
Residential	↓ 3.3%	23.0%
Commercial	↓ 4.0%	15.9%
Agricultural	↑ 15.2%	2.2%

Wisconsin Resource Energy Consumption, by Type of Fuel

2009 TRILLIONS OF BTU AND PERCENT OF TOTAL



1970-2009 TRILLIONS OF BTU



^a "Electric imports" is the estimated resource energy used in other states or Canada to produce the electricity imported into Wisconsin. This resource energy is estimated assuming 11,300 Btu of resource energy per kWh imported into Wisconsin. Values below the "0" indicate that resource energy was used in Wisconsin to produce electricity that was exported out of state.

Source: Wisconsin Office of Energy Independence

Wisconsin Resource Energy Consumption, by Type of Fuel

1970-2009 TRILLIONS OF BTU AND PERCENT OF TOTAL

Year	Petroleum		Natural Gas		Coal ^a		Renewables ^b		Nuclear ^d		Electric Imports ^c		Total
1970	457.7	40.0%	329.8	28.8%	355.4	31.1%	27.3	2.4%	1.7	0.1%	-28.2	-2.5%	1,143.7
1975	475.0	38.9%	365.1	29.9%	262.3	21.5%	29.4	2.4%	111.2	9.1%	-20.4	-1.7%	1,222.6
1980 ^r	454.4	35.7%	344.5	27.1%	324.6	25.5%	48.9	3.8%	107.0	8.4%	-6.5	-0.5%	1,273.0
1985 ^r	412.1	32.7%	305.0	24.2%	374.4	29.7%	51.9	4.1%	118.6	9.4%	-1.8	-0.1%	1,260.1
1990 ^r	444.4	31.3%	306.4	21.6%	411.4	28.9%	50.2	3.5%	121.2	8.5%	87.7	6.2%	1,421.3
1995 ^r	473.3	29.4%	381.1	23.7%	463.7	28.8%	49.6	3.1%	118.5	7.4%	123.0	7.6%	1,609.2
1996 ^r	488.6	30.1%	403.7	24.9%	486.9	30.0%	53.1	3.3%	109.3	6.7%	80.2	4.9%	1,621.7
1997 ^r	492.7	30.3%	400.4	24.6%	510.1	31.3%	51.4	3.2%	42.3	2.6%	130.3	8.0%	1,627.2
1998 ^r	491.4	30.6%	361.0	22.5%	495.8	30.9%	46.4	2.9%	101.5	6.3%	107.7	6.7%	1,603.8
1999 ^r	508.6	30.6%	375.5	22.6%	505.5	30.4%	48.5	2.9%	124.1	7.5%	99.9	6.0%	1,662.1
2000 ^r	503.7	29.8%	393.3	23.2%	519.4	30.7%	53.6	3.2%	123.8	7.3%	98.1	5.8%	1,691.8
2001 ^r	506.2	30.0%	360.4	21.4%	521.9	30.9%	52.5	3.1%	124.3	7.4%	121.6	7.2%	1,686.9
2002 ^r	515.7	30.3%	384.5	22.6%	508.5	29.9%	55.9	3.3%	134.4	7.9%	100.4	5.9%	1,699.4
2003 ^r	509.4	29.8%	394.0	23.1%	527.0	30.9%	57.5	3.4%	132.0	7.7%	86.9	5.1%	1,706.9
2004 ^r	526.2	30.5%	381.5	22.1%	537.2	31.1%	59.9	3.5%	128.4	7.4%	94.0	5.4%	1,727.3
2005 ^r	506.3	29.5%	411.9	24.0%	531.7	31.0%	60.5	3.5%	81.8	4.8%	124.7	7.3%	1,716.9
2006 ^r	498.8	30.0%	373.5	22.5%	515.7	31.0%	62.7	3.8%	132.1	7.9%	80.8	4.9%	1,663.7
2007 ^r	500.9	28.7%	401.1	23.0%	515.9	29.5%	71.5	4.1%	139.4	8.0%	118.5	6.8%	1,747.3
2008 ^r	481.7	27.3%	412.3	23.3%	556.6	31.5%	80.3	4.5%	131.3	7.4%	104.4	5.9%	1,766.5
2009^p	470.8	28.0%	391.4	23.3%	499.0	29.7%	87.4	5.2%	137.0	8.1%	95.5	5.7%	1,681.1

a Including petroleum coke.

b Renewables includes solar, wind, wood, biogas, biomass, ethanol and hydroelectric.

c Electric imports are the estimated resource energy used in other states or Canada to produce the electricity imported into Wisconsin. This resource energy is estimated assuming 11,300 Btu of resource energy per kWh imported into Wisconsin. Negative percentages indicate that resource energy was used in Wisconsin to produce electricity that was exported out of state.

d Nuclear energy reported here is from power plants formerly owned by Wisconsin utilities and currently owned by independent power producers.

p Preliminary estimates.

r Revised due to revisions in contributing tables.

Source: Compiled from tables in this publication for Wisconsin petroleum, natural gas, coal, renewable resources and electricity use, by economic sector, and for Wisconsin electric utility energy use.

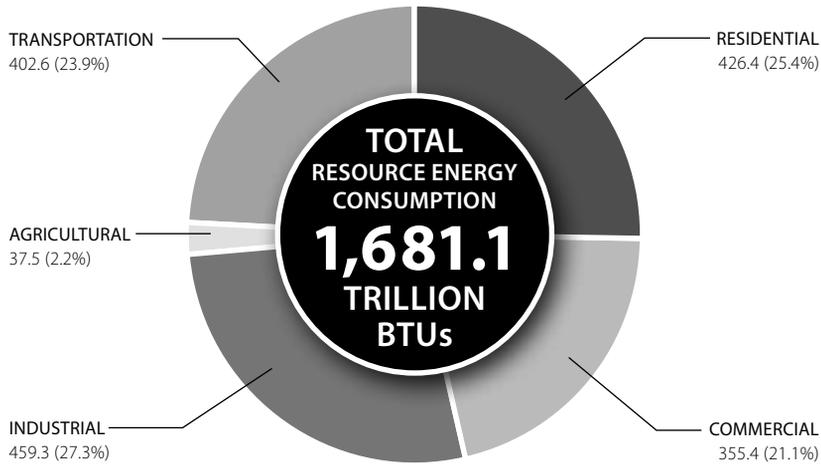
RESOURCE
ENERGY
CONSUMPTION

4.8%

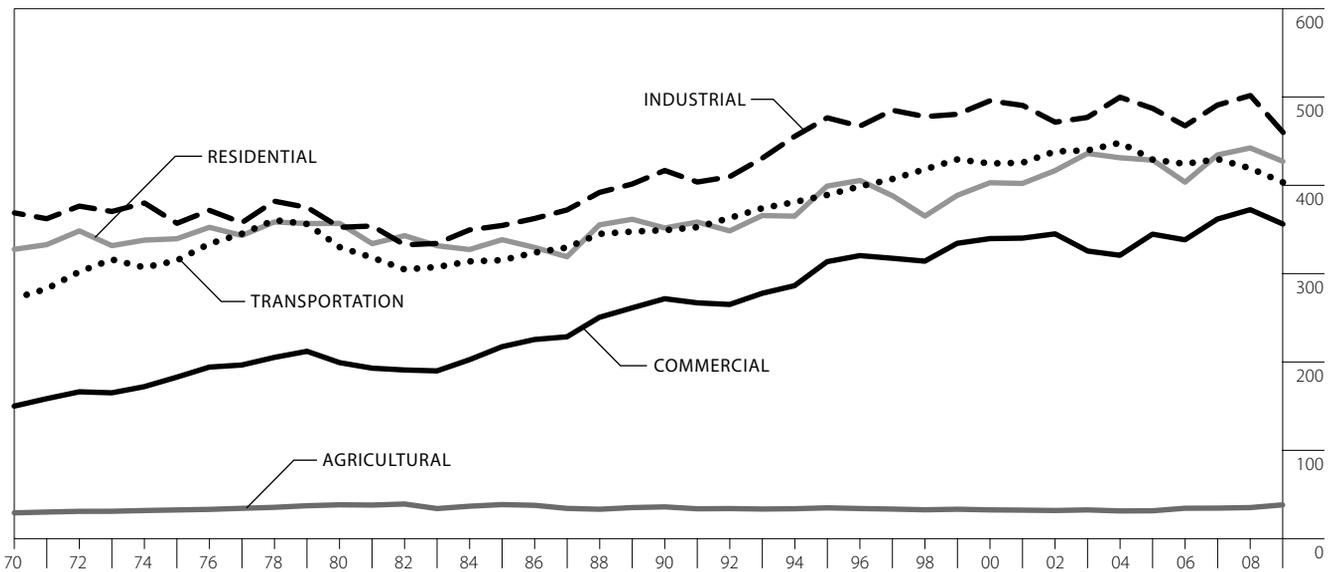
Resource energy consumption decreased 4.8 percent in 2009. Petroleum use decreased 2.3 percent; natural gas, decreased 5.1 percent; coal, decreased 10.3 percent; and renewables, increased 8.9 percent.

Wisconsin Resource Energy Consumption, by Economic Sector

2009 TRILLIONS OF BTU AND PERCENT OF TOTAL



1970-2009 TRILLIONS OF BTU



Source: Wisconsin Office of Energy Independence.

Wisconsin Resource Energy Consumption, by Economic Sector

1970-2009 TRILLIONS OF BTU AND PERCENT OF TOTAL

Year	Residential		Commercial		Industrial		Agricultural ^a		Transportation		Total
1970	326.7	28.6%	149.3	13.1%	368.0	32.2%	28.4	2.5%	271.2	23.7%	1,143.7
1975	338.7	27.7%	182.0	14.9%	356.1	29.1%	31.7	2.6%	314.0	25.7%	1,222.6
1980 ^r	356.1	28.0%	198.5	15.6%	351.7	27.6%	37.5	2.9%	329.2	25.9%	1,273.0
1985 ^r	337.6	26.8%	216.5	17.2%	353.7	28.1%	37.8	3.0%	314.4	25.0%	1,260.1
1990 ^r	350.9	24.7%	270.8	19.1%	416.0	29.3%	35.2	2.5%	348.4	24.5%	1,421.2
1995 ^r	398.4	24.8%	312.8	19.4%	475.6	29.6%	34.1	2.1%	388.3	24.1%	1,609.2
1996 ^r	404.7	25.0%	319.6	19.7%	466.1	28.7%	33.3	2.1%	398.0	24.5%	1,621.7
1997 ^r	387.4	23.8%	316.6	19.5%	484.2	29.8%	32.7	2.0%	406.4	25.0%	1,627.2
1998 ^r	364.3	22.7%	313.3	19.5%	477.0	29.7%	31.9	2.0%	417.3	26.0%	1,603.7
1999 ^r	387.8	23.3%	333.6	20.1%	479.6	28.9%	32.5	2.0%	428.5	25.8%	1,662.1
2000 ^r	402.1	23.8%	338.9	20.0%	494.9	29.3%	31.8	1.9%	423.9	25.1%	1,691.6
2001 ^r	401.3	23.8%	339.4	20.1%	489.7	29.0%	31.5	1.9%	424.8	25.2%	1,686.6
2002 ^r	415.8	24.5%	344.2	20.3%	470.7	27.7%	31.1	1.8%	437.5	25.7%	1,699.3
2003 ^r	435.3	25.5%	324.8	19.0%	476.1	27.9%	31.8	1.9%	438.7	25.7%	1,706.7
2004 ^r	430.4	24.9%	319.9	18.5%	498.9	28.9%	30.6	1.8%	447.4	25.9%	1,727.2
2005 ^r	427.7	24.9%	343.9	20.0%	486.2	28.3%	30.8	1.8%	428.3	24.9%	1,716.9
2006 ^r	402.6	24.2%	337.4	20.3%	466.5	28.0%	33.6	2.0%	423.5	25.5%	1,663.6
2007 ^r	433.6	24.8%	361.0	20.7%	490.1	28.0%	33.8	1.9%	428.8	24.5%	1,747.3
2008 ^r	441.5	25.0%	371.6	21.0%	500.7	28.3%	34.4	1.9%	418.5	23.7%	1,766.7
2009^p	426.4	25.4%	355.4	21.1%	459.3	27.3%	37.5	2.2%	402.6	23.9%	1,681.1

RESOURCE
ENERGY
CONSUMPTION
4.8%

Total resource energy consumption decreased

4.8 percent in 2009.

The only increase (8.9 percent) was in the agricultural sector.

Every other sector saw

a decrease ranging from 3.8 percent

(Transportation sector)

to 8.3 percent

(Industrial sector).

^a OEI discontinued a per-acre approach to gathering fuel data for the agriculture sector and substituted data from the Wisconsin Department of Revenue and from the federal National Agriculture Statistics Service (NASS). Data from NASS were not available previously.

^p Preliminary estimates.

^r Revised due to revisions in contributing tables.

Source: Compiled from tables in this publication for Wisconsin petroleum, natural gas, coal, renewable energy and electricity use, by economic sector, and for Wisconsin electric utility energy use.

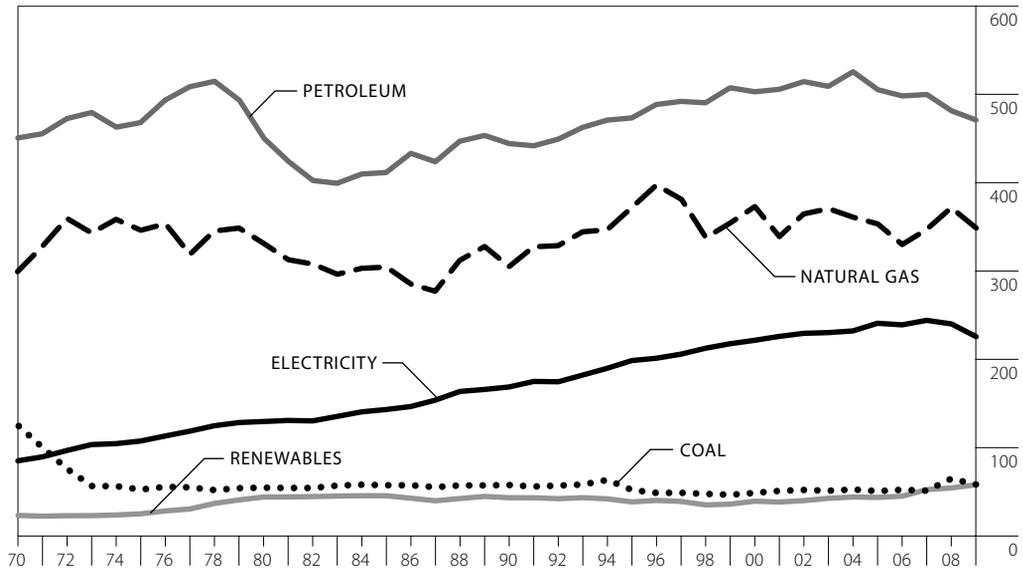
Wisconsin End-Use Energy Consumption, by Type of Fuel

END-USE ENERGY
4.0%
IN 2009

End-use energy is a measure of the energy content of fuels at the point of consumption. Since much of the energy needed to generate electricity is lost in the generation process, end-use energy consumption figures will always be lower than the directly linked resource energy consumption figures.

End-use energy decreased by 4.0 percent overall in 2009, after increasing in 2008. Petroleum continues to be the most-used end-use energy source in Wisconsin (39.9 percent).

1970-2009 TRILLIONS OF BTU



1970-2009 TRILLIONS OF BTU AND PERCENT OF TOTAL

Year	Petroleum	Natural Gas	Coal	Renewables	Electricity	Total
1970	449.8	298.7	124.3	22.5	84.4	979.6
1975	467.2	345.3	51.8	24.3	106.7	995.4
1980 ^r	449.6	330.4	53.9	43.3	128.8	1,006.1
1985 ^r	410.7	303.6	56.7	44.9	142.4	958.3
1990 ^r	443.4	304.0	56.9	43.3	167.9	1,015.5
1995 ^r	472.5	371.0	51.3	41.9	197.8	1,134.5
2000 ^r	502.1	371.9	48.0	46.6	220.8	1,189.3
2001 ^r	504.9	337.8	50.3	44.9	225.2	1,163.1
2002 ^r	513.6	363.8	51.3	46.7	228.7	1,204.1
2003 ^r	508.2	369.7	50.5	50.4	229.5	1,208.3
2004 ^r	524.7	360.1	51.9	52.0	231.4	1,220.1
2005 ^r	504.5	352.5	50.0	53.3	240.1	1,200.3
2006 ^r	497.4	329.0	51.6	55.3	238.3	1,171.6
2007 ^r	499.0	346.1	50.5	65.3	243.4	1,204.3
2008 ^r	480.6	370.6	64.0	71.9	239.3	1,226.5
2009 ^p	470.1	348.0	57.6	76.6	225.0	1,177.3

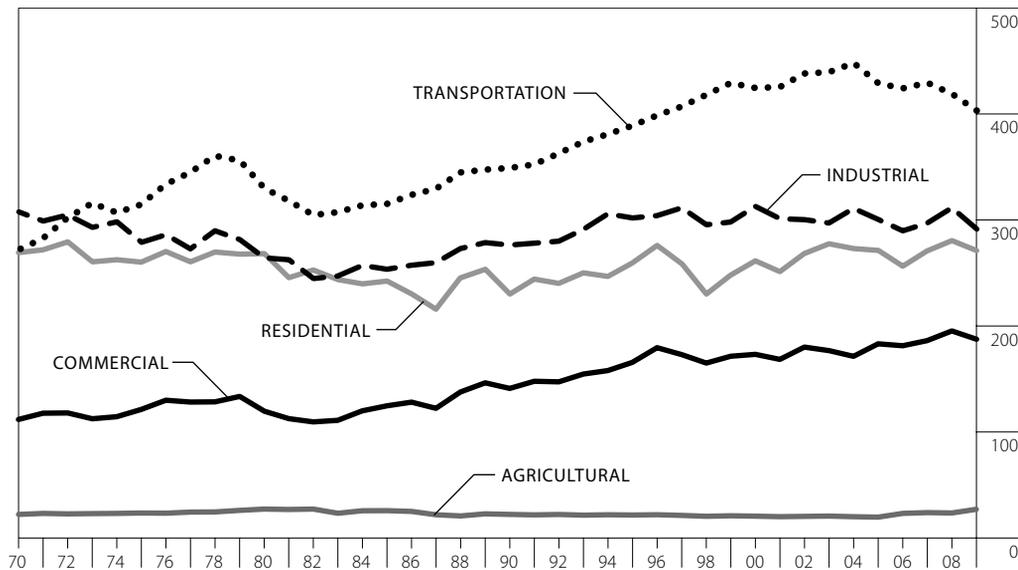
^p Preliminary estimates.

^r Revised due to revisions in contributing tables.

Source: Compiled from tables in this publication for Wisconsin petroleum, natural gas, coal, renewable and electricity use, by economic sector, and for Wisconsin electric utility energy use.

Wisconsin End-Use Energy Consumption, by Economic Sector

1970-2009 TRILLIONS OF BTU



END-USE ENERGY
4.0%
 IN 2009

End-use energy consumption decreased 4.0 percent in 2009. The transportation sector continues to be the largest user consumer of end-use energy in Wisconsin (34.2 percent).

1970-2009 TRILLIONS OF BTU AND PERCENT OF TOTAL

Year	Residential		Commercial		Industrial		Agricultural		Transportation		Total
1970	268.6	27.4%	111.2	11.3%	307.0	31.3%	21.6	2.2%	271.2	27.7%	979.6
1975	259.6	26.1%	120.6	12.1%	278.2	28.0%	22.9	2.3%	314.0	31.5%	995.4
1980 ^r	267.6	26.6%	119.0	11.8%	263.6	26.2%	26.7	2.6%	329.2	32.7%	1,006.1
1985 ^r	241.7	25.2%	124.1	12.9%	252.9	26.4%	25.2	2.6%	314.5	32.8%	958.3
1990 ^r	229.3	22.6%	140.4	13.8%	275.7	27.2%	21.6	2.1%	348.4	34.3%	1,015.5
1995 ^r	258.8	22.8%	165.1	14.6%	301.3	26.6%	21.0	1.9%	388.3	34.2%	1,134.5
2000 ^r	260.8	21.9%	172.6	14.5%	312.1	26.2%	20.0	1.7%	423.9	35.6%	1,189.3
2001 ^r	250.5	21.5%	167.8	14.4%	300.5	25.8%	19.5	1.7%	424.8	36.5%	1,163.1
2002 ^r	267.7	22.2%	179.4	14.9%	299.7	24.9%	19.8	1.6%	437.5	36.3%	1,204.1
2003 ^r	276.9	22.9%	176.1	14.6%	296.4	24.5%	20.0	1.7%	438.8	36.3%	1,208.3
2004 ^r	272.4	22.3%	170.7	14.0%	310.2	25.4%	19.4	1.6%	447.4	36.7%	1,220.1
2005 ^r	270.7	22.5%	182.5	15.2%	299.8	25.0%	19.0	1.6%	428.3	35.7%	1,200.3
2006 ^r	255.6	21.8%	180.7	15.4%	289.1	24.7%	22.6	1.9%	423.5	36.1%	1,171.6
2007 ^r	270.2	22.4%	185.6	15.4%	296.4	24.6%	23.3	1.9%	428.8	35.6%	1,204.3
2008 ^r	279.9	22.8%	194.7	15.9%	310.7	25.3%	23.0	1.9%	418.3	34.1%	1,226.5
2009 ^p	270.5	23.0%	186.9	15.9%	290.9	24.7%	26.5	2.2%	402.6	34.2%	1,177.3

p Preliminary estimates.

r Revised due to revisions in contributing tables.

Source: Compiled from tables in this publication for Wisconsin petroleum, natural gas, coal, renewable energy and electricity use, by economic sector, and for Wisconsin electric utility energy use.

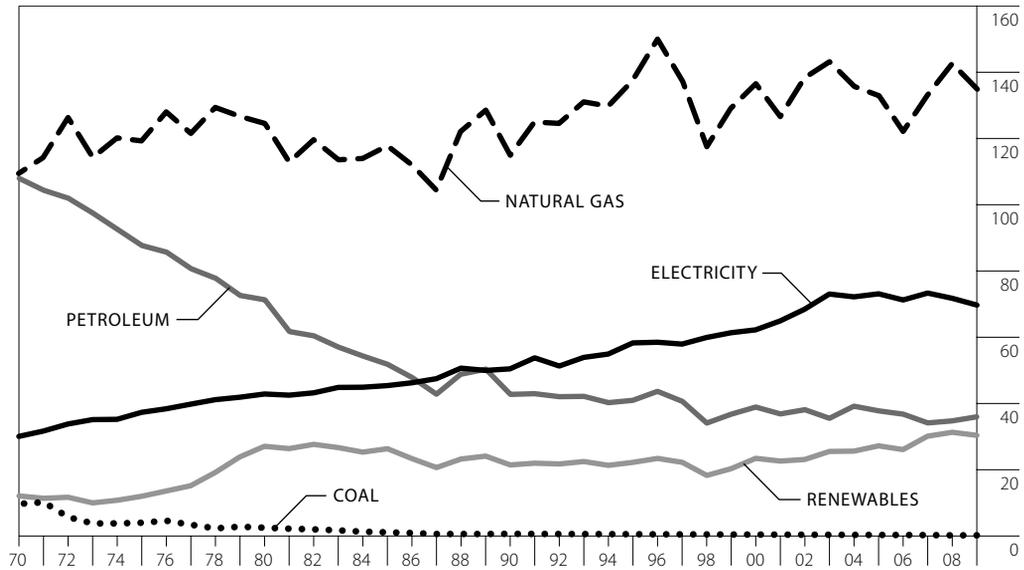
Wisconsin Residential Energy Use, by Type of Fuel

**RESIDENTIAL
END-USE
ENERGY
3.3%
IN 2009**

Residential end-use energy decreased 3.3 percent in 2009. Natural gas continues to be the dominant fuel used in Wisconsin homes (49.9 percent), providing just under half of the end-use energy used.

Electricity consumption decreased 2.8 percent from 2008, while petroleum use increased by 3.6 percent and natural gas use decreased by 5.3 percent. Between 1970 and 2009, petroleum use in the residential sector declined 66.8 percent.

1970-2009 TRILLIONS OF BTU



1970-2009 TRILLIONS OF BTU AND PERCENT OF TOTAL

Year	Petroleum	Natural Gas	Coal	Renewables ^a	Electricity	Total End Use	Total Resource ^b
1970	107.9	109.4	9.5	11.9	29.9	268.6	326.7
1975	87.6	119.2	3.8	11.8	37.2	259.6	338.7
1980 ^r	71.2	124.5	2.3	26.9	42.7	267.6	356.1
1985 ^r	51.7	117.7	0.9	26.2	45.2	241.7	337.6
1990 ^r	42.6	114.7	0.4	21.3	50.3	229.3	350.9
1995 ^r	40.8	137.5	0.3	22.0	58.2	258.8	398.4
2000 ^r	38.8	136.4	0.2	23.3	62.1	260.8	402.1
2001 ^r	36.7	126.4	0.2	22.4	64.8	250.5	401.3
2002 ^r	38.0	138.3	0.2	22.9	68.4	267.7	415.8
2003 ^r	35.4	143.1	0.2	25.4	72.9	276.9	435.3
2004 ^r	39.0	135.7	0.1	25.5	72.1	272.4	430.4
2005 ^r	37.6	132.9	0.1	27.0	73.0	270.7	427.7
2006 ^r	36.6	121.9	0.1	25.9	71.1	255.6	402.6
2007 ^r	34.0	133.0	0.1	30.0	73.2	270.2	433.6
2008 ^r	34.6	142.5	0.0	31.1	71.6	279.9	441.5
2009 ^p	35.8	134.9	0.0	30.2	69.6	270.5	426.4

^a Renewables includes wood/biomass, solar, wind and biogas.

^b Includes energy resources (and losses) attributable to electricity generation.

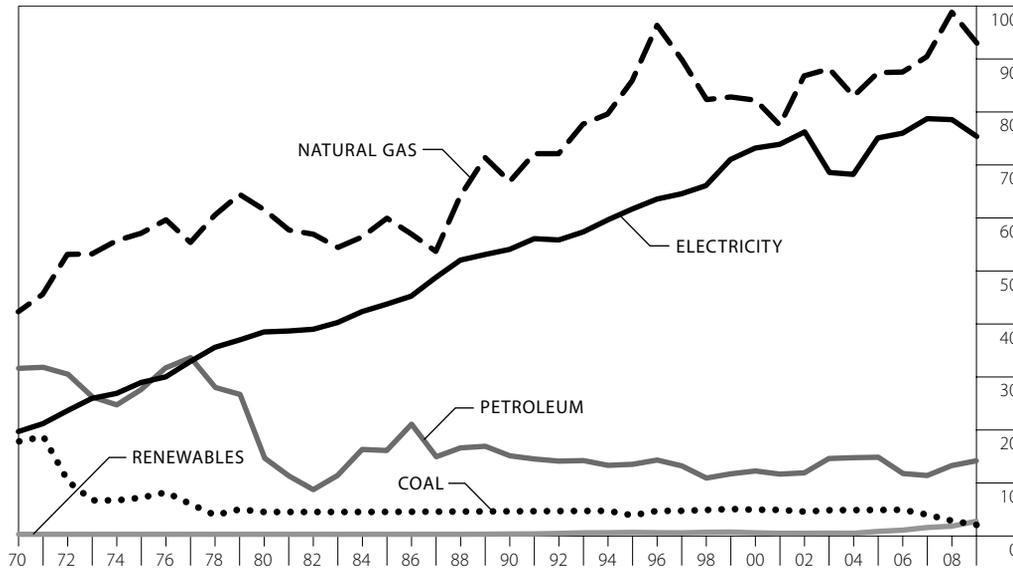
^p Preliminary estimates.

^r Revised due to revisions in contributing tables.

Source: Compiled from tables in this publication for Wisconsin petroleum, natural gas, coal, renewables and electricity use, by economic sector, and for Wisconsin electric utility energy use.

Wisconsin Commercial Energy Use, by Type of Fuel

1970-2009 TRILLIONS OF BTU



1970-2009 TRILLIONS OF BTU AND PERCENT OF TOTAL

Year	Petroleum		Natural Gas		Coal		Renewables ^a		Electricity		Total End Use	Total Resource ^b
1970	31.5	28.3%	42.2	38.0%	17.7	15.9%	0.2	0.2%	19.6	17.6%	111.2	149.3
1975	27.5	22.8%	57.0	47.2%	7.1	5.9%	0.2	0.2%	28.8	23.9%	120.6	182.0
1980	14.6	12.3%	61.4	51.6%	4.4	3.7%	0.2	0.2%	38.4	32.3%	119.0	198.5
1985	16.0	12.9%	59.8	48.2%	4.4	3.6%	0.2	0.2%	43.6	35.2%	124.1	216.5
1990	15.0	10.7%	66.7	47.5%	4.5	3.2%	0.3	0.2%	54.0	38.4%	140.4	270.8
1995	13.4	8.1%	85.8	52.0%	3.8	2.3%	0.6	0.3%	61.6	37.3%	165.1	312.8
2000 ^r	12.1	7.0%	82.1	47.6%	4.8	2.8%	0.5	0.3%	73.1	42.3%	172.6	338.9
2001	11.6	6.9%	77.3	46.1%	4.8	2.9%	0.4	0.2%	73.8	44.0%	167.8	339.4
2002 ^r	11.8	6.6%	86.7	48.3%	4.5	2.5%	0.4	0.2%	76.1	42.4%	179.4	344.2
2003	14.5	8.2%	88.0	50.0%	4.7	2.7%	0.4	0.2%	68.5	38.9%	176.1	324.8
2004 ^r	14.7	8.6%	82.8	48.5%	4.8	2.8%	0.4	0.2%	68.1	39.9%	170.7	319.9
2005 ^r	14.7	8.1%	87.3	47.8%	4.8	2.6%	0.7	0.4%	75.0	41.1%	182.5	343.9
2006	11.7	6.5%	87.4	48.4%	4.8	2.7%	1.0	0.5%	75.9	42.0%	180.7	337.4
2007 ^r	11.3	6.1%	90.3	48.7%	3.9	2.1%	1.5	0.8%	78.6	42.4%	185.6	361.0
2008 ^r	13.2	6.8%	98.6	50.7%	2.7	1.4%	1.7	0.9%	78.4	40.3%	194.7	371.6
2009 ^p	14.1	7.5%	92.9	49.7%	2.0	1.1%	2.7	1.4%	75.3	40.3%	186.9	355.4

^a Renewables includes solar, wood, biomass, wind, hydro and biogas.

^b Includes energy resources (and losses) attributable to electricity generation.

^p Preliminary estimates.

^r Revised due to revisions in contributing tables.

Source: Compiled from tables in this publication for Wisconsin petroleum, natural gas, coal, renewables and electricity use, by economic sector, and for Wisconsin electric utility energy use.

COMMERCIAL
END-USE
ENERGY
4.0%
IN 2009

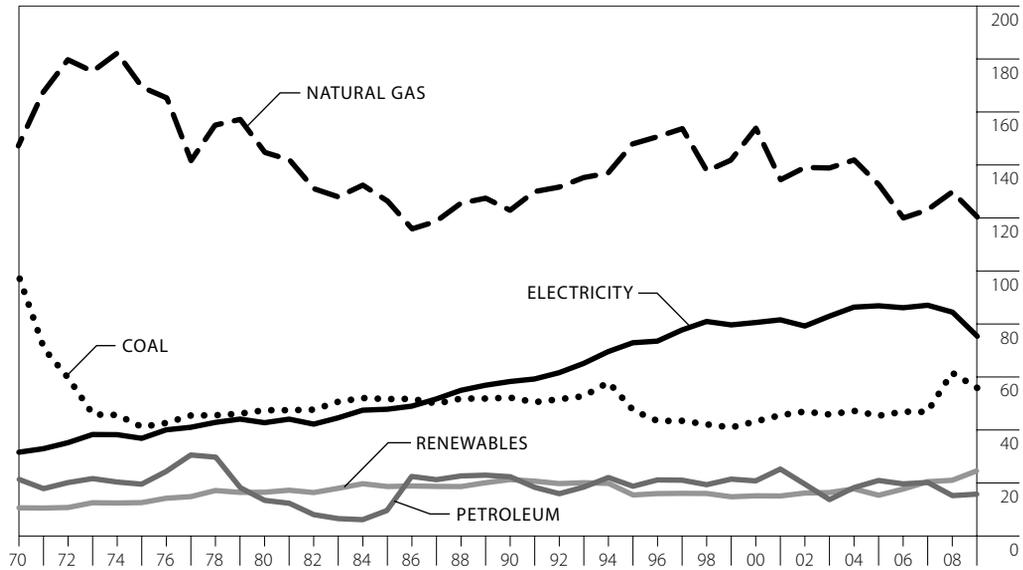
In 2009, commercial sector end-use energy decreased 4.0 percent. Since 1980, commercial end-use energy has increased 57.1 percent. Electricity energy use almost doubled (96.2 percent) over the same period. The commercial sector saw decreases in electricity use (4.0 percent) and natural gas (5.8 percent), and an increase in petroleum (6.8 percent). Natural gas remains the major energy source, providing 49.7 percent of commercial sector energy, followed by electricity at 40.3 percent. Electricity use in this sector increased 284.4 percent since 1970. Petroleum's importance in this sector has declined from providing 28.3 percent of the energy used in 1970, to presently accounting for only 7.5 percent of total commercial energy consumption.

Wisconsin Industrial Energy Use, by Type of Fuel

**INDUSTRIAL
END-USE
ENERGY
6.4%
IN 2009**

End-use energy consumption in the industrial sector decreased 6.4 percent in 2009, following an increase of 4.8 percent in 2008. The major industrial energy sources are natural gas (41.3 percent) and electricity (25.8 percent), trailed by coal (19.1 percent), renewables (8.4 percent) and petroleum (5.3 percent). While petroleum continues to be the largest end-use energy source in Wisconsin, in the industrial sector petroleum comprises the smallest amount of energy use by fuel. Use of all fuels in the industrial sector declined, with the exception of petroleum (3.8 percent increase) and renewables (17.1 percent increase). The decreases, by fuel, are: coal, 9.1 percent; electricity, 10.7 percent; and natural gas, 7.2 percent.

1970-2009 TRILLIONS OF BTU



1970-2009 TRILLIONS OF BTU AND PERCENT OF TOTAL

Year	Petroleum		Natural Gas		Coal		Renewables ^a		Electricity		Total End Use	Total Resource ^b
1970	21.1	6.9%	147.1	47.9%	97.1	31.6%	10.4	3.4%	31.4	10.2%	307.0	368.0
1975	19.3	6.9%	169.1	60.8%	40.9	14.7%	12.3	4.4%	36.6	13.2%	278.2	356.1
1980	13.2	5.0%	144.5	54.8%	47.2	17.9%	16.2	6.2%	42.5	16.1%	263.6	351.7
1985	9.4	3.7%	126.1	49.9%	51.4	20.3%	18.4	7.3%	47.6	18.8%	252.9	353.7
1990	22.1	8.0%	122.6	44.5%	51.9	18.8%	21.0	7.6%	58.0	21.1%	275.7	416.0
1995	18.5	6.1%	147.7	49.0%	47.2	15.7%	15.2	5.1%	72.7	24.1%	301.3	475.6
2000 ^r	20.5	6.6%	153.4	49.1%	43.0	13.8%	14.9	4.8%	80.3	25.7%	312.1	494.9
2001 ^r	25.0	8.3%	134.1	44.6%	45.3	15.1%	14.8	4.9%	81.3	27.1%	300.5	489.7
2002	19.3	6.4%	138.8	46.3%	46.7	15.6%	16.0	5.3%	79.0	26.3%	299.7	470.7
2003	13.4	4.5%	138.6	46.8%	45.6	15.4%	16.1	5.4%	82.7	27.9%	296.4	476.1
2004 ^r	18.0	5.8%	141.6	45.7%	47.0	15.1%	17.5	5.7%	86.1	27.8%	310.2	498.9
2005	20.7	6.9%	132.3	44.1%	45.1	15.0%	15.1	5.0%	86.6	28.9%	299.8	486.2
2006	19.4	6.7%	119.7	41.4%	46.7	16.1%	17.4	6.0%	85.9	29.7%	289.1	466.5
2007 ^r	20.0	6.7%	122.8	41.4%	46.6	15.7%	20.2	6.8%	86.8	29.3%	296.4	490.1
2008 ^r	15.0	4.8%	129.5	41.7%	61.3	19.7%	20.8	6.7%	84.2	27.1%	310.7	500.7
2009 ^p	15.5	5.3%	120.2	41.3%	55.7	19.1%	24.3	8.4%	75.2	25.8%	290.9	459.3

^a Renewables includes hydro, wood, biogas, wind and biomass.

^b Includes energy resources (and losses) attributable to electricity generation.

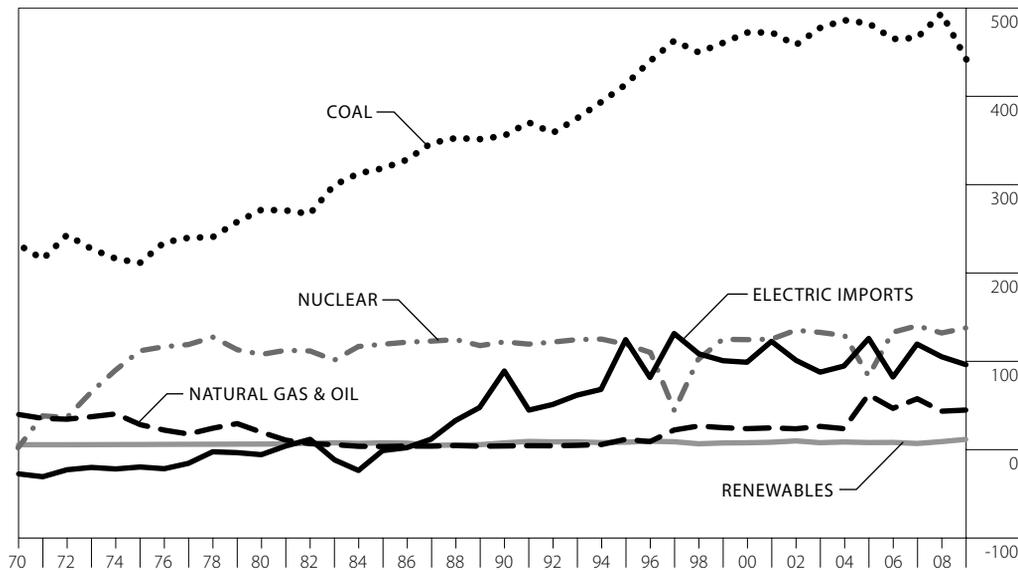
^p Preliminary estimates.

^r Revised due to revisions in contributing tables.

Source: Compiled from tables in this publication for Wisconsin petroleum, natural gas, coal, renewables and electricity use, by economic sector, and for Wisconsin electric utility energy use.

Wisconsin Energy Use for Electricity Generation, in Btu, by Type of Fuel

1970-2009 TRILLIONS OF BTU



1970-2009 TRILLIONS OF BTU AND PERCENT OF TOTAL

Year	Petroleum	Natural Gas	Coal ^a	Renewables	Nuclear ^b	Electric Imports ^c	Hydro	Total
1970	7.9 3.2%	31.1 12.5%	231.1 93.0%	4.8 1.9%	1.7 0.7%	-28.2 -11.4%	4.8 1.9%	248.4
1975	7.8 2.3%	19.8 5.9%	210.5 63.0%	5.1 1.5%	111.2 33.3%	-20.4 -6.1%	5.1 1.5%	333.9
1980	4.8 1.2%	14.1 3.6%	270.7 68.4%	5.6 1.4%	107.0 27.0%	-6.5 -1.6%	5.6 1.4%	395.8
1985	1.4 0.3%	1.4 0.3%	317.7 71.5%	7.0 1.6%	118.6 26.7%	-1.8 -0.4%	7.0 1.6%	444.2
1990	1.0 0.2%	2.4 0.4%	354.5 61.8%	6.9 1.2%	121.2 21.1%	87.7 15.3%	6.1 1.1%	573.7
1995	0.8 0.1%	10.1 1.5%	412.4 61.3%	7.7 1.1%	118.5 17.6%	123.0 18.3%	7.2 1.1%	672.5
2000 ^r	1.6 0.2%	21.4 3.0%	471.4 65.2%	7.0 1.0%	123.8 17.1%	98.1 13.6%	6.0 0.8%	723.3
2005 ^r	1.8 0.2%	59.4 7.9%	481.7 63.7%	7.2 1.0%	81.8 10.8%	124.7 16.5%	5.1 0.7%	756.6
2006 ^r	1.4 0.2%	44.5 6.1%	464.1 63.5%	7.4 1.0%	132.1 18.1%	80.8 11.1%	4.9 0.7%	730.4
2007 ^r	1.9 0.2%	54.9 7.0%	465.4 59.2%	6.2 0.8%	139.4 17.7%	118.5 15.1%	4.6 0.6%	786.4
2008 ^r	1.1 0.1%	41.7 5.4%	492.6 63.2%	8.3 1.1%	131.3 16.8%	104.4 13.4%	5.0 0.6%	779.3
2009^p	0.7 0.1%	43.4 6.0%	441.4 60.6%	10.9 1.5%	137.0 18.8%	95.5 13.1%	4.3 0.6%	728.7

a Includes petroleum coke

b Based on 10,800 Btu per kWh

c Estimated assuming 11,300 Btu of resource energy per kWh imported into Wisconsin. Numbers in parentheses and negative percentages indicate resource energy used in Wisconsin to produce electricity that was exported

p Preliminary estimates.

r Revised.

Source: Public Service Commission of Wisconsin, Accounts and Finance Division, *Statistics of Wisconsin Public Utilities*, Bulletin #8 (1970-1994); U.S. Department of Agriculture, Rural Electrification Administration, *Annual Statistical Report*, REA Bulletin 1-1 (1970-1995); Wisconsin Department of Natural Resources, Annual Survey of Point Source Emissions, unpublished (1971-2009); American Gas Association, *Gas Facts* (1970-1995); U.S. Department of Energy, Energy Information Administration, *Electric Power Monthly*, [DOE/EIA-0226(03/10)] (May 2010); Public Service Commission of Wisconsin, unpublished data (2005-2009); telephone survey of wastewater treatment facilities and landfills on biogas production (2007-2009).

ENERGY USE FOR ELECTRIC GENERATION

6.5%
IN 2009

Wisconsin's energy use for electric generation decreased by 6.5 percent in 2009. Since the early 1980s, coal and nuclear power have been dominate fuels for electricity generation.

Coal use decreased 10.4 percent and imports of electricity (and associated losses) from other states and Canada decreased 8.6 percent. Petroleum use decreased by 38.1 while natural gas increased by 4.0 percent. In 2009, of the electricity produced in Wisconsin, coal provided 60.6 percent of the energy. The proportion of energy provided by petroleum, natural gas, renewables and hydropower was only 7.5 percent, and balance of electricity was nuclear or imports to the state.

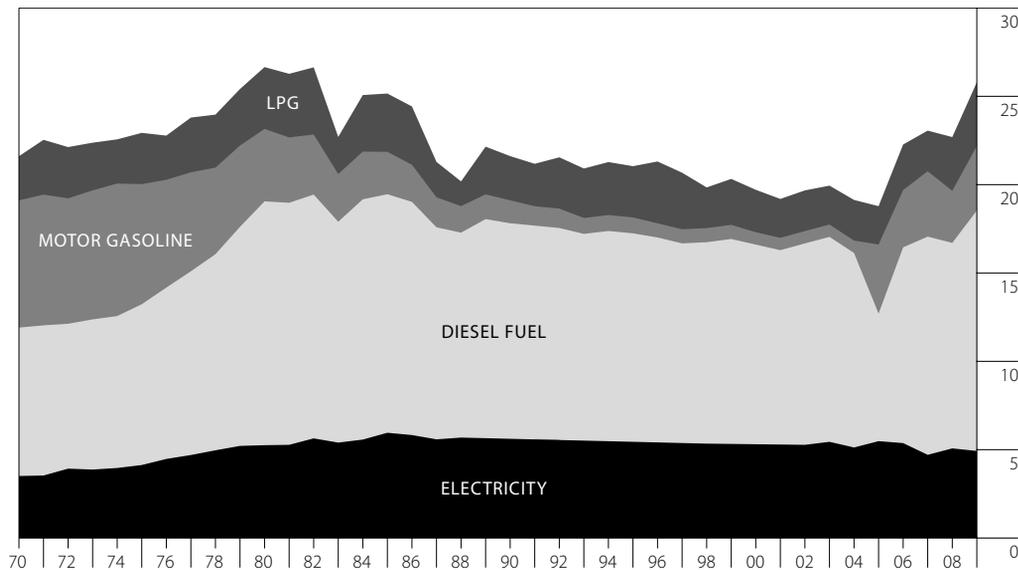
Wisconsin Agricultural Energy Use, in Btu, by Type of Fuel

AGRICULTURAL
END-USE
ENERGY
15.2%
IN 2009

Agricultural energy end-use increased by 15.2 percent in 2009. Energy use in this sector is affected by changes in mechanization and automation, and by advances in technology such as biodiesel. Agricultural sector energy use accounted for 2.2 percent of total end-use energy in Wisconsin.

Starting in 2005, figures in this table reflect a shift from a per acre approach to gathering fuel data to new data resources for petroleum fuels. Previous to 2005, distillate and kerosene data were included in the diesel figure.

1970-2009 TRILLIONS OF BTU



1970-2009 TRILLIONS OF BTU AND PERCENT OF TOTAL

Year	Motor Gasoline	Diesel Fuel ^a	LPG	Other Fuel ^b	Total Petroleum	Electricity	Total End Use	Total Resource Use ^c
1970	7.2	8.4	2.5		18.1	3.5	21.6	28.4
1975	6.8	9.1	2.9		18.8	4.1	22.9	31.7
1980	4.1	13.8	3.5		21.4	5.3	26.7	37.5
1985	2.4	13.5	3.3		19.2	6.0	25.2	37.8
1990	1.3	12.2	2.5		16.0	5.6	21.6	35.2
1995	0.9	11.8	2.9		15.6	5.4	21.0	34.1
2000	0.7	11.3	2.4		14.4	5.3	19.7	31.8
2005	3.9	7.2	2.2	0.2	13.5	5.5	19.0	30.8
2006	3.2	11.1	2.6	0.3	17.2	5.4	22.6	33.6
2007	3.7	12.4	2.3	0.2	18.6	4.7	23.3	33.8
2008 ^r	3.0	11.6	3.0	0.3	17.9	5.1	23.0	34.4
2009 ^p	3.7	13.6	3.6	0.7	21.5	4.9	26.4	37.5

^a Includes other light distillates, through 2005.

^b This fuel is primarily distillate and kerosene, but may include small amounts of coal and wood.

^c Includes energy resources (and losses) attributed to electricity generation.

^p Preliminary estimates.

^r Revised.

Source: Wisconsin Department of Administration, Division of Energy, based on U.S. Department of Agriculture, *Energy and U. S. Agriculture: 1974 Data Base* (September 1976), *1978 Census of Agriculture* (1980) and *Farm Production Expenditures* (1980-1984); Wisconsin Department of Agriculture, Trade, and Consumer Protection, *Wisconsin Agricultural Statistics* (1974-2009) and *Wisconsin Dairy Facts* (1982-2006); Wisconsin Department of Revenue fuels sales and tax data (1991-2009); National Agriculture Statistics Service, unpublished expenditure data (2005-2009); United States Department of Agriculture, Economic Research Service data, http://www.ers.usda.gov/data/FarmIncome/val_add/2000_08/Va0008WI.xls (2005-2009); Energy Information Administration, petroleum navigator, http://tonto.eia.doe.gov/dnav/pet/PET_CONS_821USEA_DCU_SWL_A.htm (2005-2009).

Wisconsin Agricultural Energy Use, in Gallons and kWh, by Type of Fuel

1970-2009 MILLIONS OF GALLONS AND MILLIONS OF kWh

Year	Motor Gasoline	Diesel ^a	LPG	Other Fuel ^b	Total Petroleum	Electricity (Millions of kWh)
1970	58.0	60.7	0.1		118.8	1,028
1975	54.3	65.8	0.1		120.2	1,210
1980	33.0	99.3	0.1		132.4	1,539
1985	19.1	97.8	0.1		117.0	1,745
1990	10.1	88.5	0.1		98.7	1,645
1995	6.9	85.0	0.1		92.0	1,595
1996	6.3	84.0	36.8		127.1	1,585
1997	6.1	81.9	33.1		121.1	1,575
1998	6.0	82.2	24.2		112.4	1,565
1999	6.1	83.7	27.6		117.4	1,560
2000	5.8	81.4	25.3		112.5	1,555
2001	5.7	79.5	23.5		108.7	1,550
2002	5.8	82.1	24.0		111.9	1,545
2003	6.0	84.1	22.8		112.9	1,595
2004	5.8	81.2	24.1		111.1	1,501
2005	31.2	52.1	22.7	1.5	107.6	1,606
2006	25.9	80.0	27.1	2.0	135.0	1,574
2007	29.6	89.1	24.1	1.7	144.5	1,379
2008 ^r	23.6	83.9	31.8	2.0	141.3	1,486
2009^p	29.2	98.1	37.8	4.7	169.9	1,443

^a Fuel oil and kerosene, through 2004.

^b This fuel is primarily distillate and kerosene, but may include small amounts of coal and wood.

^p Preliminary estimates.

^r Revised

Source: Wisconsin Department of Administration, Division of Energy, based on U.S. Department of Agriculture, *Energy and U. S. Agriculture: 1974 Data Base* (September 1976), *1978 Census of Agriculture* (1980) and Farm Production Expenditures (1980-1984); Wisconsin Department of Agriculture, Trade, and Consumer Protection, *Wisconsin Agricultural Statistics* (1974-2009) and *Wisconsin Dairy Facts* (1982-2006); and Wisconsin Department of Revenue, *Motor Vehicle Fuel Tax Statistics* (1991-2009); National Agriculture Statistics Service, unpublished expenditure data (2005-2009); United States Department of Agriculture, Economic Research Service data, http://www.ers.usda.gov/data/FarmIncome/val_add/2000_08/Va0008WI.xls (2005-2009); Energy Information Administration, petroleum navigator, http://tonto.eia.doe.gov/dnav/pet/PET_CONS_821USEA_DCU_SWI_A.htm (2005-2009).

Although farmers use manure digesters and other forms of energy generation such as biomass, and biodiesel to power and heat their farm, their primary energy comes from petroleum sources.

The Office of Energy Independence instituted a new method of data collection for fuels used in the agricultural sector. Starting in 2005, agricultural sector data have been revised to reflect the new data collection method. Previous to 2005, kerosene and distillates were included in the diesel figure.

Wisconsin Transportation Energy Use, in Btu, by Type of Fuel

TRANSPORTATION ENERGY USE

3.8%

MOTOR GASOLINE USE

0.6%

ETHANOL USE

5.8%

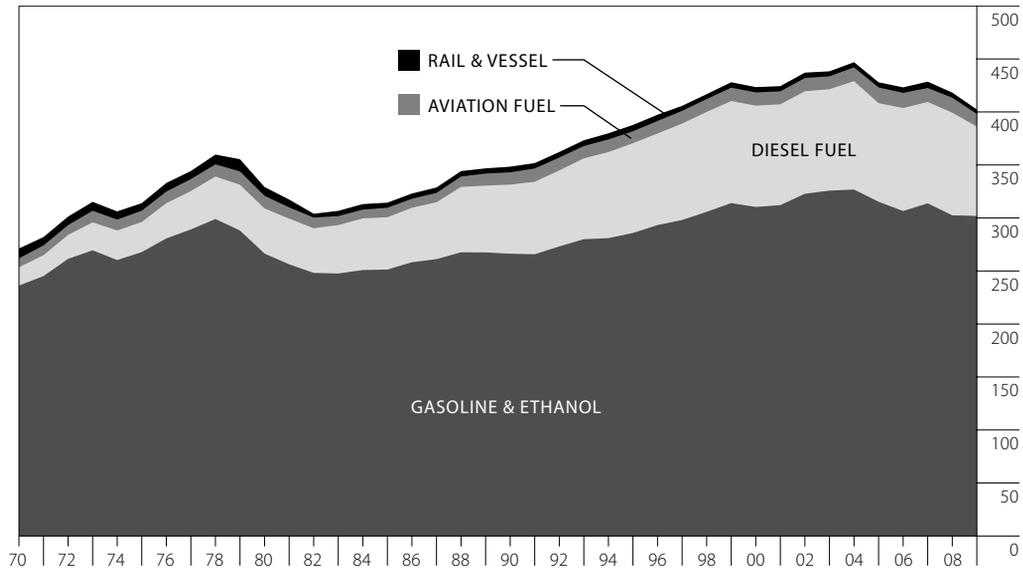
Transportation energy use decreased

3.8 percent in 2009.

Motor gasoline use decreased 0.6 percent, while ethanol use increased 5.8 percent.

Diesel fuel is used primarily for trucking freight. Diesel fuel use decreased 13.0 percent. Transportation activities consume 34.2 percent of Wisconsin's total end-use energy, accounting for 81.4 percent of petroleum use.

1970-2009 TRILLIONS OF BTU



Year	Motor Gasoline ^a	Ethanol	Diesel Fuel	Aviation		Rail Distillate & Residual	LPG	Total ^b
				Gasoline	Jet Fuel			
1970	236.2	0.0	17.3	0.7	7.7	9.3	NA	271.2
1975	267.8	0.0	28.4	0.8	9.8	7.2	NA	314.0
1980	266.4	0.0	42.6	0.9	11.0	8.3	NA	329.2
1985 ^r	251.2	0.1	49.3	0.6	8.4	4.8	NA	314.4
1990 ^r	265.6	0.7	65.2	0.6	11.0	5.3	NA	348.4
1995 ^r	281.7	4.1	84.7	0.7	10.6	5.9	0.6	388.3
2000 ^r	302.5	7.9	95.6	0.8	11.7	5.0	0.5	423.9
2001 ^r	304.9	7.3	95.1	0.7	11.5	4.9	0.4	424.8
2002 ^r	315.4	7.4	96.7	0.6	11.9	5.1	0.4	437.5
2003 ^r	317.3	8.5	95.7	0.5	11.6	4.7	0.4	438.7
2004 ^r	318.2	8.7	102.2	0.5	12.5	4.9	0.4	447.4
2005 ^r	304.9	10.4	93.1	0.5	14.3	4.9	0.3	428.3
2006 ^r	295.5	11.0	97.2	0.4	13.9	5.2	0.3	423.5
2007 ^r	300.2	13.6	95.6	0.4	12.8	6.0	0.2	428.8
2008 ^r	284.2	18.3	96.8	0.3	13.8	4.8	0.2	418.5
2009 ^p	282.5	19.4	84.2	0.3	11.8	4.2	0.2	402.6

^a Excludes ethanol.

^b Since 1994, fewer than .05 trillion Btu of compressed natural gas (CNG) were used for highway transportation.

^p Preliminary estimate.

^r Revised

NA – Not available.

Source: Wisconsin Department of Commerce, Bureau of Petroleum Inspection, *Report on Petroleum Products Inspected and Delivered to Wisconsin* (1970-1995); Wisconsin Department of Revenue, *Motor Vehicle Fuel Tax Statistics* (1970-2009) and *Petroleum Supply Annual*, DOE/EIA-3340 (1982-2009); U.S. Department of Energy, Form EIA-782C, "Monthly Report of Petroleum Products Sold for Consumption" (1983-2009); WI Office of Energy Independence surveys of airport fixed base operators and railways (2007-2009).

Wisconsin Transportation Energy Use, in Gallons, by Type of Fuel

1970-2009 MILLIONS OF GALLONS

Year	Motor Gasoline ^a	Ethanol	Diesel Fuel	Aviation		Distillate & Residual			Total ^b
				Gasoline	Jet Fuel	Rail	Vessel	LPG	
1970	1,889.1	0.0	124.8	5.9	56.7	49.2	17.0	NA	2,142.7
1975	2,142.8	0.0	205.1	6.7	72.4	36.6	14.1	NA	2,477.7
1980	2,130.7	0.0	307.1	7.0	81.4	44.8	14.8	NA	2,585.8
1985 ^r	2,009.7	1.5	356.9	4.5	62.2	27.1	7.4	NA	2,469.3
1990 ^r	2,124.4	8.3	471.1	5.0	81.6	28.6	9.0	NA	2,728.0
1995 ^r	2,254.1	48.5	612.5	5.6	78.6	35.1	6.9	6.1	3,047.4
1996 ^r	2,307.8	56.8	624.6	5.7	82.0	38.4	3.7	6.0	3,125.0
1997 ^r	2,345.5	57.5	657.6	5.8	84.0	34.1	0.0	5.8	3,190.3
1998 ^r	2,398.4	71.5	681.0	5.9	85.0	31.9	0.5	5.7	3,279.9
1999 ^r	2,461.5	75.4	696.3	6.1	87.4	37.0	0.0	5.1	3,368.8
2000 ^r	2,513.2	93.8	691.2	6.0	87.0	35.9	0.0	5.3	3,432.5
2001 ^r	2,524.5	85.9	687.7	5.9	85.0	35.2	0.0	4.6	3,428.9
2002 ^r	2,611.3	88.2	698.9	4.9	88.2	36.9	0.0	4.0	3,532.3
2003 ^r	2,639.6	100.9	692.1	4.3	86.1	33.7	0.0	3.8	3,560.5
2004 ^r	2,648.1	102.5	738.5	4.2	92.5	35.7	0.0	3.7	3,625.2
2005 ^r	2,439.2	123.0	672.7	4.1	105.7	35.1	0.0	3.0	3,382.8
2006 ^r	2,364.1	130.4	702.6	3.5	102.9	37.2	0.0	3.2	3,343.9
2007 ^r	2,401.7	161.2	691.3	2.8	94.6	43.2	0.0	2.3	3,397.2
2008 ^r	2,273.3	217.0	698.6	2.6	102.4	34.7	0.0	2.5	3,331.2
2009 ^p	2,260.3	229.7	608.7	2.4	87.0	30.1	0.0	2.2	3,220.5

^a Excludes ethanol. See adjacent column for amounts of ethanol.

^b In 2009, 179.1 thousand gasoline gallon equivalents of compressed natural gas were used for highway transportation.

^p Preliminary estimate.

^r Revised.

NA – Not available.

Source: Wisconsin Department of Commerce, Bureau of Petroleum Inspection, *Report on Petroleum Products Inspected and Delivered to Wisconsin* (1970-1995); Wisconsin Department of Revenue, *Motor Vehicle Fuel Tax Statistics* (1970-2009) and *Petroleum Supply Annual*, DOE/EIA-3340 (1982-2009); U.S. Department of Energy, Form EIA-782C, "Monthly Report of Petroleum Products Sold Into States for Consumption" (1983-2009); WI Office of Energy Independence surveys of airport fixed base operators and railways.

AVERAGE
PRICE OF
GASOLINE
\$.915
PER GALLON

In 2009, the average statewide price of gasoline decreased by \$.915 a gallon, to \$2.374 a gallon.

Ethanol, a renewable energy resource primarily distilled from corn, is used as an oxygenate in reformulated gasoline and in the blending of E10 (10 percent ethanol, 90 percent gasoline) and E85 (85 percent ethanol, 15 percent gasoline).

The increased use of ethanol is also linked to the increased availability of ethanol statewide.

CHAPTER 2

Energy Use by Type of Fuel

Wisconsin's Contributions to the Advancement of Renewable Energy

Both of the projects on this page were partially funded by a low-interest revolving loan fund from the State Energy Program (SEP) through the American Recovery and Reinvestment Act (ARRA). The loans, administered by the Wisconsin Office of Energy Independence and the Wisconsin Department of Commerce, assist manufacturers that are investing to produce renewable energy or components, or making steps to improve their competitiveness through energy efficiency or renewable energy deployment.



Whey Better Power

Betin-Monotchevre, Inc.—the nation's largest goat-cheese manufacturer—is overcoming one of the biggest obstacles every cheese factory encounters when it comes to their waste. The company is installing an anaerobic digester to process their whey and wastewater into energy.

Previously, all of the plant's wastewater was hauled off-site for land application. Now the digester processes the whey and wastewater and turns it into methane gas which is used to generate electricity to power both the digester and to help meet up to 80 percent of the company's energy needs.

The digester was installed as part of an expansion that added 22,000 feet to a 90,000-square-foot plant. The project is expected to create 13 jobs for the firm, which employs 102. The \$3.5 million project was partly financed by a \$550,000 SEP ARRA loan.

Idle Free System Saves Fuel and the Air

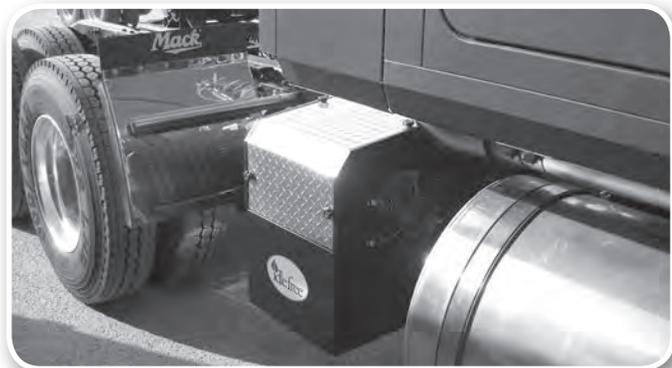


Idle Free Systems, Inc., the developer of a battery-based system to allow truck operators to save fuel, money and the air when the truck is in idle-mode, is expanding their Watertown plant.

The company received a \$450,000 SEP ARRA which with leveraged dollars, represents a total investment of more than \$2 million, and will assist in the creation of 20 jobs.

When an Idle Free idle reduction system is in use for an hour, it saves roughly a gallon and a half of fuel. This quickly translates into real savings for the environment, and for drivers.

In addition, with funding from the Wisconsin Energy Independent Fund, Idle Free is working on a Biodiesel Flow system—breakthrough technology that allows the use of biodiesel year round, by ensuring consistent fuel flow throughout a vehicle system regardless of temperature or biodiesel blend.



Wisconsin Petroleum Use, by Economic Sector

1970-2009 TRILLIONS OF BTU AND PERCENT OF TOTAL

Year	Residential		Commercial		Industrial		Agricultural ^a		Transportation		Electric Utility		Total	Total End Use
1970	107.9	23.6%	31.5	6.9%	21.1	4.6%	18.1	4.0%	271.2	59.3%	7.9	1.7%	457.7	449.8
1975	87.6	18.4%	27.5	5.8%	19.3	4.1%	18.8	4.0%	314.0	66.1%	7.8	1.6%	475.0	467.2
1980	71.2	15.7%	14.6	3.2%	13.2	2.9%	21.4	4.7%	329.2	72.4%	4.8	1.1%	454.4	449.6
1985	51.7	12.5%	16.0	3.9%	9.4	2.3%	19.2	4.7%	314.4	76.3%	1.4	0.3%	412.1	410.7
1990	42.6	9.6%	15.0	3.4%	22.1	5.0%	16.0	3.6%	347.7	78.2%	1.0	0.2%	444.4	443.4
1995	40.8	8.6%	13.4	2.8%	18.5	3.9%	15.6	3.3%	384.2	81.2%	0.8	0.2%	473.3	472.5
1996	43.5	8.9%	14.2	2.9%	20.9	4.3%	15.9	3.3%	393.2	80.5%	0.9	0.2%	488.6	487.7
1997	40.5	8.2%	13.1	2.7%	20.8	4.2%	15.3	3.1%	401.5	81.5%	1.5	0.3%	492.7	491.2
1998	33.9	6.9%	10.8	2.2%	19.1	3.9%	14.5	3.0%	411.3	83.7%	1.8	0.4%	491.4	489.6
1999	36.6	7.2%	11.6	2.3%	21.2	4.2%	15.0	2.9%	422.2	83.0%	2.0	0.4%	508.6	506.6
2000 ^r	38.8	7.7%	12.1	2.4%	20.5	4.1%	14.7	2.9%	416.0	82.6%	1.6	0.3%	503.7	502.1
2001 ^r	36.7	7.2%	11.6	2.3%	25.0	4.9%	14.2	2.8%	417.5	82.5%	1.3	0.3%	506.2	504.9
2002 ^r	38.0	7.4%	11.8	2.3%	19.3	3.7%	14.5	2.8%	430.1	83.4%	2.1	0.4%	515.7	513.6
2003 ^r	35.4	6.9%	14.5	2.8%	13.4	2.6%	14.6	2.9%	430.3	84.5%	1.3	0.2%	509.4	508.2
2004 ^r	39.0	7.4%	14.7	2.8%	18.0	3.4%	14.3	2.7%	438.7	83.4%	1.5	0.3%	526.2	524.7
2005 ^r	37.6	7.4%	14.7	2.9%	20.7	4.1%	13.6	2.7%	417.9	82.5%	1.8	0.4%	506.3	504.5
2006 ^r	36.6	7.3%	11.7	2.3%	19.4	3.9%	17.2	3.5%	412.5	82.7%	1.4	0.3%	498.8	497.4
2007 ^r	34.0	6.8%	11.3	2.3%	20.0	4.0%	18.6	3.7%	415.2	82.9%	1.9	0.4%	500.9	499.0
2008 ^r	34.6	7.2%	13.2	2.7%	15.0	3.1%	17.9	3.7%	400.0	83.0%	1.1	0.2%	481.7	480.6
2009^p	35.8	7.6%	14.1	3.0%	15.5	3.3%	21.5	4.6%	383.2	81.4%	0.7	0.1%	470.8	470.1

OVERALL
PETROLEUM
USE
2.3%

Overall petroleum use measured in British thermal units (Btu) decreased 2.3 percent in 2009. Of the total petroleum used in Wisconsin, 81.4 percent is in the transportation sector, which saw a decrease of 4.2 percent.

Agriculture sector numbers do not include agricultural processing plants; these are classified in the commercial sector.

^a OEI discontinued a per-acre approach to gathering fuel data for the agriculture sector and substituted data from the Wisconsin Department of Revenue and the federal National Agriculture Statistics Service (NASS). Data from NASS were not available previous to 2005.

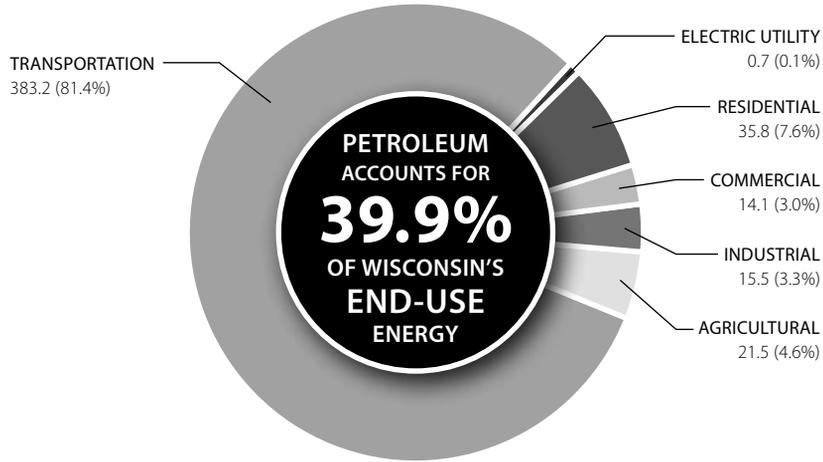
^p Preliminary estimates.

^r Revised.

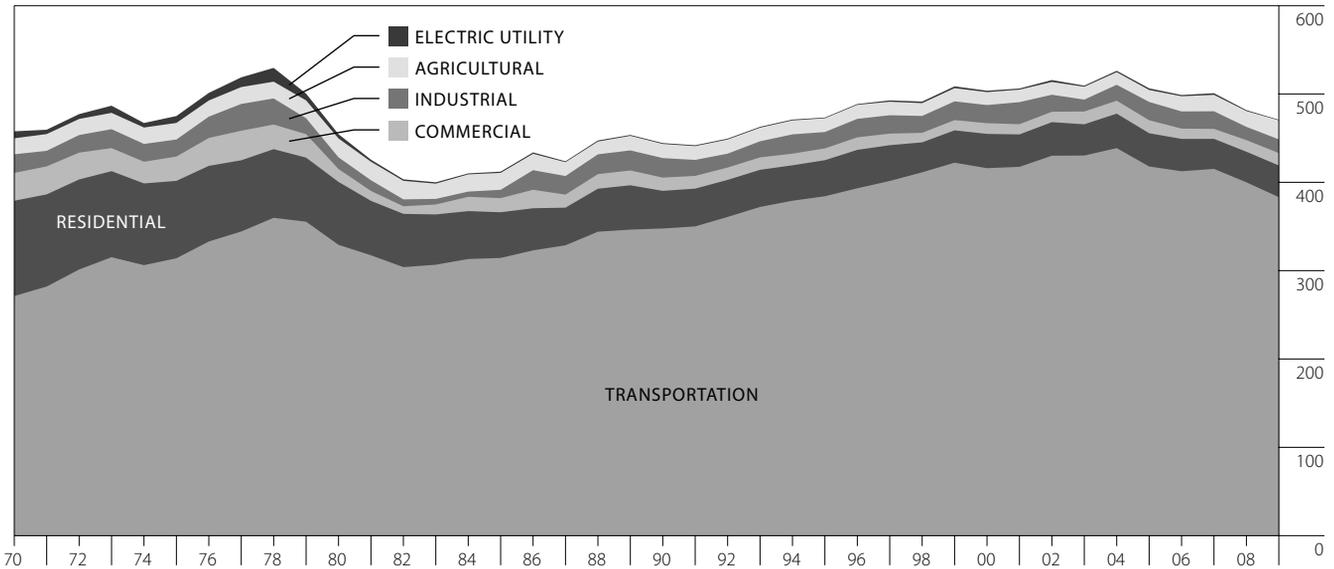
Source: Wisconsin Department of Commerce, Bureau of Petroleum Inspection, *Report on Petroleum Products Inspected and Delivered to Wisconsin* (1970-1995); Wisconsin Department of Revenue, *Collection of Petroleum Inspection Fees* (1996-2006) and *Fuel Tax Statistical Report* (1996-2009); Office of Energy Independence phone surveys of airport fixed base operators and railways; U.S. Department of Energy, Form EIA-782C, "Monthly Report of Petroleum Products Sold Into States for Consumption" (1983-2007); U.S. Department of Energy, Form EIA-821 (2003-2009); unpublished data from the National Agriculture Statistics Service (2005-2009).

Wisconsin Petroleum Use, by Economic Sector

2009 TRILLIONS OF BTU AND PERCENT OF TOTAL



1970-2009 TRILLIONS OF BTU



Source: Wisconsin Office of Energy Independence.

Wisconsin Petroleum Use, in Btu, by Type of Product

1970-2009 TRILLIONS OF BTU

Year	Gasoline ^{a,b}	Jet Fuel	Light Distillate	Middle Distillate	Residual Fuel Oil	LPG ^c	Total
1970	244.1	7.7	35.1	123.4	21.9	25.7	457.9
1975	275.4	9.8	16.9	133.5	13.3	26.0	474.9
1980	271.3	11.0	11.3	124.7	11.0	25.2	454.5
1985	254.3	8.4	13.4	110.7	2.3	23.1	412.2
1990	267.8	11.0	10.8	122.3	7.9	24.8	444.6
1995	285.3	10.6	9.6	131.3	7.6	30.9	475.3
1996	292.2	11.1	10.4	136.2	6.8	34.2	490.9
1997	297.0	11.3	10.7	137.4	6.8	31.8	495.0
1998	304.2	11.5	10.9	135.5	4.9	27.3	494.3
1999	312.2	11.8	11.2	142.0	5.0	29.4	511.6
2000 ^r	307.7	11.7	11.3	141.1	5.3	30.3	507.4
2001 ^r	309.7	11.5	11.4	142.2	5.6	27.7	508.1
2002 ^r	320.3	11.9	11.2	141.5	4.3	30.1	519.2
2003 ^r	322.7	11.6	11.6	134.0	5.8	29.2	515.0
2004 ^r	322.5	12.5	12.6	146.1	7.2	30.3	531.3
2005 ^r	309.3	14.3	11.7	135.0	8.6	27.5	506.3
2006 ^r	299.2	13.9	11.7	137.8	4.5	31.8	498.8
2007 ^r	304.3	12.8	10.4	137.5	4.9	30.9	500.9
2008 ^r	287.5	13.8	10.8	134.4	4.0	31.3	481.7
2009^p	286.5	11.8	9.5	125.4	4.4	33.3	470.8

Middle distillate is used both as a heating fuel in furnaces and boilers, and as diesel fuel in trucks. Light distillate includes kerosene and is primarily used as a thinner during periods of cold weather.

a Includes both vehicle and aviation gasoline.

b Does not include ethanol. Ethanol use in motor gasoline is shown in the Renewable Energy chapter and later in this chapter.

c Liquefied petroleum gas (propane).

p Preliminary estimates.

r Revised.

Source: Wisconsin Department of Commerce, Bureau of Petroleum Inspection, *Report on Petroleum Products Inspected and Delivered to Wisconsin* (1970-1995); Wisconsin Department of Revenue, *Collection of Petroleum Inspection Fees* (1996-2006) and *Fuel Tax Statistical Report* (1996-2009); U.S. Department of Energy, Form EIA-782C, "Monthly Report of Petroleum Products Sold into States for Consumption" http://www.eia.doe.gov/oil_gas/petroleum/data_publications/prime_supplier_report/psrh_2008_09.html. (1983-2009); WI Office of Energy Independence telephone surveys of airport fixed base operators and railways; unpublished expenditure data from the National Agriculture Statistics Service (2005-2009).

Wisconsin Petroleum Use, in Gallons, by Type of Product

GASOLINE
USE**0.3%**

JET FUEL

15.0%

In 2009, gasoline use
decreased by 0.3 percent
and jet fuel decreased
by 15.0 percent.

LP USE

6.4%

LP use increased by
6.4 percent.

1970-2009 MILLIONS OF GALLONS

Year	Gasoline ^{a,b}	Jet Fuel	Light Distillate	Middle Distillate	Residual Fuel Oil	LPG ^c	Total
1970	1,953.0	56.7	260.2	889.7	146.2	269.0	3,574.8
1975	2,203.5	72.4	125.0	962.8	88.8	272.6	3,725.1
1980	2,170.5	81.4	83.4	899.4	73.5	264.1	3,572.3
1985	2,033.3	62.2	99.2	798.2	15.5	241.5	3,249.9
1990	2,139.5	81.6	80.1	882.2	52.7	260.2	3,496.3
1995	2,266.6	78.6	72.3	946.4	50.5	323.8	3,738.2
1996	2,319.8	82.0	77.3	982.2	45.2	357.9	3,864.4
1997	2,357.3	84.0	79.4	990.5	45.6	332.9	3,889.7
1998	2,410.3	85.0	80.8	976.6	32.8	285.9	3,871.4
1999	2,473.7	87.4	82.9	1,024.3	33.1	307.7	4,009.1
2000 ^r	2,431.2	87.0	83.9	1,017.4	35.4	317.5	3,972.3
2001 ^r	2,450.1	85.0	84.3	1,025.6	37.2	306.1	3,988.2
2002 ^r	2,533.7	88.2	82.9	1,020.3	28.8	314.7	4,068.6
2003 ^r	2,549.0	86.1	86.1	966.3	26.4	322.6	4,036.5
2004 ^r	2,555.6	92.5	93.2	1,053.7	45.5	321.6	4,162.1
2005 ^r	2,474.6	105.7	86.6	973.2	57.1	288.4	3,985.6
2006 ^r	2,393.6	102.9	86.3	993.5	30.1	332.6	3,938.9
2007 ^r	2,434.2	94.6	77.3	991.7	32.9	323.9	3,954.5
2008 ^r	2,299.6	102.4	79.6	969.0	26.9	327.3	3,804.7
2009^p	2,291.9	87.0	70.3	904.5	29.0	348.2	3,731.0

a Includes both vehicle and aviation gasoline.

b Does not include the ethanol. Ethanol use in motor gasoline is shown in the Renewable Energy chapter and later in this chapter.

c Liquefied petroleum gas (propane).

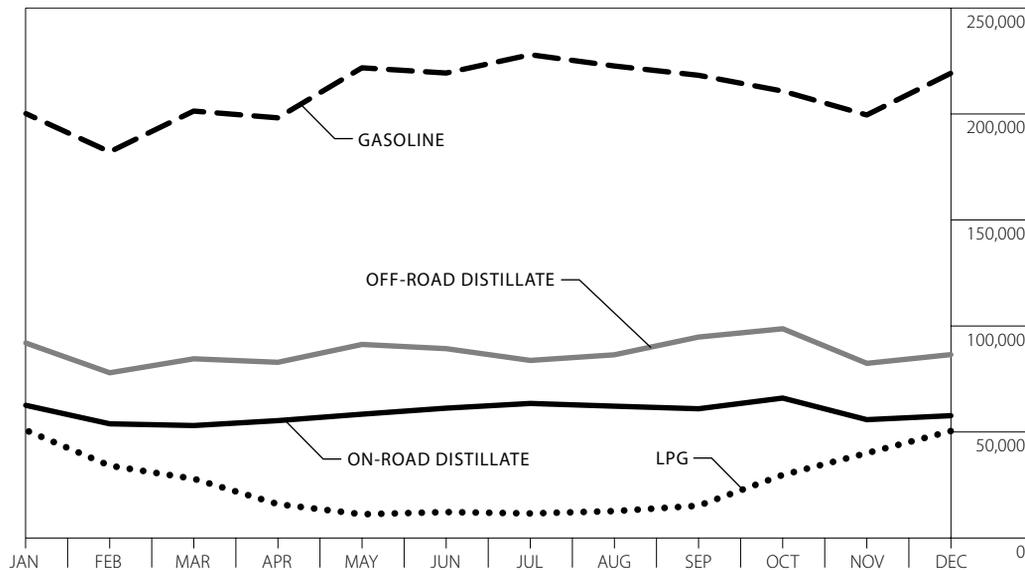
p Preliminary estimates.

r Revised.

Source: Wisconsin Department of Commerce, Bureau of Petroleum Inspection, *Report on Petroleum Products Inspected and Delivered to Wisconsin* (1970-1995); Wisconsin Department of Revenue, *Collection of Petroleum Inspection Fees* (1996-2006) and *Fuel Tax Statistical Report* (1996-2009); U.S. Department of Energy Form EIA-782C, "Monthly Report of Petroleum Products Sold into States for Consumption" (1983-2009) http://www.eia.doe.gov/oil_gas/petroleum/data_publications/prime_supplier_report/psrh_2008_09.html; WI Office of Energy Independence telephone surveys of airport fixed base operators and railways; unpublished data from the National Agriculture Statistics Service (2005-2009).

Petroleum Product Deliveries to Wisconsin, by Month

2009 THOUSANDS OF GALLONS



In general, gasoline sales peaked during the summer vacation months, while deliveries of fuels used for heating (off-road distillate and LPG) peaked during winter months.

Figures will not match the consumption figures in earlier pages in this chapter because deliveries do not always translate to sales during the same time frame.

A map of Wisconsin's petroleum pipelines can be found in the Map Appendix at the back of the book.

Month	Off-Road Distillate ^a	On-Road Distillate ^b	LPG ^c	Gasoline ^d
January	91,679	62,283	50,552	199,889
February	77,596	53,543	33,771	181,777
March	84,202	52,723	27,596	201,046
April	82,551	55,048	15,624	197,845
May	90,976	58,084	10,881	221,441
June	88,986	60,924	11,916	218,992
July	83,433	63,144	11,275	227,621
August	86,093	61,858	12,363	222,302
September	94,458	60,636	14,910	217,922
October	98,363	65,676	29,407	210,461
November	82,059	55,490	39,708	199,184
December	86,183	57,383	50,124	218,873
Total	1,046,580	706,793	308,126	2,517,353

^a Kerosene, No. 1 and No. 2 fuel oil used for heating and processing, jet fuel and aviation gasoline used for flying. Does not include non-taxed diesel fuel used on farms. Numbers in italics are incomplete data because some data are withheld by the federal Energy Information Administration to protect reporter identification.

^b On-road diesel fuel sales.

^c Liquefied petroleum gas (propane).

^d Vehicle gasoline sales; does not include aviation gasoline. Includes ethanol.

Source: Wisconsin Department of Revenue, *Monthly Motor Fuel Consumption Report* (2008-2009); U.S. Department of Energy, Form EIA-782C, "Monthly Report of Petroleum Products Sold into States for Consumption" (2009) http://www.eia.doe.gov/oil_gas/petroleum/data_publications/prime_supplier_report/psrh_2008_09.html.

Wisconsin Production and Use of Ethanol in Reformulated Gasoline, E10 and E85

ETHANOL
PRODUCTION
7.6%

In 2009, Wisconsin ethanol production decreased 7.6 percent.

Ethanol use in Wisconsin increased 7.2 percent with increased consumption of RFG (9.0 percent), E10 (6.3 percent) and E85 (6.3 percent).

The increase in ethanol usage in Wisconsin is related to a number of factors including: major oil companies blending ethanol with gasoline at retail locations to stretch gasoline; the number of E85 gas stations increased^d; retail outlets where E85 is sold are likely to sell E10 at their other pumps; and the overall saturation of Wisconsin's gasoline by ethanol statewide.

Ethanol is one of the few energy sources that Wisconsin exports.

1994-2009 THOUSANDS OF GALLONS

Year	Production	Consumption			Total
		RFG ^a	E10 ^b	E85 ^c	
1994	NA	NA	13,331	9	13,340
1995	NA	38,048	10,461	17	48,526
1996	NA	49,784	6,973	36	56,793
1997	NA	49,460	8,012	54	57,526
1998	NA	66,571	4,877	58	71,506
1999	NA	67,400	7,937	63	75,400
2000	NA	70,724	23,080	43	93,847
2001	NA	67,449	18,458	32	85,939
2002	15,529	71,152	17,026	48	88,226
2003	76,947	77,302	23,536	86	100,924
2004	106,886	74,816	27,617	106	102,539
2005	171,764	73,046	49,186	723	122,955
2006	210,386	77,614	50,487	2,302	130,403
2007	283,800	69,963	87,128	4,144	161,235
2008 ^r	447,300	68,047	141,762	4,800	214,609
2009^p	413,348	74,142	150,756	5,100	229,998

^a RFG is reformulated gasoline. Starting January 1, 1995, the federal government mandated its sale in six southeastern Wisconsin counties to comply with the Clean Air Act. Ethanol is used to provide the oxygenate required in RFG.

^b E10 is a motor fuel blend consisting of 10 percent ethanol and 90 percent conventional gasoline (non RFG).

^c E85 is a motor fuel consisting of 85 percent ethanol and 15 percent gasoline.

^d From August 2009 to April 30, 2010, the number of E85 gas stations increased from 125 to 127.

^p Preliminary.

^r Revised.

NA – Not available.

Source: Wisconsin Department of Revenue; Wisconsin Office of Energy Independence survey of E85 distributors; U.S. Department of Energy, Form EIA-782C, *Monthly Report of Petroleum Products Sold into States for Consumption* (2009) http://www.eia.doe.gov/oil_gas/petroleum/data_publications/prime_supplier_report/psrh_2008_09.html.

Wisconsin Liquefied Petroleum Gas Use, by Economic Sector

1970-2009 MILLIONS OF GALLONS AND PERCENT OF TOTAL

Year	Residential		Commercial		Industrial		Agricultural ^a		Transportation		Total
1970	190.9	70.9%	23.8	8.8%	28.2	10.5%	26.2	9.7%	NA	0.0%	269.1
1975	176.5	64.7%	36.5	13.4%	29.5	10.8%	30.1	11.0%	NA	0.0%	272.6
1980	176.3	66.7%	33.5	12.7%	17.5	6.6%	36.9	14.0%	NA	0.0%	264.2
1985	158.2	65.5%	29.4	12.2%	19.3	8.0%	34.6	14.3%	NA	0.0%	241.5
1990	162.1	62.3%	36.5	14.0%	35.7	13.7%	25.9	10.0%	NA	0.0%	260.2
1995	203.8	62.9%	48.0	14.8%	35.0	10.8%	30.9	9.5%	6.1	1.9%	323.8
1996	219.5	61.3%	51.7	14.4%	43.9	12.3%	36.8	10.3%	6.0	1.7%	357.9
1997	210.3	63.2%	48.7	14.6%	35.0	10.5%	33.1	9.9%	5.8	1.7%	332.9
1998	183.5	64.2%	42.4	14.8%	30.1	10.5%	24.2	8.5%	5.7	2.0%	285.9
1999	197.9	64.3%	45.8	14.9%	31.3	10.2%	27.6	9.0%	5.1	1.7%	307.7
2000	211.0	66.5%	47.2	14.9%	28.7	9.0%	25.3	8.0%	5.3	1.7%	317.5
2001	204.0	66.6%	45.8	15.0%	28.3	9.2%	23.4	7.6%	4.6	1.5%	306.1
2002	213.1	67.7%	47.6	15.1%	26.0	8.3%	24.0	7.6%	4.0	1.3%	314.7
2003	224.0	69.4%	50.0	15.5%	22.0	6.8%	22.8	7.1%	3.8	1.2%	322.6
2004	221.3	68.8%	49.5	15.4%	23.1	7.2%	24.1	7.5%	3.6	1.1%	321.6
2005	198.5	68.8%	43.6	15.1%	20.7	7.2%	22.7	7.9%	3.0	1.0%	288.4
2006	228.3	68.7%	50.2	15.1%	23.8	7.1%	27.1	8.1%	3.2	1.0%	332.6
2007	224.6	69.4%	49.4	15.3%	23.4	7.2%	24.1	7.5%	2.3	0.7%	323.9
2008 ^r	221.2	67.6%	48.7	14.9%	23.1	7.1%	31.8	9.7%	2.5	0.8%	327.3
2009 ^p	232.6	66.8%	51.2	14.7%	24.3	7.0%	37.8	10.9%	2.2	0.6%	348.2

LPG USE
6.4%

Liquefied petroleum gas (LPG), (propane), use increased 6.4 percent in 2009.

Agriculture sector numbers do not include agricultural processing plants; these are classified in the commercial sector.

Increased usage of LP in the Agricultural sector (18.9 percent) is likely related to crop drying applications.

^a Starting with 2005 data, OEI discontinued a per-acre approach to gathering fuel data for the agriculture sector and substituted data from the Wisconsin Department of Revenue and from the federal National Agriculture Statistics Service (NASS).

^p Preliminary estimates.

^r Revised.

NA – Not available.

Source: U.S. Department of Energy, Form EIA-25, "Prime Supplier's Monthly Report" (1974-2009) and Form EIA-782C, "Monthly Report of Petroleum Products Sold into States for Consumption" (1983-2009) http://www.eia.doe.gov/oil_gas/petroleum/data_publications/prime_supplier_report/psrh_2008_09.html; National Agricultural Statistics Service, unpublished data (2005-2009); Wisconsin Department of Revenue, *Monthly Motor Fuel Consumption Report* (2008-2009).

Wisconsin Natural Gas Use, by Economic Sector

NATURAL GAS
END-USE
6.1%
FROM 2008

In 2009, warmer winter weather led to decreased natural gas use in the residential sector. In the electric sector, natural gas used to generate electricity increased by 4 percent. The electric sector includes natural gas used by utilities and independent power producers who generate and sell electricity to other companies. Overall, natural gas end-use decreased by 6.1 percent from 2008. Natural gas use is up 14.5 percent from 1990.

A map of Natural Gas Company Territories and Major Pipelines can be found in the Map Appendix in this publication.

1970-2009 TRILLIONS OF BTU AND PERCENT OF TOTAL

Year	Residential		Commercial ^a		Industrial		Electric ^b		Total	Total End Use
1970	109.4	33.2%	42.2	12.8%	147.1	44.6%	31.1	9.4%	329.8	298.7
1975	119.2	32.6%	57.0	15.6%	169.1	46.3%	19.8	5.4%	365.1	345.3
1980	124.5	36.1%	61.4	17.8%	144.5	41.9%	14.1	4.1%	344.5	330.4
1985	117.7	38.6%	59.8	19.6%	126.1	41.3%	1.4	0.5%	305.0	303.6
1990	114.7	37.4%	66.7	21.8%	122.6	40.0%	2.4	0.8%	306.4	304.0
1995	137.5	36.1%	85.8	22.5%	147.7	38.8%	10.1	2.7%	381.1	371.0
1996	149.8	37.1%	96.1	23.8%	150.4	37.3%	7.4	1.8%	403.7	396.3
1997	137.3	34.3%	89.7	22.4%	153.4	38.3%	20.0	5.0%	400.4	380.4
1998	117.2	32.5%	82.2	22.8%	137.4	38.1%	24.2	6.7%	361.0	336.8
1999	129.1	34.4%	82.7	22.0%	141.6	37.7%	22.1	5.9%	375.5	353.4
2000 ^r	136.4	34.7%	82.1	20.9%	153.4	39.0%	21.4	5.4%	393.3	371.9
2001 ^r	126.4	35.1%	77.3	21.4%	134.1	37.2%	22.6	6.3%	360.4	337.8
2002 ^r	138.3	36.0%	86.7	22.5%	138.8	36.1%	20.7	5.4%	384.5	363.8
2003	143.1	36.3%	88.0	22.3%	138.6	35.2%	24.3	6.2%	394.0	369.7
2004 ^r	135.7	35.6%	82.8	21.7%	141.6	37.1%	21.4	5.6%	381.5	360.1
2005 ^r	132.9	32.3%	87.3	21.2%	132.3	32.1%	59.4	14.4%	411.9	352.5
2006	121.9	32.6%	87.4	23.4%	119.7	32.0%	44.5	11.9%	373.5	329.0
2007	133.0	33.2%	90.3	22.5%	122.8	30.6%	54.9	13.7%	401.1	346.1
2008 ^r	142.5	34.6%	98.6	23.9%	129.5	31.4%	41.7	10.1%	412.3	370.6
2009^p	134.9	34.5%	92.9	23.7%	120.2	30.7%	43.4	11.1%	391.4	348.0

^a Includes sales to government agencies and other public authorities for general or institutional purposes and vehicle fuel, classified as "other" sales by the American Gas Association.

^b Includes gas used in electric power generation by utilities and independent power producers.

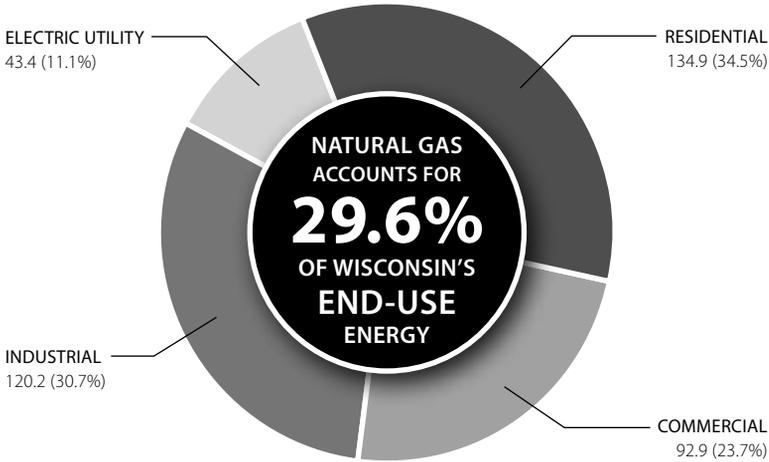
^p Preliminary estimates.

^r Revised using final annual data from the federal Energy Information Administration.

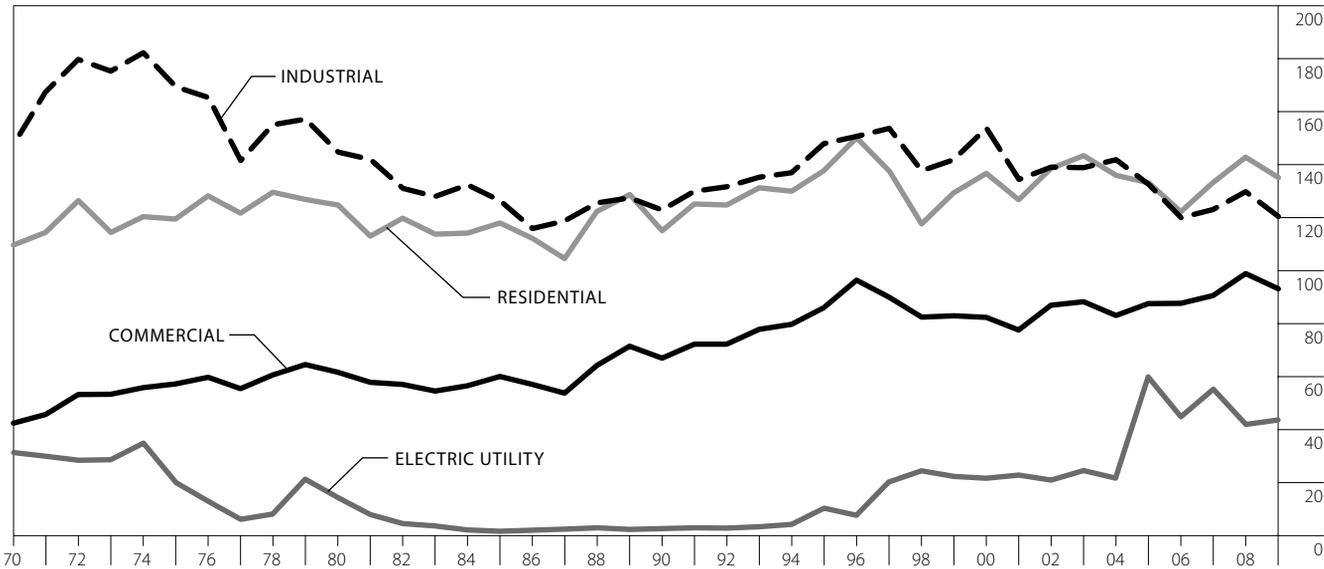
Source: American Gas Association, Gas Facts (1961-1997); Public Service Commission of Wisconsin, Accounts and Finance Division, *Statistics of Wisconsin Public Utilities*, Bulletin #8 (1963-1989), Public Service Commission of Wisconsin, *Operating Revenue and Expense Statistics, Class A and B Utilities in Wisconsin* (1990-1993), form PSC-AF 2 *Gas Sales and Sales Ratio* (1994-2007) and discussions with Public Service Commission staff; U.S. Department of Energy, *Natural Gas Annual, 1991-2008* [DOE/EIA-0131(08)] (March 2010) and *Natural Gas Monthly* [DOE/EIA-0130 (2010/03)] (March 2010).

Wisconsin Natural Gas Use, by Economic Sector

2009 TRILLIONS OF BTU AND PERCENT OF TOTAL



1970-2009 TRILLIONS OF BTU



Source: Wisconsin Office of Energy Independence.

Wisconsin Natural Gas Sales, by Public Service Commission of Wisconsin Sector

In 2009, natural gas use for residential and non residential space heating increased. Because of its lower cost, transport gas continues to be the preferred method of purchasing gas by large commercial and industrial users. These large users purchase the gas directly from the producers and have the interstate pipelines and local distribution companies transport this gas through their pipeline system for a fee.

Firm natural gas service guarantees no interruptions while *interruptible* service permits interruption on short notice, generally in peak-load seasons. Natural gas classified under “general” is used for applications other than heating, such as running gas appliances like a stove, dryer or water heater.

Data presented here are derived from natural gas utility annual reports submitted to the Public Service Commission of Wisconsin. Data collected by the federal Energy Information Administration and the PSCW differ in methodology used to account for natural gas used by a utility for electric generation, resulting in a difference in statewide gas consumption.

This table has been completely revised to account for new methodology that more accurately tracks gas consumption across Wisconsin. Figures on this page do not match figures elsewhere in this publication due to different data sources.

1970-2009 TRILLIONS OF BTU

Year	Residential		Commercial, Industrial & Electric			Total to Ultimate Utility Customers	Commercial, Industrial and Electric Transport Gas	Total Sold and Used ^d
	General	Heating	Firm ^a	Interruptible ^b	Heating			
1970 ^r	7.6	101.3	27.4	121.9	47.6	324.0	0.0	324.0
1975 ^r	6.8	112.4	36.6	135.2	60.6	362.9	0.0	362.9
1980 ^r	4.3	116.8	25.0	99.6	62.2	343.5	0.0	343.5
1985 ^r	2.8	114.7	13.4	95.6	65.6	306.7	0.0	306.7
1990 ^r	2.1	112.1	3.7	32.6	59.8	228.4	75.1	303.5
1995 ^r	1.8	135.0	3.3	50.2	78.7	289.9	87.4	377.2
1996 ^r	1.9	145.8	3.3	37.6	86.2	294.1	103.3	397.4
1997 ^r	1.8	134.2	3.3	23.6	79.3	260.6	133.3	394.0
1998 ^r	1.6	113.6	3.2	17.1	66.7	216.4	141.8	358.2
1999 ^r	1.6	125.1	3.0	18.3	72.5	231.6	147.0	378.6
2000 ^r	1.6	132.0	2.8	16.4	77.8	241.9	147.5	389.4
2001 ^r	1.4	123.7	3.2	14.7	70.0	224.5	133.3	357.7
2002 ^r	1.4	134.6	4.2	16.2	73.6	244.0	138.2	382.2
2003 ^r	1.5	140.2	4.3	12.1	77.6	253.9	136.0	390.0
2004 ^r	1.5	133.0	4.3	9.1	73.0	234.8	138.2	373.0
2005 ^r	1.4	129.9	3.4	9.6	72.8	239.5	157.3	396.8
2006 ^r	1.4	118.7	3.0	8.6	69.9	214.1	145.0	359.1
2007 ^r	1.5	129.7	3.3	8.6	74.2	232.4	159.7	392.1
2008 ^r	1.7	139.0	3.5	9.7	81.2	247.6	158.1	405.6
2009 ^p	1.7	131.7	3.5	9.0	76.7	231.4	153.3	384.7

^a Firm service guarantees no interruptions.

^b Interruptible service permits interruption on short notice, generally in peak-load seasons.

^c Includes gas used by the gas utility and transport gas.

^d Totals given here may differ from other tables due to different sources.

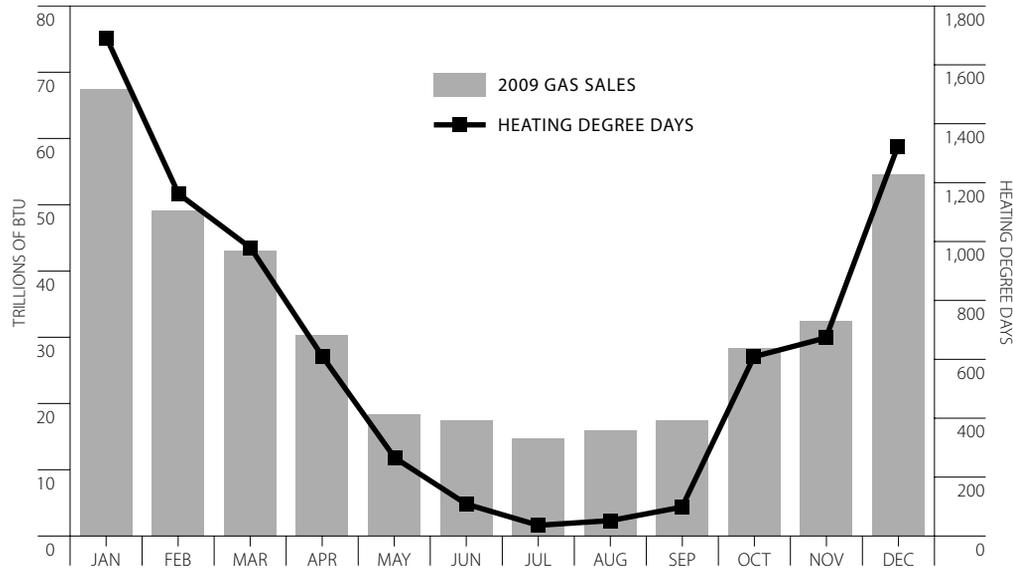
^p Preliminary estimates.

^r Revised.

Source: Public Service Commission of Wisconsin, Accounts and Finance Division, *Statistics of Wisconsin Public Utilities*, Bulletin #8 (1963-1989), *Operating Revenue and Expense Statistics; Class A and B Utilities in Wisconsin* (1990-1993), and form PSC-AF 2 (1994-2009)

Wisconsin Natural Gas Sales, by Month

2009 GAS SALES AND HEATING DEGREE DAYS



1976-2009 TRILLIONS OF BTU

Month	1976	1980	1985	1990	1995	2000	2005	2006	2007	2008	2009 ^p
January	50.9	52.8	51.3	40.6	52.7	60.1	60.2	44.9	54.3	62.2	67.5
February	40.3	47.3	42.3	39.3	48.7	47.1	45.7	49.3	61.5	58.8	49.1
March	38.5	42.9	32.2	34.3	39.1	37.7	48.3	42.2	41.1	49.0	43.1
April	26.5	27.4	21.2	25.2	32.9	32.0	28.8	23.6	32.4	30.3	30.4
May	22.3	17.6	14.4	18.9	20.0	21.6	22.8	19.8	19.1	20.5	18.3
June	16.0	14.1	11.2	12.7	15.5	15.9	21.2	18.5	16.0	15.6	17.4
July	14.6	13.4	11.1	11.5	15.2	15.6	20.2	17.7	17.7	17.1	14.7
August	15.8	13.5	11.7	12.8	17.6	18.0	21.0	18.4	20.3	16.9	16.0
September	16.3	14.8	13.1	14.1	16.9	17.6	18.4	17.6	17.3	16.7	17.5
October	27.4	25.9	18.7	22.7	25.2	24.2	24.0	31.2	25.1	26.4	28.4
November	38.9	32.2	31.2	30.3	44.7	40.6	35.8	35.6	37.4	37.8	32.4
December	51.3	46.3	48.6	44.3	54.5	63.7	55.1	45.0	54.6	59.1	54.5
Total^a	358.8	348.2	306.9	306.9	383.0	394.1	401.5	363.8	396.8	410.4	389.5

^a Totals given here may differ from other tables due to different sources.

^p Preliminary estimates.

Source: Wisconsin natural gas utility monthly reports submitted to the Public Service Commission of Wisconsin (1976-2009).

NATURAL GAS

5.1%

In 2009, mild weather during the winter heating season months led to a 5.1 percent decrease in natural gas use compared to the 2008. Sales of natural gas are directly related to the number of Heating Degree Days (HDD). For more information on HDDs and Cooling Degree Days (CDD), see Chapter 8 in this publication.

Average Number of Natural Gas Customers in Wisconsin, by Public Service Commission of Wisconsin Sector

11,518
NEW
CUSTOMERS

Wisconsin gas utilities added 11,518 new customers in 2009.

This table has been completely revised to account for new methodology that more accurately tracks the number of natural gas customers across Wisconsin.

Firm natural gas service guarantees no interruptions while *interruptible* service permits interruption on short notice, generally in peak-load seasons. Natural gas classified under “general” is used for applications other than heating, such as running gas appliances like a stove, dryer or water heater. Transport gas is gas piped through utility pipelines, but paid for through a direct contract between an industrial user and the natural gas pipeline company.

1970-2009

Year	Residential		Commercial, Industrial & Electric				Total
	General	Space Heating	Firm	Interruptible	Space Heating	Transportation	
1970 ^r	183,695	566,676	13,806	3,104	50,783		818,064
1975 ^r	157,684	700,766	11,685	3,716	65,666		939,517
1980 ^r	112,700	853,300	10,058	2,206	78,736		1,057,000
1985 ^r	90,500	922,500	9,220	2,312	85,468		1,110,000
1990 ^r	77,000	1,046,557	9,713	1,257	101,487	740	1,236,754
1995 ^r	62,000	1,229,424	7,723	1,426	122,275	569	1,423,417
1996 ^r	60,900	1,263,670	7,115	2,159	124,930	803	1,459,577
1997 ^r	59,200	1,302,148	6,954	1,405	130,087	1,138	1,500,932
1998 ^r	57,900	1,332,168	7,199	1,255	133,854	1,501	1,533,877
1999 ^r	56,000	1,370,909	7,221	1,124	135,241	1,999	1,572,494
2000 ^r	54,700	1,404,259	7,095	1,005	139,764	2,136	1,608,959
2001 ^r	51,500	1,433,036	7,511	1,233	142,844	2,326	1,638,450
2002 ^r	49,200	1,465,500	8,208	1,362	147,404	2,448	1,674,122
2003 ^r	48,900	1,492,555	8,295	1,396	148,181	2,394	1,701,721
2004 ^r	48,300	1,521,419	8,956	1,377	149,323	2,441	1,731,816
2005 ^r	45,700	1,546,921	7,673	1,266	152,145	2,509	1,756,214
2006 ^r	45,400	1,566,372	6,790	1,234	154,307	2,450	1,776,553
2007 ^r	45,900	1,586,300	6,886	1,195	156,131	2,401	1,798,813
2008 ^r	45,900	1,600,744	7,002	1,201	158,420	2,371	1,815,638
2009 ^p	45,700	1,611,383	6,927	1,209	159,597	2,340	1,827,156

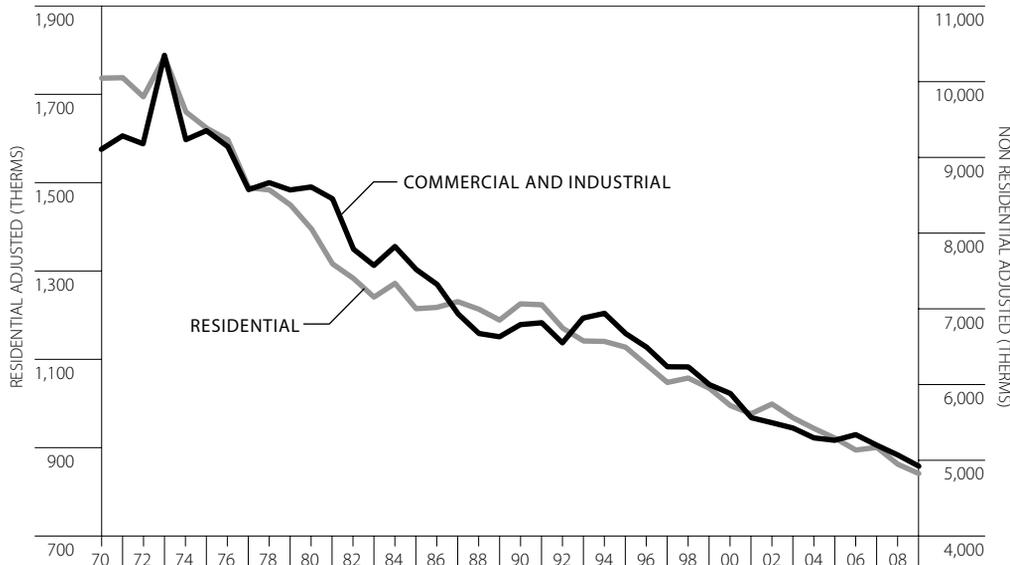
^p Preliminary estimate.

^r Revised.

Source: Public Service Commission of Wisconsin, Accounts and Finance Division, *Statistics of Wisconsin Public Utilities*, Bulletin #8 (1963-1989), *Operating Revenue and Expense Statistics; Class A and B Utilities in Wisconsin* (1990-1993), and form PSC-AF 2 Gas Sales and Sales Ratio (1994-2009), U.S. Department of Energy, *Natural Gas Annual, 1991-2009* [DOE/EIA-0131(08)] (March 2010).

Wisconsin Natural Gas Sales Per Customer, by Public Service Commission of Wisconsin Sector

1970-2009 THERMS PER CUSTOMER



Year	Residential			Commercial, Industrial & Electric			
	General	Actual	Adjusted ^a	Firm	Interruptible	Actual	Adjusted ^a
1970 ^r	412	1,788	1,735	19,852	393,886	9,377	9,099
1975 ^r	432	1,603	1,622	31,297	364,846	9,234	9,343
1980 ^r	384	1,443	1,394	32,065	451,417	8,900	8,600
1985 ^r	310	1,250	1,213	19,336	413,392	7,742	7,512
1990 ^r	277	1,078	1,224	5,705	259,679	5,973	6,783
1995 ^r	295	1,104	1,126	5,991	352,144	6,540	6,666
2000 ^r	296	950	994	4,667	163,625	5,615	5,874
2001 ^r	274	873	975	5,054	119,572	4,974	5,554
2002 ^r	279	929	997	6,129	119,077	5,112	5,487
2003 ^r	310	950	966	6,289	86,533	5,327	5,417
2004 ^r	302	885	942	5,805	66,183	4,966	5,287
2005 ^r	304	848	920	5,541	75,815	4,843	5,255
2006 ^r	299	763	893	5,710	69,685	4,552	5,329
2007 ^r	334	826	899	6,177	71,737	4,768	5,190
2008 ^r	372	878	861	6,404	81,151	5,160	5,061
2009 ^p	382	827	840	6,524	74,036	4,840	4,914

^a Space heating categories are adjusted to reflect demand under average heating degree days (HDDs). In the residential category, annual consumption per heating degree day was multiplied by the 1971-2000 30-year normal of 7,699 HDDs. In the commercial category, the space heating use was adjusted the same way.

^p Preliminary estimates.

^r Revised.

Source: Public Service Commission of Wisconsin, *Statistics of Wisconsin Public Utilities*, Bulletin #8 (1963-1989), *Operating Revenue and Expense Statistics; Class A and B Utilities in Wisconsin* (1991-1993), and form PSC-AF 2 (1990-2009).

RESIDENTIAL
SPACE HEATING
2.4%
COMMERCIAL
& INDUSTRIAL
SPACE HEATING
2.9%

Natural gas use for residential space heating, adjusted for weather conditions, decreased 2.4 percent in 2009, while Commercial and Industrial space heating decreased 2.9 percent in 2009. Figures in this table were revised to include updated weather-correction methodology.

Data in this table have been historically revised to reflect revised methodology.

Wisconsin Natural Gas Deliveries, by Pipeline Company

The major supplier of natural gas to Wisconsin, ANR, transports most of its gas from Oklahoma and Louisiana. Northern Natural Gas Company transports its gas to Wisconsin from Texas, Oklahoma, Kansas and Alberta, Canada. Natural Gas Pipeline Company transports gas to Wisconsin primarily from Oklahoma, Louisiana and Texas. However, Viking Gas Transmission Company's gas originates primarily from Alberta, Canada. Guardian Pipeline began transporting natural gas to Wisconsin on December 7, 2002.

1970-2009 TRILLIONS OF BTU AND PERCENT OF TOTAL

Year	ANR Pipeline Co. ^a		Viking Gas Trans. Co. ^b		Natural Gas Pipeline Co. ^c		Northern Natural Gas Co.		Guardian Pipeline ^d		Total ^{e,f}
1970	289.4	88.2%	6.0	1.8%	6.3	1.9%	26.6	8.1%			328.3
1975	323.0	88.5%	5.7	1.6%	7.1	1.9%	29.2	8.0%			365.0
1980	305.5	88.8%	3.9	1.1%	7.8	2.3%	26.8	7.8%			344.0
1985	265.8	87.4%	1.2	0.4%	7.7	2.5%	29.4	9.7%			304.1
1990	218.2	72.0%	6.0	2.0%	7.4	2.4%	53.8	17.7%			303.2
1995	264.3	69.6%	9.1	2.4%	23.5	6.2%	83.1	21.9%			380.0
1996	269.5	67.7%	9.9	2.5%	26.1	6.6%	92.3	23.2%			397.8
1997	265.8	68.1%	10.4	2.7%	23.1	5.9%	90.8	23.3%			390.1
1998	241.0	67.6%	10.2	2.9%	19.7	5.5%	85.5	24.0%			356.4
1999	256.3	68.8%	11.4	3.1%	16.3	4.4%	88.3	23.7%			372.3
2000	272.1	69.0%	11.1	2.8%	21.0	5.3%	90.0	22.8%			394.2
2001	236.4	66.0%	14.1	3.9%	23.7	6.6%	84.1	23.5%			358.3
2002	267.2	68.7%	15.1	3.9%	22.3	5.7%	82.5	21.2%	1.9	0.5%	389.0
2003	257.0	64.6%	16.0	4.0%	19.9	5.0%	84.8	21.3%	20.3	5.1%	398.0
2004	241.8	60.5%	14.8	3.7%	19.8	5.0%	82.3	20.6%	40.8	10.2%	399.5
2005	253.2	61.1%	16.1	3.9%	19.6	4.7%	82.3	19.9%	42.9	10.4%	414.1
2006	219.0	57.5%	14.6	3.8%	19.9	5.2%	86.8	22.8%	40.6	10.7%	380.9
2007	249.9	59.2%	18.8	4.5%	18.0	4.3%	86.5	20.5%	48.9	11.6%	422.1
2008	258.3	58.6%	17.9	4.1%	17.5	4.0%	93.0	21.1%	53.9	12.2%	440.6
2009^p	243.0	59.0%	17.6	4.3%	18.5	4.5%	78.9	19.2%	53.5	13.0%	411.5

a Formerly American Natural Resources Pipeline Co.

b Formerly Midwest Gas Transmission Co.

c In 1994, Midcon Corporation became part of the Natural Gas Pipeline Co. Prior to 1994, data in this table included delivery information from Midcon Corporation.

d The Guardian Pipeline became operational on December 7, 2002.

e Total purchases differ from the total sold and used by gas utilities due to inventory changes, utility production from liquefied petroleum gas and some unaccounted gas.

f Prior to 1990, deliveries represent utility gas sales. Beginning in 1990, deliveries represent total gas used in Wisconsin, including both utility and transported gas deliveries.

p Preliminary estimate.

Source: Public Service Commission of Wisconsin, Accounts and Finance Division, *Statistics of Wisconsin Public Utilities*, Bulletin #8 (1970-1993). Telephone conversations and unpublished emails with pipeline representatives 1991-2010.

Wisconsin Coal Use, in Btu, by Economic Sector

1970-2009 TRILLIONS OF BTU AND PERCENT OF TOTAL

This table represents a conversion from tons to trillions of Btus. The conversion factor from tons to Btus of coal depends on the type of coal used in the sector. For example, the industrial and commercial sectors use bituminous coal with a high energy content (21.0 to 23.6 MMBtu p/ton), where the utility sector uses sub-bituminous coal with a lower energy and sulfur content (19.6 MMBtu p/ton). Utilities use low-sulfur coal conform to regulations addressing sulfur emissions from utilities.

Year	Residential		Commercial		Industrial		Electric Utility ^a		Total	Total End Use
1970	9.5	2.7%	17.7	5.0%	97.1	27.3%	231.1	65.0%	355.4	124.3
1975	3.8	1.4%	7.1	2.7%	40.9	15.6%	210.5	80.3%	262.3	51.8
1980	2.3	0.7%	4.4	1.4%	47.2	14.5%	270.7	83.4%	324.6	53.9
1985	0.9	0.2%	4.4	1.2%	51.4	13.7%	317.7	84.9%	374.4	56.7
1990	0.4	0.1%	4.5	1.1%	51.9	12.6%	354.5	86.2%	411.4	56.9
1995	0.3	0.1%	3.8	0.8%	47.2	10.2%	412.4	88.9%	463.7	51.3
1996	0.3	0.1%	4.6	0.9%	43.1	8.9%	438.8	90.1%	486.9	48.1
1997	0.3	0.1%	4.6	0.9%	43.2	8.5%	462.0	90.6%	510.1	48.1
1998	0.3	0.1%	4.8	1.0%	41.9	8.4%	448.9	90.5%	495.8	46.9
1999	0.2	0.0%	5.0	1.0%	40.7	8.1%	459.6	90.9%	505.5	45.9
2000	0.2	0.0%	4.8	0.9%	43.0	8.3%	471.4	90.8%	519.4	48.0
2001	0.2	0.0%	4.8	0.9%	45.3	8.7%	471.6	90.4%	521.9	50.3
2002	0.2	0.0%	4.5	0.9%	46.7	9.2%	457.1	89.9%	508.5	51.3
2003	0.2	0.0%	4.7	0.9%	45.6	8.7%	476.6	90.4%	527.0	50.5
2004	0.1	0.0%	4.8	0.9%	47.0	8.7%	485.4	90.3%	537.2	51.9
2005	0.1	0.0%	4.8	0.9%	45.1	8.5%	481.7	90.6%	531.7	50.0
2006	0.1	0.0%	4.8	0.9%	46.7	9.0%	464.1	90.0%	515.7	51.6
2007 ^r	0.1	0.0%	3.9	0.8%	46.6	9.0%	465.4	90.2%	515.9	50.5
2008 ^r	0.0	0.0%	2.7	0.5%	61.3	11.0%	492.6	88.5%	556.6	64.0
2009^p	0.0	0.0%	2.0	0.4%	55.7	11.2%	441.4	88.4%	499.0	57.6

^a Includes petroleum coke co-fired with coal.

^p Preliminary estimates.

^r Revised.

Source: U.S. Department of Energy, Energy Information Administration, *State Energy Data Report*, [DOE/EIA-0214(94)] (October 1996); *Coal Distribution* [DOE/EIA-0125 (95/4Q)] (1980-1995); Wisconsin Department of Natural Resources, Annual Survey of Point Source Emissions, unpublished (1971-2009); annual reports of various Wisconsin electric generating utilities (1995-2009); U.S. Department of Commerce, Bureau of the Census of Housing (1970, 1980, 1990 and 2000).

END-USE
COAL
CONSUMPTION
10.0%

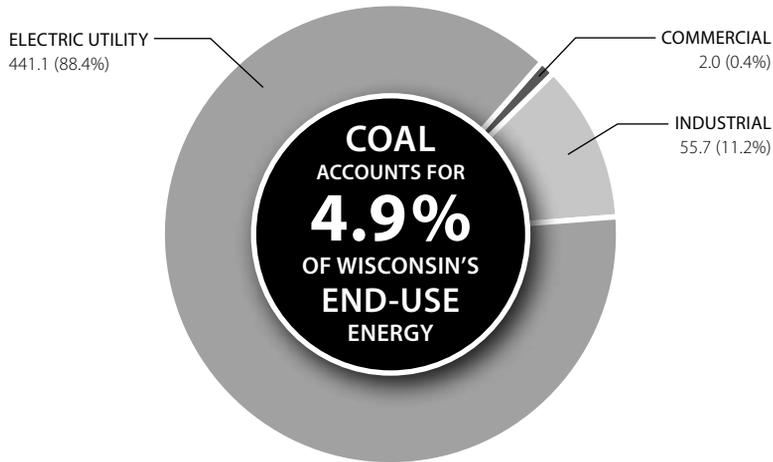
Wisconsin's end-use coal consumption decreased 10.0 percent in 2009. Coal use declined in all sectors because of decreased economic activity in 2009.

Wisconsin total coal use has increased by 90.2 percent since 1975. Industrial coal consumption decreased 9.1 percent in 2009.

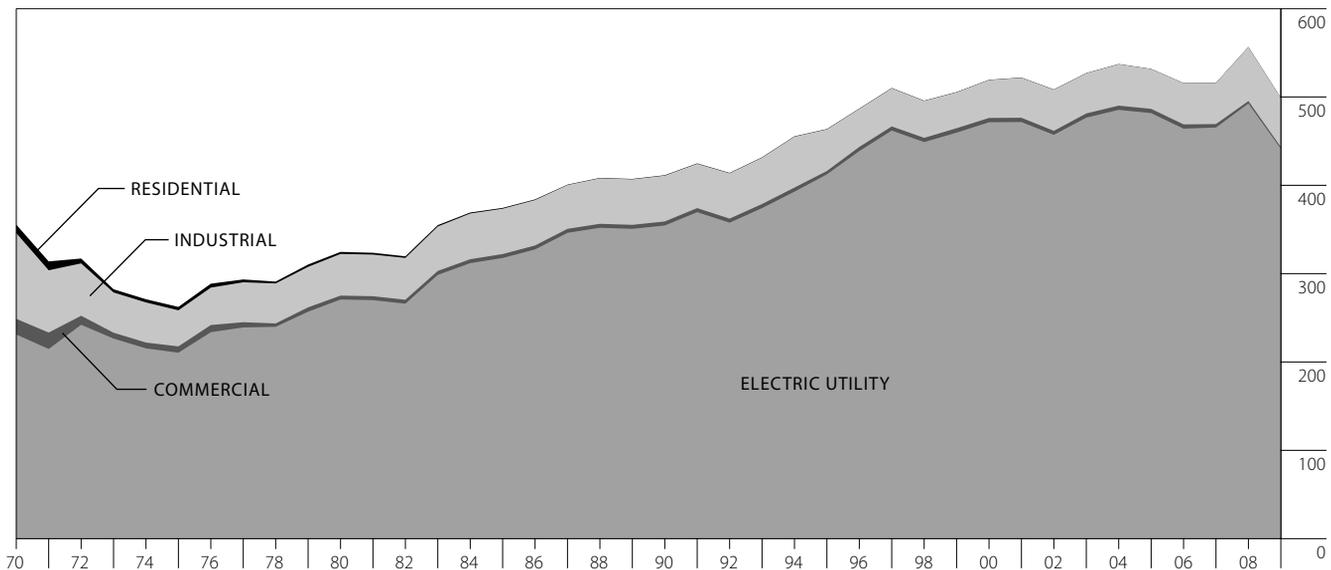
Commercial sector use of coal is limited primarily to state facilities and large institutions, and decreased by 28.2 percent.

Wisconsin Coal Use, by Economic Sector

2009 TRILLIONS OF BTU AND PERCENT OF TOTAL



1970-2009 TRILLIONS OF BTU



Source: Wisconsin Office of Energy Independence.

Wisconsin Coal Use, in Tons, by Economic Sector

1970-2009 THOUSANDS OF TONS AND PERCENT OF TOTAL

Year	Residential		Commercial		Industrial		Electric Utility ^a		Total
1970	453	2.9%	840	5.4%	3,870	25.0%	10,294	66.6%	15,457
1975	202	1.7%	375	3.1%	1,716	14.2%	9,776	81.0%	12,069
1980	113	0.7%	210	1.3%	2,001	12.5%	13,715	85.5%	16,039
1985	40	0.2%	211	1.1%	2,176	11.7%	16,208	87.0%	18,635
1990	20	0.1%	216	1.1%	2,200	10.7%	18,087	88.1%	20,523
1995	15	0.1%	179	0.8%	1,998	8.6%	21,042	90.6%	23,234
1996	14	0.1%	220	0.9%	1,827	7.5%	22,386	91.6%	24,447
1997	13	0.1%	220	0.9%	1,830	7.1%	23,571	92.0%	25,634
1998	12	0.0%	228	0.9%	1,773	7.1%	22,904	91.9%	24,917
1999	11	0.0%	237	0.9%	1,724	6.8%	23,450	92.2%	25,422
2000	10	0.0%	230	0.9%	1,820	7.0%	24,050	92.1%	26,110
2001	9	0.0%	229	0.9%	1,919	7.3%	24,062	91.8%	26,219
2002	8	0.0%	213	0.8%	1,978	7.8%	23,323	91.4%	25,522
2003	7	0.0%	226	0.9%	1,931	7.3%	24,314	91.8%	26,478
2004	6	0.0%	227	0.8%	1,989	7.4%	24,765	91.8%	26,987
2005	5	0.0%	228	0.9%	1,911	7.2%	24,577	92.0%	26,721
2006	4	0.0%	230	0.9%	1,976	7.6%	23,679	91.5%	25,889
2007 ^r	3	0.0%	185	0.7%	1,972	7.6%	23,745	91.7%	25,905
2008 ^r	0	0.0%	131	0.5%	2,595	9.3%	25,132	90.2%	27,858
2009 ^p	0	0.0%	94	0.4%	2,358	9.4%	22,518	90.2%	24,970

^a Includes petroleum coke co fired with coal.

^p Preliminary estimates.

^r Revised.

Source: U.S. Department of Energy, Energy Information Administration, *State Energy Data Report* [DOE/EIA-0214(94)] (October 1996); U.S. Department of Commerce, Bureau of Census, *Census of Manufacturers and Annual Survey of Manufacturers, Fuels and Electric Energy Consumed* (1971-1982); Wisconsin Department of Natural Resources, *Annual Survey of Point Source Emissions*, unpublished (1971-2009); annual reports of various Wisconsin electric generating utilities (1995-2009); U.S. Department of Commerce, Bureau of the Census of Housing (1970, 1980, 1990 and 2000); http://www.eia.doe.gov/cneaf/electricity/epa/epa_sprdshts.html.

COAL
USE DECREASED
2,888
THOUSAND
TONS

The total weight of coal used in Wisconsin decreased 2,888 thousand tons (10.4 percent) in 2009.

Wisconsin Electric Utility Coal Use, by Plant

COAL
USE BY
ELECTRIC
UTILITIES
10.4%

Coal use by Wisconsin's electric utilities decreased 10.4 percent in 2009. The two largest power plants, Pleasant Prairie and Columbia, used 39.2 percent of the utility coal burned in Wisconsin, while Wisconsin's newest coal plant Weston 4 (Wisconsin Public Service) is responsible for most of the increased coal consumption and uses 7.7 percent of Wisconsin's utility coal.

A map of Wisconsin's coal transportation routes and major coal plants can be found in the Map Appendix at the back of the book.

1975-2009 THOUSANDS OF TONS

Utility / Plant Name	1975	1980	1985	1990	1995	2000	2005	2006	2007	2008 ^r	2009 ^p
Dairyland Power Cooperative											
Alma	502	1,188	1,268	1,506	1,231	1,754	2,031	1,950	2,019	2,010	1,732
Genoa	801	915	914	680	788	928	1,172	1,162	1,083	1,172	985
Stoneman	111	74	44	30	0	0	38	23	36	13	13
Madison Gas and Electric Co.											
Blount Street	77	144	61	95	137	215	228	103	106	115	15
Northern States Power Co.											
Bay Front	52	100	36	45	30	115	152	96	140	132	100
Wisconsin Electric Power Co.											
Oak Creek	2,873	2,542	2,528	1,522	2,093	3,410	3,255	3,287	3,238	3,371	2,687
Pleasant Prairie	0	581	2,564	4,703	5,073	5,295	5,373	4,737	4,963	4,982	4,762
Port Washington	691	683	348	126	430	641	0	0	0	0	0
Valley	536	774	528	463	458	690	780	805	792	761	612
Wisconsin Power and Light Co.											
Blackhawk	24	30	8	0	0	0	0	0	0	0	0
Columbia	1,025	3,603	2,991	3,665	4,238	4,355	4,274	4,326	4,541	4,563	4,053
Edgewater	976	1,056	2,112	2,180	2,702	2,531	2,533	2,400	2,810	2,777	2,473
Nelson Dewey	512	552	541	497	615	580	729	727	657	642	569
Rock River	293	245	317	198	253	2	0	0	0	0	0
Wisconsin Public Services Corp.											
Pulliam	753	744	489	674	1,130	1,444	1,627	1,620	1,617	1,379	958
Weston	239	329	1,275	1,555	1,702	1,972	2,143	2,044	1,712	2,859	3,363
Municipal Utilities											
Manitowoc ^a	142	67	91	116	160	108	140	105	77	240	144
Marshfield	90	40	48	7	0	0	0	0	0	0	0
Menasha	58	28	25	25	2	10	6	63	110	116	52
Richland Center	21	20	20	0	0	0	0	0	0	0	0
Total^b	9,776	13,715	16,208	18,087	21,042	24,050	24,577	23,679	23,745	25,132	22,518

^a Includes petroleum coke co-fired with coal.

^b The totals do not always match the sum of the individual plants in this table. The totals are drawn from the federal Energy Information Administration, while the plant-specific data comes from the Wisconsin Department of Natural Resources emissions data. Starting in 2008, the totals reflect the WI DNR data.

^p Preliminary.

^r Revised.

Source: Wisconsin Department of Natural Resources, Annual Survey of Point Source Emissions, unpublished (1975-2009); annual reports of various Wisconsin electric generating utilities (1995-2009); U.S. Department of Energy, *Electric Power Monthly* [DOE/EIA-0226 (2009/03)](March 2009).

Wisconsin Manufacturing Industry Coal Purchases, by Industry Group

Entries in the table without figures indicate coal tons of less than 500 tons.

1971-2009 THOUSANDS OF TONS

SIC Industry Group	1971	1975	1980	1985	1990	1995 ^r	2000 ^r	2005 ^r	2006 ^r	2007 ^r	2008 ^r	2009 ^p
20 Food and Kindred	213	56	64	72	43	10	15	21	21	22	14	16
26 Paper and Allied	1,940	1,469	1,737	1,878	1,863	1,825	1,700	1,765	1,833	1,838	2,503	2,260
32 Stone, Clay and Glass	79	13	8	49	116	120	80	121	116	108	51	61
33 Primary Metals	114	50	80	66	95	—	—	—	—	—	27	21
37 Transport Equipment	107	35	30	37	32	22	12	4	6	4	2	—
Total Manufacturing	2,810	1,716	2,001	2,176	2,200	1,998	1,820	1,911	1,976	1,972	2,595	2,358

^p Preliminary.

^r Revised.

Source: U.S. Department of Commerce, Bureau of the Census, *Census of Manufacturers*, and *Annual Survey of Manufacturers* (1972-1981); U.S. Department of Energy, Energy Information Administration, *Coal Distribution* [DOE/EIA-0125 (95/4Q)] (1980-1995); Wisconsin Department of Natural Resources, *Annual Survey of Point Source Emissions*, unpublished (1972-2009).

PAPER & ALLIED
PRODUCTS
95.8%

Wisconsin's industrial coal use continues to be dominated by paper and allied products, which consumed 95.8 percent of the industrial coal used in 2009.

Coal Deliveries to Wisconsin Industries, by Region of Origin

1975-2009 THOUSANDS OF TONS

Origin ^a	1975	1980	1985	1990	1995	2000	2005	2007	2008 ^r	2009 ^p
Eastern PA	39	136	24	4	5	8	137	148	141	48
Western PA	11	125	192	38	33	11	0	0	0	0
Northern WV	93	339	150	230	384	75	175	98	78	99
Ohio	91	129	43	0	10	0	36	19	0	0
Southern No. 1 (WV and VA)	35	88	2	1	15	190	13	0	0	0
Southern No. 2 (WV and KY)	1,210	497	757	628	529	326	243	261	259	125
Western KY	111	127	147	98	196	179	192	197	195	97
Illinois	515	520	624	300	228	147	101	106	135	307
Indiana	55	114	89	43	67	52	207	215	217	214
Western U.S.	11	3	0	0	0	0	0	0	0	0
CO and NM	0	0	0	0	0	0	190	322	203	104
Wyoming	24	16	0	346	250	521	368	423	446	421
Utah	1	0	0	0	0	0	71	0	7	12
MO and WA	281	220	158	0	15	0	0	0	0	0
Total	2,477	2,314	2,186	1,688	1,733	1,509	1,733	1,789	1,681	1,427

^a Includes shipments to Wisconsin end users and dealers. Does not include deliveries to Superior Midwest Energy Terminal for trans-shipment from Wisconsin.

^p Preliminary.

^r Revised.

Source: U.S. Bureau of Mines, "Bituminous Coal and Lignite Distribution", *Mineral Industry Surveys* (1973-1976); U.S. Department of Energy, Energy Information Administration, *Bituminous and Subbituminous Coal and Lignite Distribution* (1977-1979); *Coal Industry Annual* [DOE/EIA-0584] (2000); *Coal Distribution* [DOE/EIA-0125 (99/4Q)] (1980-1999); *Quarterly Coal Report* [DOE/EIA - 0121(2009/4Q)] (March 2010); <http://www.eia.doe.gov/cneaf/coal/quarterly/qcr.pdf> and http://www.eia.doe.gov/cneaf/coal/page/coalistrib/coal_distributions.html.

COAL FROM
WESTERN U.S.
37.6%

Coal currently used by Wisconsin industry comes primarily from the western part of the country (37.6 percent). There has been a gradual decline in industrial coal use. Industrial coal from Illinois has declined 51 percent since 1985.

Coal Deliveries to Wisconsin, by Transportation Mode and Type of Receiving Facility

COAL
SHIPPED BY RAIL
9.1%

Coal shipped by rail decreased 9.1 percent in 2009 as total coal deliveries also decreased by the same percentage. Nearly 99 percent of coal is delivered to Wisconsin by rail. The long term increase in coal tonnage shipped by rail reflects the increased use of low sulfur western coal. Use of low sulfur eastern coal shipped by the Great Lakes, and midwest coal shipped by river barge, is expected to continue at near current levels. Changes in Wisconsin coal deliveries will be concentrated in rail deliveries of western coal for electric utilities.

1975-2009 THOUSANDS OF TONS

Transportation Mode and Type of Receiving Facility	1975	1980	1985	1990	1995	2000	2005	2007	2008 ^a	2009 ^p
Rail										
Electric Utilities	7,631	11,140	13,194	17,237	18,815	25,072	21,722	24,063	24,996	22,761
Coke Plants	29	11	0	0	0	0	0	0	0	0
Other Industrial	850	1,047	846	811	772	1,169	1,177	1,377	1,469	1,299
Residential/Commercial	170	3	5	1	3	33	417	56	96	75
Subtotal	8,680	12,201	14,045	18,049	19,590	26,274	23,316	25,496	26,561	24,135
Great Lakes Shipping										
Electric Utilities	2,211	1,713	1,118	429	1,005	753	1,572	518	69	0
Coke Plants	224	167	0	0	0	0	0	0	0	0
Other Industrial	992	981	1,024	822	788	331	46	39	0	0
Residential/Commercial	212	46	11	1	0	0	0	0	40	14
Subtotal	3,639	2,907	2,153	1,252	1,793	1,084	1,618	557	109	14
River Barge										
Electric Utilities	1,756	1,487	1,042	855	1,083	32	1,508	454	12	103
Other Industrial	0	62	246	55	120	4	22	18	11	9
Residential/Commercial	0	1	10	2	126	129	0	0	32	24
Subtotal	1,756	1,550	1,298	912	1,329	165	1,530	472	55	136
Truck										
Electric Utilities	0	0	2	31	0	0	0	50	0	60
Other Industrial	0	1	45	1	53	5	488	355	200	119
Residential/Commercial	0	0	0	0	0	0	1	0	1	0
Subtotal	0	1	47	32	53	5	489	405	201	179
Total^a	14,075	16,659	17,543	20,245	22,765	27,528	26,953	26,930	26,926	24,464

^a Total data reported in this table may differ from other tables because of different sources. Subtotals may not add due to rounding.

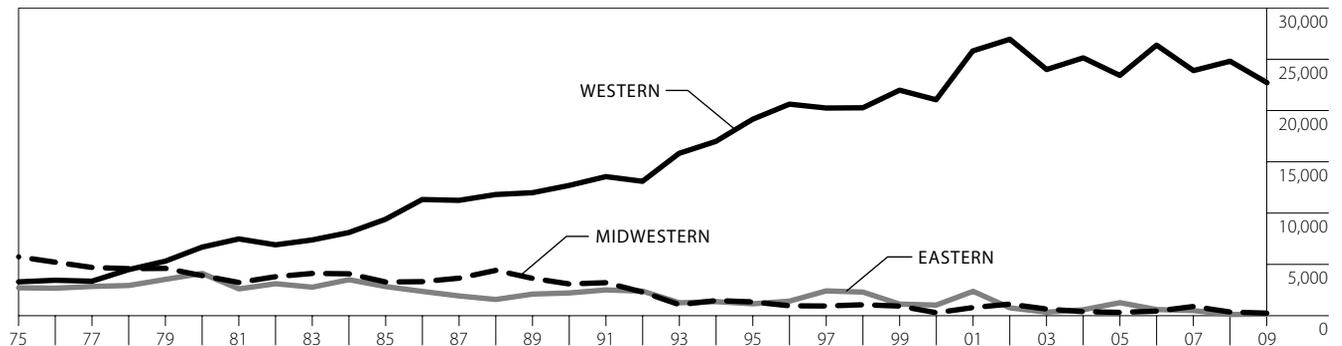
^p Preliminary.

^r Revised.

Source: U.S. Bureau of Mines, "Bituminous Coal and Lignite Distribution", *Mineral Industry Surveys* (1973-1976); U.S. Department of Energy, Energy Information Administration, *Bituminous and Subbituminous Coal and Lignite Distribution* (1977-1979), *Coal Industry Annual* [DOE/EIA - 0584] (2000), *Coal Distribution* [DOE/EIA-0125 (99/4Q)] (1980-1999) and *Quarterly Coal Report* [DOA/EIA-0121 (2009/4Q)] (March 2010), www.eia.doe.gov/cneaf/coal/quarterly/qcr.pdf and www.eia.doe.gov/cneaf/coal/page/coal_distrib/coal_distributions.html.

Coal Deliveries to Wisconsin Power Plants, by Region of Origin

1975-2009 THOUSANDS OF TONS



Coal Deliveries to Wisconsin Power Plants, by State of Origin

1975-2009 THOUSANDS OF TONS

State	1975	1980	1985	1990	1995	2000	2005	2006	2007	2008 ^r	2009 ^p
Eastern											
Kentucky	2,073	2,816	2,122	196	95	47	758	269	179	0	10
Pennsylvania	572	1,007	639	1,760	941	826	0	3	12	0	76
West Virginia	5	233	0	136	57	34	252	260	240	12	0
Other States	1	0	9	59	0	62	191	2	0	37	0
Subtotal	2,651	4,056	2,770	2,151	1,093	969	1,201	534	431	49	86
Midwestern											
Illinois	4,857	3,364	1,478	1,136	1,232	0	97	297	686	236	86
Indiana	785	205	1,731	1,893	46	221	159	84	146	56	96
Ohio	27	272	0	0	0	0	0	0	0	0	0
Other States	0	1	9	0	0	0	0	0	0	0	0
Subtotal	5,669	3,842	3,218	3,029	1,278	221	256	381	832	292	182
Western											
Montana	2,161	2,575	2,235	1,983	2,102	463	591	1,237	1,961	562	548
Wyoming	1,053	4,042	7,101	10,605	15,223	19,192	20,581	23,150	19,811	22,569	21,438
Other States	20	0	0	43	1,758	1,320	2,174	1,907	2,050	1,605	670
Subtotal	3,234	6,617	9,336	12,631	19,083	20,975	23,346	26,294	23,822	24,736	22,656
Total	11,554	14,515	15,324	17,811	21,454	22,165	24,803	27,209	25,085	25,077	22,924

p Preliminary.

r Revised.

Source: U.S. Department of Energy, Cost and Quality of Fuels for Electric Utility Plants 2000 [DOE/EIA-0191(2001)] (May 2001); Quarterly Coal Report [DOE/EIA-0121 (2009/4Q)] (March 2010); <http://www.eia.doe.gov/cneaf/coal/quarterly/qcr.pdf> and http://www.eia.doe.gov/cneaf/coal/page/coal_distrib/coal_distributions.html. U.S.

**COAL
DELIVERIES
8.6%**

Coal deliveries to Wisconsin power plants decreased 8.6 percent. This resulted in a decrease of coal stockpiled at Wisconsin utilities for future use.

Wisconsin Electric Utility Sales, by Economic Sector

TOTAL
ELECTRICITY
SALES
6.4%

Total electricity sales decreased 6.4 percent in 2009 but have grown 3.7 percent over the past ten years. In 2009, electricity sales decreased in all sectors.

A map of Wisconsin's major electric lines and service territory areas can be found in the Map Appendix.

1970-2009 MILLIONS OF kWh AND PERCENT OF TOTAL

Year	Residential		Commercial ^a		Industrial		Agricultural ^{c,d}		Total ^e
1970	8,761	35.4%	5,738	23.2%	9,188	37.2%	1,028	4.2%	24,715
1975	10,893	34.8%	8,452	27.0%	10,721	34.3%	1,210	3.9%	31,276
1980	12,513	33.2%	11,243	29.8%	12,450	33.0%	1,539	4.1%	37,745
1985	13,257	31.8%	12,783	30.6%	13,940	33.4%	1,745	4.2%	41,725
1990 ^b	14,740	30.0%	15,808	32.1%	17,005	34.6%	1,645	3.3%	49,198
1995	17,040	29.4%	18,042	31.1%	21,290	36.7%	1,595	2.8%	57,967
1996	17,100	29.1%	18,588	31.6%	21,471	36.6%	1,585	2.7%	58,744
1997	16,935	28.2%	18,881	31.4%	22,703	37.8%	1,575	2.6%	60,094
1998	17,522	28.2%	19,334	31.2%	23,640	38.1%	1,565	2.5%	62,061
1999	17,942	28.2%	20,781	32.7%	23,264	36.6%	1,560	2.5%	63,547
2000	18,199	28.1%	21,407	33.1%	23,528	36.4%	1,555	2.4%	64,689
2001	18,990	28.8%	21,614	32.8%	23,823	36.1%	1,550	2.3%	65,977
2002 ^f	20,030	29.9%	22,290	33.3%	23,134	34.5%	1,545	2.3%	66,999
2003	21,364	31.8%	20,056	29.8%	24,226	36.0%	1,595	2.4%	67,241
2004	21,120	31.2%	19,951	29.4%	25,228	37.2%	1,501	2.2%	67,800
2005	21,385	30.4%	21,968	31.2%	25,376	36.1%	1,606	2.3%	70,335
2006	20,842	29.9%	22,230	31.8%	25,163	36.0%	1,574	2.3%	69,809
2007	21,454	30.1%	23,032	32.3%	25,436	35.7%	1,379	1.9%	71,301
2008 ^r	20,986	29.9%	22,978	32.8%	24,672	35.2%	1,486	2.1%	70,122
2009^p	20,390	30.9%	22,055	33.5%	22,029	33.4%	1,443	2.2%	65,917

^a Includes sales to public authorities (including sales for street and highway lighting) and utility company interdepartmental sales (for example, from electric to gas department of a combined utility).

^b Beginning in 1989, U.S. DOE data sources have been used.

^c Beginning in 2003, USDA agricultural statistics were used to electricity sales to this sector. To accommodate this shift in data sources, numbers in the residential and agricultural sectors have been historically revised.

^d The agricultural sector does not include processing plants for crops and other agricultural products; these are classified under the commercial sector.

^e Total sales may vary from other pages due to independent rounding.

^f In 2002, EIA shifted their commercial and industrial criteria. Previous editions of this publication corrected for this shift, but revisions based on availability of firm agricultural electric consumption data prompted a historical revision starting in 1989. This publication no longer corrects for shifts in EIA data collection methods which are reflected in 2003.

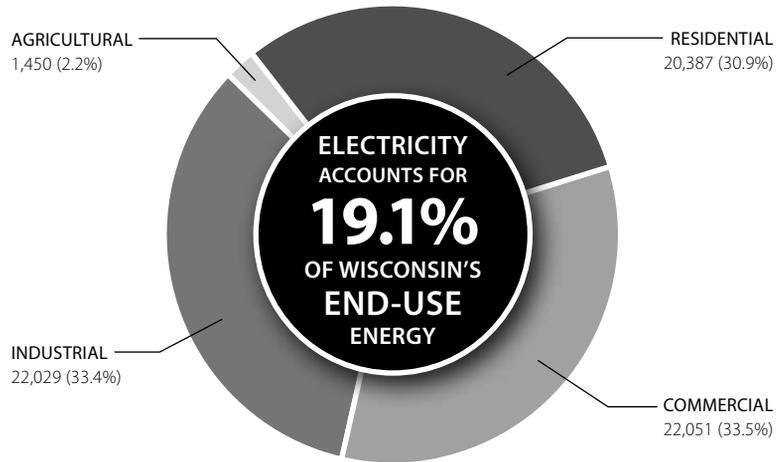
^p Preliminary estimates.

^r Revised

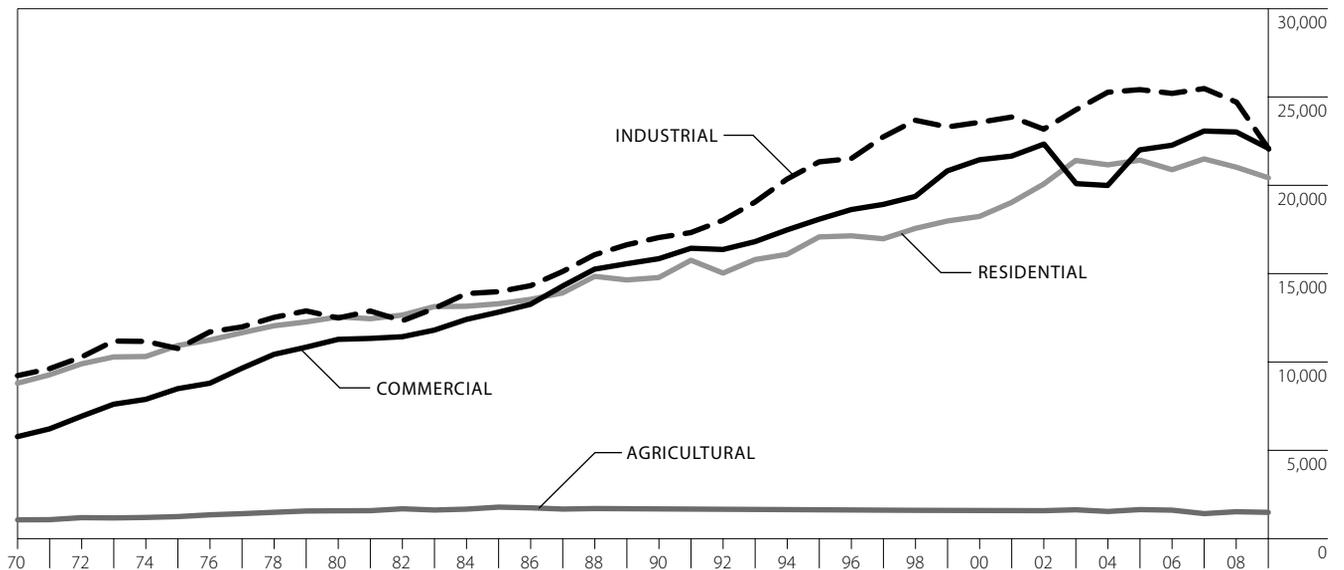
Source: Sectoral disaggregation by Wisconsin Office of Energy Independence, based on Public Service Commission of Wisconsin, *Statistics of Wisconsin Public Utilities*, Bulletin #8 (1970-1994); U.S. Department of Agriculture, Rural Electrification Administration, Annual Statistical Report, REA Bulletin 1-1 (1970-1994); U.S. Department of Energy, Electric Sales and Revenue 1989-1999 [DOE/EIA-0540 (99)] (October 2000), *Electric Power Monthly*, Table 5.4B [DOE/EIA-0226 (2010/03)] (March 2010) (1989-2009). http://www.eia.doe.gov/cneaf/electricity/epm/epm_sum.html; U.S. Department of Agriculture, Economic Research Service, electricity expenditure data at <http://www.ers.usda.gov/> (2007-2009).

Wisconsin Electric Utility Sales, by Economic Sector

2009 MILLIONS OF kWh AND PERCENT OF TOTAL



1970-2009 MILLIONS OF kWh



Source: Wisconsin Office of Energy Independence.

Wisconsin Electricity Sales to Ultimate Customers, by Private and Municipal Utilities and Power Cooperatives

Investor owned utilities supply the vast majority of power to Wisconsin electricity customers (83.3 percent). The relative amounts of power supplied by the three types of suppliers have changed very little over the past 20 years.

1970-2009 MILLIONS OF kWh AND PERCENT OF TOTAL

Year	Private Utilities		Municipal Utilities		Power Cooperatives		Total
1970	21,515	87.1%	2,160	8.7%	1,040	4.2%	24,715
1975	27,021	86.4%	2,784	8.9%	1,471	4.7%	31,276
1980	32,335	85.7%	3,547	9.4%	1,864	4.9%	37,746
1985	35,497	85.1%	4,132	9.9%	2,096	5.0%	41,725
1990 ^a	41,653	84.7%	5,263	10.7%	2,282	4.6%	49,198
1995	48,814	84.2%	6,479	11.2%	2,674	4.6%	57,967
1996	49,332	84.0%	6,635	11.3%	2,777	4.7%	58,744
1997	50,640	84.3%	6,627	11.0%	2,827	4.7%	60,094
1998	52,242	84.2%	6,992	11.3%	2,827	4.6%	62,061
1999	53,517	84.2%	7,215	11.4%	2,815	4.4%	63,547
2000	54,404	84.1%	7,375	11.4%	2,910	4.5%	64,689
2001	55,545	84.2%	7,349	11.1%	3,083	4.7%	65,977
2002	56,250	84.0%	7,523	11.2%	3,226	4.8%	66,999
2003	56,459	84.0%	7,500	11.2%	3,282	4.9%	67,241
2004	57,099	84.0%	7,598	11.2%	3,279	4.8%	67,976
2005	58,899	83.7%	7,950	11.3%	3,487	5.0%	70,336
2006	58,395	83.6%	7,904	11.3%	3,510	5.0%	69,809
2007	59,585	83.6%	8,079	11.3%	3,637	5.1%	71,301
2008 ^r	58,429	83.3%	7,947	11.3%	3,746	5.3%	70,122
2009^p	54,908	83.3%	7,449	11.3%	3,560	5.4%	65,917

^a Beginning in 1989, U.S. DOE data sources have been used.

^p Preliminary estimates.

^r Revised

Source: Public Service Commission of Wisconsin, Accounts and Finance Division, *Statistics of Wisconsin Public Utilities*, Bulletin #8, Table 5 (1970-1994); U.S. Department of Agriculture, Rural Electrification Administration, *Annual Statistical Report*, REA Bulletin 1-1, Table 31 (1970-1994); U.S. Department of Energy, *Electric Sales and Revenue 1989-2000* [DOE/EIA-0540 (2000)] (November 2001), and *Electric Power Monthly* [DOE/EIA-0226 (2010/03)] (March 2010). www.eia.doe.gov/cneaf/electricity/epm/epm_sum.html

Eastern Wisconsin Electric Utility Power Load and Non-Coincident Peak Demand

Non-coincident peak demand is the sum of the individual monthly peak electric demands from Wisconsin's eastern utilities.

1970-2009

Year	Load	Peak Demand		Capacity Factor ^b
	(Millions of kWh)	Summer (MW)	Winter (MW)	(Percent)
1970	22,818	4,125	3,964	63.1
1975	28,616	5,314	4,903	61.5
1980	34,836	6,009	5,525	66.0
1985	39,325	6,464	6,166	69.4
1990 ^c	47,381	8,326	7,210	65.0
1995	55,821	9,833	8,275	64.8
1996	58,408	9,061	8,285	73.4
1997	59,946	9,313	8,302	73.5
1998	59,563	10,099	8,644	67.3
1999	61,990	10,756	8,977	65.8
2000	64,084	10,814	9,152	67.6
2001	61,701	11,645	8,440	60.5
2002	67,698	11,401	8,917	67.8
2003	68,886	11,688	9,192	67.3
2004	68,296	10,981	9,729	70.8
2005	70,441	11,946	9,595	67.3
2006	67,216	12,129	9,238	63.3
2007 ^d	68,796	11,698	9,204	67.1
2008 ^e	66,930	11,060	9,482	68.9
2009^f	63,349	11,267	9,114	64.2

^a Wisconsin Electric Power Co., Wisconsin Power and Light Co., Wisconsin Public Service Corp., and Madison Gas and Electric Co.

^b Capacity Factor = Annual Energy Generation (kWh) / [Peak Demand (kW) x 8,760 (hours/year)]

^c Beginning in January 1988, data includes Wisconsin Electric Power Co. generation from Presque Isle, Michigan.

^d Preliminary estimates.

^e Revised.

^f Source: Wisconsin electric utility annual reports submitted to the Public Service Commission of Wisconsin (1970-2009); <http://psc.wi.gov/apps/annlreport/default>

SUMMER
PEAK
DEMAND
1.9%

Wisconsin's 2009 summer peak electricity demand for the eastern Wisconsin utilities^a increased 1.9 percent due to warmer weather in June. The increase compared to 2008 was 207 megawatts.

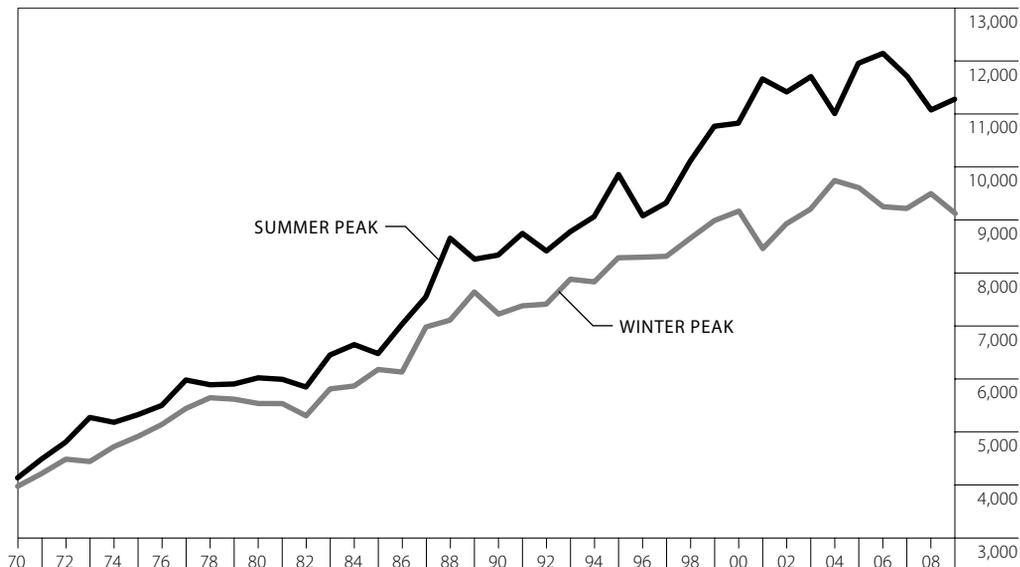
WINTER
PEAK
DEMAND
3.9%

Winter peak demand decreased 3.9 percent in 2009 due to warmer December weather. Summer peak demand in 2009 exceeded winter peak demand by 2,153 megawatts. Winter peak demand includes November through February. Because these data are presented annually, winter peak demand in this chart only includes November and December 2009; the peak demand will be adjusted to include January and February in the next edition of this publication.

Eastern Wisconsin Electric Utility Non-Coincident Peak Demand

HIGHEST
PEAK
12,129
MEGAWATTS
SUMMER
2006

1970-2009 MEGAWATTS



Eastern Wisconsin Electric Utility Power Load and Non-Coincident Peak Demand, by Month

The highest non-coincident peak demand in 2009 was seen in June.

2009

Month	Load (Millions of kWh) ^a	Non-Coincident Peak Demand (MW) ^b
January	5,884	9,204
February	5,083	8,692
March	5,249	8,300
April	4,739	7,397
May	4,737	7,749
June	5,202	11,267
July	5,270	9,007
August	5,706	10,047
September	5,183	8,864
October	5,336	7,802
November	5,171	8,082
December	5,789	9,114
Total	63,349	

^a Wisconsin Electric Power Co., Wisconsin Power and Light Co., Wisconsin Public Service Corp., and Madison Gas and Electric Co.

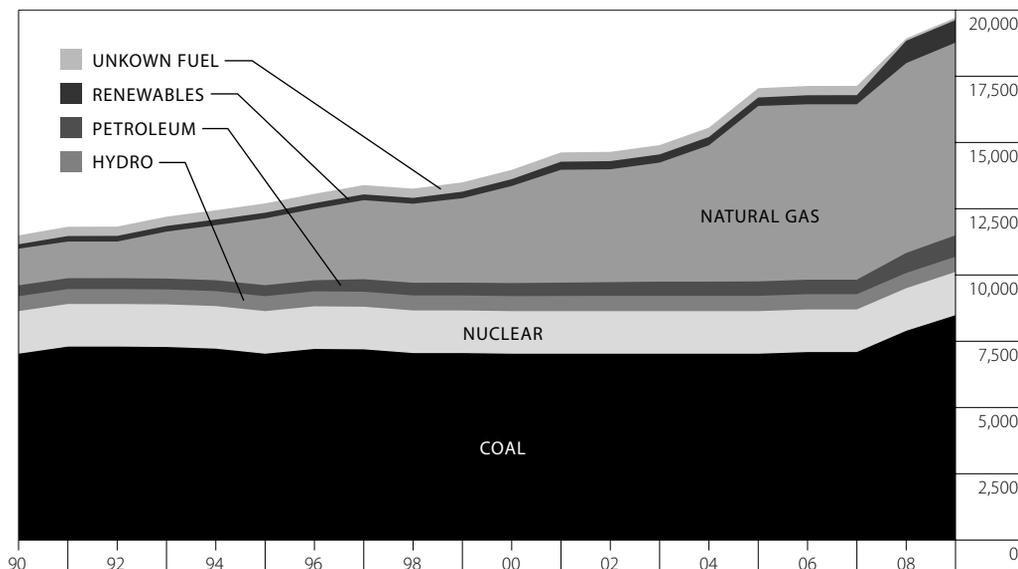
^b Non-coincident peak demand is the sum of the individual monthly peak electric demands from the four utilities listed above for each month.

Source: Wisconsin electric utility annual reports submitted to the Public Service Commission of Wisconsin (2009).

<http://psc.wi.gov/apps/annreport/default>

Wisconsin Electric Generating Capacity, by Type of Plant

1990-2009 MEGAWATTS



Year	Coal	Nuclear	Hydro	Petroleum	Natural Gas	Renewables	Unknown Fuel	Total ^{a,b}
1990	7,028	1,609	562	410	1,383	165	337	11,494
1991	7,297	1,609	562	410	1,383	208	350	11,819
1992	7,297	1,609	563	410	1,383	213	350	11,824
1993	7,282	1,609	564	410	1,771	213	350	12,198
1994	7,219	1,609	564	410	2,076	213	350	12,440
1995	7,028	1,609	564	413	2,522	213	350	12,700
1996	7,209	1,609	566	417	2,694	216	350	13,062
1997	7,194	1,609	566	471	2,982	219	350	13,391
1998	7,053	1,609	567	477	2,982	220	350	13,258
1999	7,053	1,609	567	481	3,185	248	350	13,494
2000	7,028	1,609	567	491	3,662	258	350	13,965
2001	7,028	1,609	571	503	4,258	305	350	14,624
2002	7,028	1,609	576	516	4,258	308	350	14,646
2003	7,028	1,609	576	536	4,491	310	350	14,900
2004	7,028	1,609	576	536	5,143	317	350	15,560
2005	7,028	1,609	576	545	6,618	321	350	17,048
2006	7,091	1,609	576	547	6,618	341	350	17,133
2007	7,091	1,609	576	547	6,618	344	350	17,137
2008	7,893	1,608	575	756	7,161	844	89	18,925
2009^p	8,482	1,634	574	806	7,272	850	89	19,706

^a Capacity is as of December 31 of each year.

^b Totals might not add due to rounding.

^p Preliminary.

Sources: Energy Information Administration, *Electric Power Annual*, [DOE/EIA-0348(2007)](October 2007), http://www.eia.doe.gov/cneaf/electricity/epa/epa_sprdshts.html. In 2008, this table was historically revised with data from the Public Service Commission of Wisconsin. PSC/Wisconsin Generating Capacity by Fuel (1990-2009); EIA data were used in previous publications.

ELECTRIC
GENERATION
CAPACITY
781
MEGAWATTS
(4.1 PERCENT)
IN 2009

In 2009, Wisconsin's electric generation capacity increased by 781 megawatts (4.1 percent). These data represent electricity generation capacity by Wisconsin's investor-owned utilities, municipal utilities, electric co-operatives, independent power producers, and other non-utility operations (e.g., paper mills).

The Renewables data include biomass (e.g., wood, paper byproducts, landfill gas, and methane digester gas), solar and wind. Out-of-state facilities are not included in the Renewables or the hydroelectric figures.

These figures include renewable facilities that are not RPS-registered.

Wisconsin Electric Generating Capacity, by Type of Plant and Type of Producer

These data represent the generation capacity of utilities, who are required to have power available to customers via the power grid; and merchant producers who produce power for wholesale (Independent Power Producers) to utilities; and non-utilities which are primarily industrial sector businesses producing electricity for in-house use, any excess of which may also be sold to utilities for retail re-sale on the power grid.

2009 saw an overall capacity increase of 4.6 percent over 2008. The increases according to producers were: Investor Owned Utilities (IOUs), 6.8 percent; IPP, 0.7 percent; and non-utilities, 7.4 percent

These data were not available until 1990; the capacity listed for 1990 represents in-place capacity for all previous years of operation.

1990-2009 MEGAWATTS

Year	Utility Generating Capacity ^c				Non-Utility Generating Capacity			All Producers Capacity Total
	Cooperatives	Investor-Owned Utilities	Municipal	Utility Total	IPP ^a	Non-Utility ^b	Non-Utility Total	
1990	937	9,404	204	10,544	62	889	951	11,494
1991	937	9,352	203	10,492	62	916	977	11,469
1992	937	9,352	203	10,492	62	921	983	11,475
1993	937	9,627	289	10,852	62	922	983	11,836
1994	937	9,904	289	11,129	62	922	983	12,113
1995	937	10,452	290	11,678	62	960	1,022	12,700
1996	937	10,379	375	11,691	62	936	998	12,689
1997	937	10,432	376	11,744	350	939	1,289	13,033
1998	937	10,433	382	11,751	530	939	1,469	13,220
1999	937	10,455	410	11,801	830	946	1,775	13,577
2000	937	10,794	421	12,151	830	984	1,814	13,965
2001	1,033	10,798	432	12,263	1,361	1,000	2,361	14,624
2002	1,033	10,804	440	12,277	1,362	1,008	2,370	14,647
2003	1,033	11,057	440	12,530	1,362	1,008	2,371	14,901
2004	1,036	11,058	492	12,586	1,961	1,013	2,974	15,560
2005	1,037	11,098	501	12,636	3,397	1,015	4,412	17,048
2006	1,037	11,098	566	12,702	3,397	1,034	4,431	17,133
2007	1,037	10,024	566	11,628	4,471	1,038	5,509	17,137
2008	1,017	11,201	566	12,784	5,036	1,016	6,052	18,836
2009^p	1,017	11,960	566	13,543	5,071	1,092	6,163	19,706

^a IPPs are independent power producers allowed under law to sell their power to wholesalers such as utility co-operatives. They are barred from selling their power on the retail market.

^b Non-utility sources refers to industrial power producers such as paper mills.

^c Utilities include investor-owned utilities, electric co-operatives and municipalities.

^p Preliminary.

Source: Public Service Commission of Wisconsin, Accounts and Finance Division, *Generating Plants Operated by Wisconsin Electric Utilities*, Bulletin #46 (1971-1994) and personal communications 2002; U.S. Department of Agriculture, Rural Electrification Administration, *Annual Statistical Report*, REA Bulletin 1-1 (1971-1994); Public Service Commission of Wisconsin, unpublished electrical generation data (1990-2009).

Wisconsin Electric Power Generation, by Type of Plant

Utilities include investor-owned utilities, electric co-operatives and municipalities.

IPPs are independent power producers allowed under law to sell their power to wholesalers such as utility co-operatives. They are barred from selling their power on the retail market. The primary fuel used by IPPs is uranium, followed by natural gas, wind hydroelectric, and coal.

Non-utility refers to industrial power producers such as paper mills. These generation facilities primarily use coal and renewable resources such as biogas and hydro to generate electricity for their own use.

1970-2009 MILLIONS OF kWh

Year	Electricity Generation by Utilities ^e						Total Utilities	IPP	Nonutility ^e	Total IPP and Nonutility	Imports & Losses ^c	Total Sales ^h
	Coal ^b	Nuclear ^d	Hydro ^a	Petroleum ^d	Natural Gas	Renewables ^f						
1970	25,253	155	1,413		390		27,211		0	-2,496	24,715	
1975	20,615	10,292	1,483		691		33,081		0	-1,805	31,276	
1980	26,383	9,912	1,628		393		38,316		0	-571	37,745	
1985	28,840	10,978	2,046		20		41,884		0	-159	41,725	
1990	27,956	11,224	1,791	76	393		41,440		0	7,758	49,198	
1995	32,994	10,970	2,097	97	924		47,082		0	10,885	57,967	
2000	41,736	11,459	1,749	52	965	43	56,004		0	8,685	64,689	
2001	40,855	11,507	1,888	99	815	51	55,215	2	2	10,760	65,977	
2002	42,368	12,449	2,283	43	910	62	58,115	0	0	8,884	66,999	
2003	44,140	12,220	1,623	93	1,008	62	59,146	404	404	7,691	67,241	
2004	45,149	11,888	1,748	56	574	69	59,484	0	0	8,316	67,800	
2005 ^r	45,219	7,574	1,499	75	2,185	105	56,657	2,648	275	2,923	11,031	70,336
2006 ^r	42,936	12,234	1,446	215	1,928	234	58,993	3,662	2,534	6,196	7,154	69,809
2007 ^p	39,877	0	1,346	36	3,015	295	44,569	16,244	2,928	19,171	10,489	71,301
2008 ^r	41,270	0	1,457	70	2,451	510	45,757	15,125	2,915	18,040	9,240	70,122
2009^p	36,554	0	1,254	38	2,597	999	41,442	16,025	2,727	18,752	8,450	65,917

a From 1970 to 1989, hydroelectric data were sourced from the Public Service Commission of Wisconsin bulletins; from 1990 to 2006 data, are from the federal Department of Energy, Energy Information Administration (EIA). 2007, 2008 and current year data are from the Public Service Commission of Wisconsin based.

b Coal data for 2007 and 2009 include a small amount of refuse derived fuel. That figure is 9.3 and 73.254 thousand kWhs for 2007 and 2009, respectively.

c A negative sign indicates Wisconsin utilities exported electric power to other states.

d Petroleum (oil) was split from natural gas as a generation resource starting in 1990. Prior to 1990, they were combined in this table. Propane used to produce electricity is included in this category.

e Non-utility generation sources were available prior to 2005, but not collected separately until then.

f The renewables category includes biomass, methane from landfills and digesters, solar and wind resources. In 2009, the renewables category also includes undifferentiated renewables. These renewables are not split out by type of fuel due to data source limitations.

g Wisconsin utilities no longer own nuclear generation; all nuclear reactors located in Wisconsin are owned by Independent Power Producers. Nuclear generation data can be found in the IPP category in the above table.

h Sales figures for all years are from the EIA Electric Power Monthly.

p Preliminary.

r Revised.

Source: Public Service Commission of Wisconsin, Accounts and Finance Division, *Generating Plants Operated by Wisconsin Electric Utilities*, Bulletin #46 (1971-1994) and personal communications 2002; U.S. Department of Agriculture, Rural Electrification Administration, *Annual Statistical Report*, REA Bulletin 1-1 (1971-1994); U.S. Department of Energy, Energy Information Administration, *Electric Power Monthly* [DOE/EIA-0226 (2010/03)] (March 2010) (1990-2006); Public Service Commission of Wisconsin, unpublished electrical generation data (2007-2009).

**ELECTRIC
UTILITY
GENERATION
9.4%**

Total electric generation by Wisconsin utilities decreased 9.4 percent in 2009, while generation from Independent Power Producers (IPPs) increased by 6.0 percent. Industrial, or non-utility, generation decreased by 6.5 percent. In 2008, 91 percent of Wisconsin's power was produced in-state; this percentage stayed level in 2009 as Wisconsin's power imports decreased by 8.6 percent.

Utility energy production from renewable sources increased by 96.0 percent in 2009, while production from coal decreased by 11.4 percent.

Imports and losses is a reflection of the difference between total sales recorded by EIA and total sales reported by utilities and IPPs.

Wisconsin Electric Utility Fuel Costs of Power Generation, by Type of Plant

In this table, only the cost of fuel per kilowatt-hour of generation is reported. The table on the next page includes the annual variable cost of generation. Renewables such as hydroelectric plants, wind turbines and solar photovoltaic installations are not included here because they have no associated fuel costs.

Wisconsin utilities no longer own nuclear generation; all nuclear reactors located in Wisconsin are owned by Independent Power Producers. The data for 2005 and 2006 show a decline in fuel costs for nuclear generation because these are the years in which the sales of the plants were completed. Fuel cost data for nuclear plants are no longer available because these plants are owned by Independent Power Producers who do not submit annual reports to the Public Service Commission.

The costs in the table reflect costs incurred by Wisconsin's five largest investor owned utilities.

1970-2009 CENTS PER kWh

Year	Fossil Fuel Steam (Coal)	Nuclear Steam ^b	Internal Combustion ^a	Total
1970	0.43	0.16	0.75	0.44
1975	1.01	0.36	1.47	0.75
1980	1.72	0.50	3.58	1.40
1985	2.02	0.61	6.76	1.60
1990 ^e	1.61	0.52	4.51	1.27
1995 ^e	1.33	0.48	3.62	1.12
1996 ^e	1.26	0.49	3.15	1.07
1997 ^e	1.28	0.50	4.30	1.22
1998 ^e	1.25	0.52	3.76	1.13
1999 ^e	1.21	0.53	3.70	1.07
2000 ^e	1.24	0.52	6.41	1.14
2001 ^e	1.27	0.54	6.36	1.15
2002 ^e	1.31	0.50	4.61	1.12
2003 ^e	1.37	0.48	6.49	1.21
2004 ^e	1.44	0.47	6.19	1.24
2005 ^e	1.58	0.39	10.29	1.65
2006 ^e	1.78	0.35	8.28	1.61
2007 ^e	2.00	0.27	7.49	1.84
2008 ^e	2.21	0.01	7.14	1.89
2009^e	2.33	Not Available	4.52	1.81

^a Internal combustion includes both gas-powered turbines and diesel-powered engines.

^b Nuclear cost.

^e Estimate by Wisconsin Office of Energy Independence based on amount of generation by the five major Wisconsin utilities.

Source: Public Service Commission of Wisconsin, Accounts and Finance Division, *Generating Plants Operated by Wisconsin Electric Utilities*, Bulletin #46 (1971-1994); annual reports of the five major Wisconsin electric generating utilities (2009). <http://psc.wi.gov/apps/annlreport/default>

Utility Annual Variable Costs of Power Generation, by Type of Plant and Cost of Purchased Power

The All Plants and Purchased Power figures are revised from previous editions of this publication due to the break out of nuclear generation from purchased power.

The costs in the table reflect costs incurred by Wisconsin's five largest investor owned utilities.

1970-2009 CENTS PER kWh

Year	Fossil Fuel Steam (Coal)	Nuclear Steam ^b	Internal Combustion ^a	Hydro	All Plants	Purchased Power	Average Cost
1970	0.55	0.29	1.76	0.27	0.53	NA	NA
1975	1.25	0.51	2.73	0.32	0.97	NA	NA
1980	2.13	0.86	5.74	0.52	1.72	NA	NA
1985	2.55	1.32	19.12	0.61	2.09	NA	NA
1990 ^e	2.13	1.50	10.87	1.00	1.94	2.22	1.99
1995 ^e	1.80	1.63	4.71	0.71	1.75	2.17	1.83
1996 ^e	1.68	1.73	4.69	0.64	1.67	2.15	1.77
1997 ^e	1.68	4.37	5.09	0.69	1.94	2.27	2.04
1998 ^e	1.68	2.83	4.70	1.02	1.94	2.67	2.11
1999 ^e	1.68	2.03	4.83	0.87	1.79	2.96	2.05
2000 ^e	1.75	2.16	7.73	0.86	1.91	3.36	2.24
2001 ^e	1.76	2.37	7.63	0.90	1.95	3.90	2.41
2002 ^e	1.87	2.18	6.09	0.75	1.97	3.64	2.40
2003 ^e	1.91	2.40	8.02	1.12	2.10	4.05	2.61
2004 ^e	1.97	2.46	14.63	1.06	2.19	4.26	2.72
2005 ^e	2.11	2.64	16.02	1.21	2.74	5.25	3.48
2006 ^e	2.68	2.83	14.81	1.40	3.11	5.83	3.88
2007 ^e	2.94	3.05	11.76	1.65	3.42	6.29	4.22
2008 ^e	3.49	4.03	13.29	1.53	4.00	6.76	4.74
2009^e	3.77	4.25	9.84	1.81	4.22	5.78	4.65

a Internal combustion includes both gas powered turbines and diesel powered engines.

b Nuclear reactors in Wisconsin are owned by independent power producers.

e Estimate by Wisconsin Office of Energy Independence based on amount of generation by the five major Wisconsin utilities.

NA – Not Available.

Source: Public Service Commission of Wisconsin, Accounts and Finance Division, *Generating Plants Operated by Wisconsin Electric Utilities*, Bulletin #46 (1971-1994); annual reports of the five major Wisconsin electric generating utilities (2009). <http://psc.wi.gov/apps/annreport/default>

This table shows the annual variable cost of generating one kWh of electricity by various technologies in Wisconsin's electric utility plants. The average cost is more than double the previous peak in 1983 of 2.21 cents per kWh. The cost of purchased power has risen in recent years and is 36.9 percent more expensive than electricity generated in Wisconsin.

Wisconsin utilities no longer own nuclear generation; all nuclear reactors located in Wisconsin are owned by Independent Power Producers. The data for 2005 and 2006 show an increase in the per kWh cost of nuclear generation because these are the years in which sales of the plants were completed. Cost per kWh continues to increase for nuclear generation.

Electric Utility Sulfur Dioxide Emissions

**SULFUR
DIOXIDE
EMISSIONS**
18.9%

Utility sulfur dioxide emissions decreased 18.9 percent from 2008 to 2009. Declines in total emissions will depend on the growth in coal-fired generation, old plant retirement, the effectiveness of future energy efficiency efforts and increased use of natural gas and renewable energy.

1980-2009 TONS

Year	1980	1990	2000	2005	2006	2007	2008 ^r	2009 ^p
Dairyland Power Cooperative								
Alma	23,641	6,510	3,445	8,816	11,748	10,748	9,558	4,809
Genoa	43,516	28,130	8,165	13,074	13,658	12,480	11,970	6,479
J.P. Madgett	4,088	7,330	5,376	7,762	7,807	8,028	9,114	10,041
Stoneman	4,663	790	0	0	0	0	0	0
Madison Gas and Electric Co.								
Blount Street	8,436	3,851	6,923	5,969	2,617	2,762	2,958	397
Northern States Power Co.								
Bay Front	2,708	393	786	1,196	944	1,149	1,041	735
Wisconsin Electric Power Co.								
Oak Creek	122,472	45,650	22,831	12,903	13,594	13,695	14,472	14,823
Pleasant Prairie	4,972	26,933	28,726	33,656	28,566	2,229	1,092	988
Port Washington	42,295	4,009	15,572	2	2	4	4	6
Valley	41,761	14,053	15,835	8,482	7,087	6,848	6,887	5,376
Wisconsin Power and Light Co.								
Blackhawk	2,006	0	0	0	0	0	0	0
Columbia 1	24,937	18,616	15,056	13,729	10,616	12,093	13,561	11,833
Columbia 2	14,614	13,909	13,270	12,370	11,780	13,332	13,303	12,396
Edgewater 1-4	60,014	38,021	8,962	9,103	7,675	7,166	7,205	5,666
Edgewater 5	0	6,744	8,744	7,741	8,084	9,502	7,858	7,782
Nelson Dewey	32,304	10,985	14,275	14,999	14,519	15,064	13,531	12,646
Rock River	14,139	7,220	24	12	2	2	2	2
Wisconsin Public Service Corp.								
Pulliam	42,087	25,631	6,314	12,175	10,869	10,448	8,446	4,386
Weston 1, 2	21,009	6,589	3,340	3,988	3,278	2,983	2,852	2,060
Weston 3	0	7,598	8,358	9,540	9,318	6,125	7,338	5,912
Weston 4	0	0	0	0	0	0	333	972
Municipal Utilities								
Manitowoc	1,318	1,727	3,282	217	732	1,033	1,706	794
Marshfield	1,651	139	0	0	0	0	0	0
Menasha	991	695	79	0	0	0	0	0
Total								
Utility Sources	513,622	275,523	189,363	175,734	162,896	135,691	133,231	108,103
All Other Sources	172,777	101,517	87,115	68,600	67,394	67,838	87,888	77,205
All Stationary Sources	686,399	377,040	276,478	244,334	230,290	203,529	221,119	185,308
Percent Utility Sources	74.8%	73.1%	68.5%	71.9%	70.7%	66.7%	60.3%	58.3%

^p Preliminary estimates.

^r Revised.

Source: Wisconsin Department of Natural Resources, Annual Survey of Point Source Emissions, Sulfur Dioxide and Nitrogen Oxides Emissions Report PUBL-AM-343 and published by facility on the Wisconsin Department of Natural Resources website at <http://dnr.wi.gov/air/emission/ObtainEmissionSummary1995ToPresent.htm> (1986-2009). (1986-2009).

Electric Utility Nitrogen Oxides Emissions

1989-2009 TONS

Year	1989	1990	2000	2005	2006	2007	2008	2009 ^p
Dairyland Power Cooperative								
Alma	1,934	1,962	2,774	3,834	4,252	4,883	3,671	1,100
Genoa	5,243	5,304	3,611	3,717	3,909	3,556	2,696	1,574
J.P. Madgett	4,728	4,963	4,845	4,469	4,098	4,114	3,962	3,636
Madison Gas and Electric Co.								
Blount Street	1,511	1,165	1,480	1,187	490	463	568	78
Northern States Power Co.								
Bay Front	0	0	1,288	1,527	1,171	1,590	1,562	916
Wisconsin Electric Power Co.								
Oak Creek	13,967	8,917	19,786	4,650	4,634	4,646	4,978	5,530
Pleasant Praire	17,701	16,356	18,452	11,318	8,745	2,560	2,862	2,623
Port Washington	1,005	771	4,074	45	85	111	129	129
Valley	4,414	4,874	7,259	3,893	3,435	3,268	3,106	1,817
Wisconsin Power and Light Co.								
Columbia 1	6,059	6,844	7,981	3,022	2,699	2,655	2,715	2,438
Columbia 2	7,943	10,336	6,874	2,829	2,448	2,484	2,549	2,329
Edgewater 1-4	16,583	16,684	12,817	3,781	2,726	2,697	2,805	1,409
Edgewater 5	2,960	3,638	8,743	2,282	2,276	1,976	1,698	1,552
Nelson Dewey	9,997	9,997	5,413	3,060	2,848	2,938	2,589	2,382
Rock River	4,367	3,697	419	373	125	108	88	33
Wisconsin Public Services Corp.								
Pulliam	6,769	7,087	8,045	9,235	8,164	8,222	6,591	3,391
Weston 1, 2	3,003	3,308	3,262	3,754	2,622	3,039	2,699	971
Weston 3	2,374	2,360	3,228	4,385	3,965	2,529	2,593	2,034
Weston 4	0	0	0	0	0	0	281	794
Municipal Utilities								
Manitowoc	923	923	102	88	146	278	593	245
Total								
Utility Sources	111,481	109,186	120,453	67,449	58,838	52,117	48,735	34,981
All Other Sources	86,473	24,774	19,625	45,232	41,282	42,660	48,287	43,196
All Stationary Sources	197,954	133,960	140,078	112,681	100,120	94,777	97,022	78,177
Percent Utility Sources	56.3%	81.5%	86.0%	59.9%	58.8%	55.0%	50.2%	44.7%

^p Preliminary estimates.

^r Revised.

Source: Wisconsin Department of Natural Resources, Annual Survey of Point Source Emissions, Sulfur Dioxide and Nitrogen Oxides Emissions Report PUBL-AM-343 and published by facility on the Wisconsin Department of Natural Resources website at <http://dnr.wi.gov/air/emission/ObtainEmissionSummary1995toPresent.htm> (1986-2009).

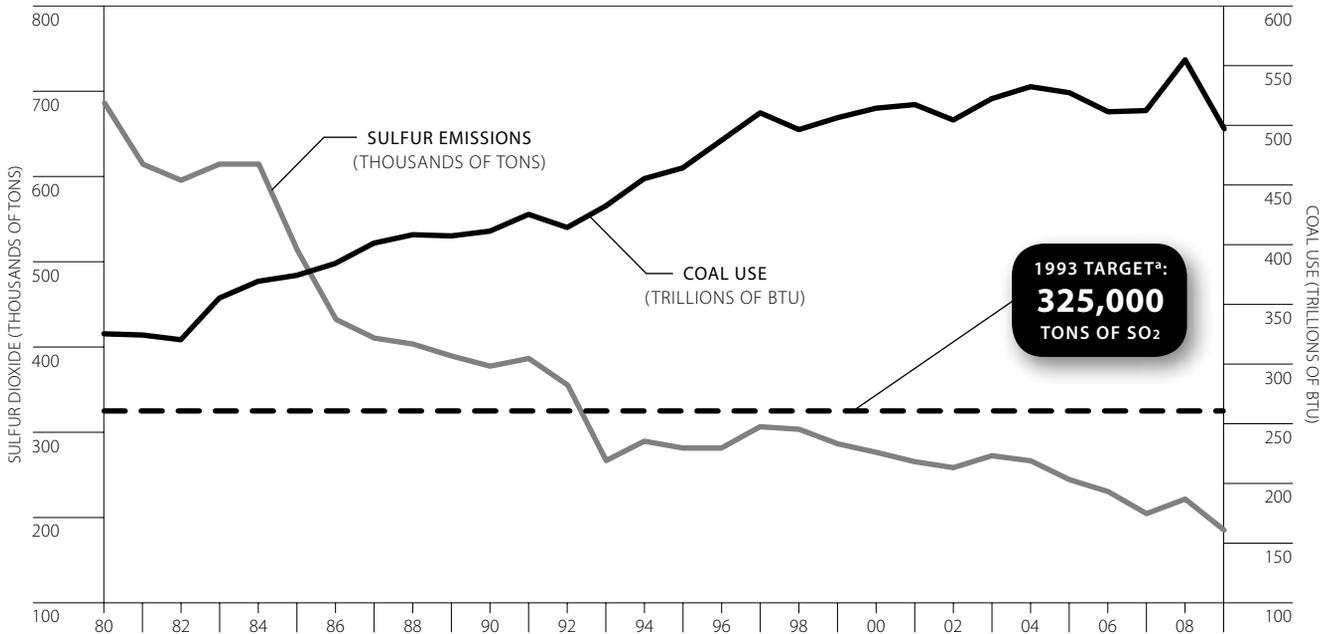
**NITROGEN
OXIDES
EMISSIONS
28.2%**

Utility nitrogen oxides (NOX) emissions decreased 28.2 percent from 2008 to 2009. Future decreases in total emissions will depend on the growth in coal fired generation, old plant retirement, the effectiveness of future energy efficiency efforts, increased use of natural gas and renewable energy, and the disposition of proposed U.S. EPA rules.

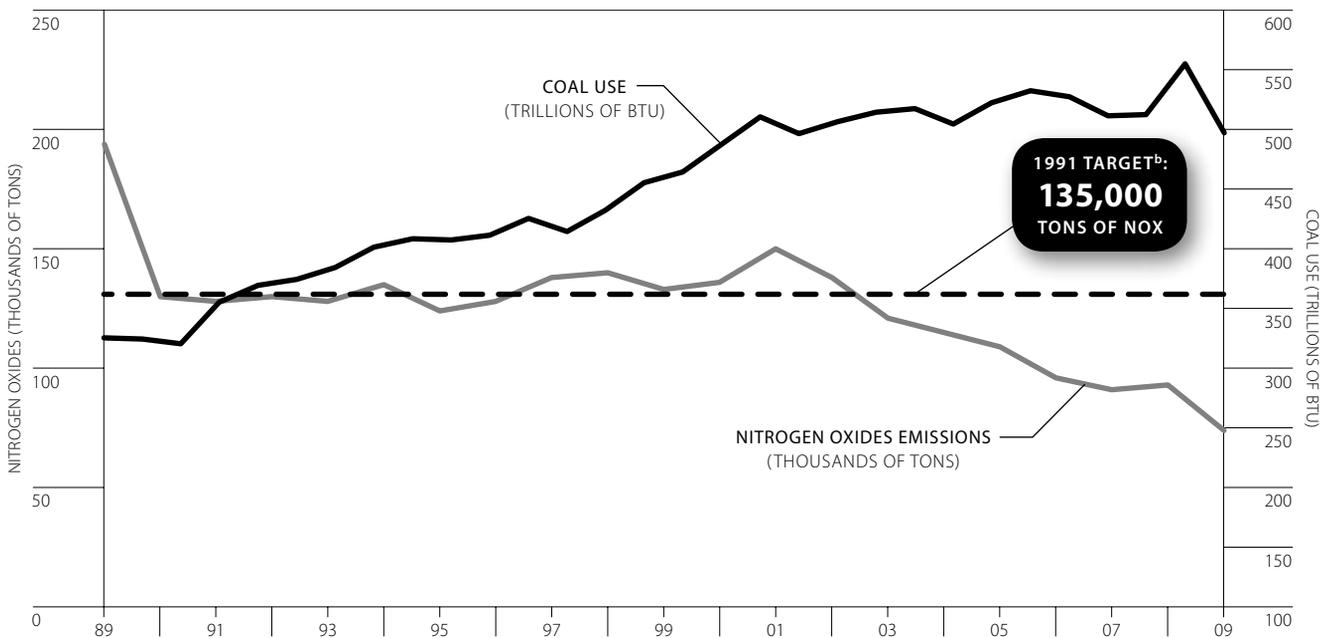
Recent changes in combustion technology have resulted in reduced NOX emissions for some generating plants.

Wisconsin Emissions and Coal Use

1980-2009 SULFUR DIOXIDE EMISSIONS AND COAL USE



1989-2009 NITROGEN OXIDES EMISSIONS AND COAL USE



a 1993 target established in Wisconsin Statutes, 285.45(2)(a). <http://www.legis.state.wi.us/statutes/Stat0285.pdf>. Target is for all major utilities and large sources.

b 1991 target established in Wisconsin Statutes, 285.47(2). <http://www.legis.state.wi.us/statutes/Stat0285.pdf>. Target is for all major utilities.

Source: Wisconsin Office of Energy Independence.

Wisconsin Utility Power Plant Inventory, 2009

Utility/Site ^a	Nameplate Capacity (MW)	Number of Units	Primary Fuel	Utility/Site ^a	Nameplate Capacity (MW)	Number of Units	Primary Fuel	Utility/Site ^a	Nameplate Capacity (MW)	Number of Units	Primary Fuel				
Dairyland Power Cooperative				Wisconsin Electric Power Co.				Wisconsin Public Services Corp.							
Alma 1-3	58.1	3	Coal, Oil	Blu Sky Green Field	145.2	88	Wind	DePere	187.2	1	Gas, Oil				
Alma 4, 5	136.0	2	Coal, Oil	Byron	1.3	2	Wind	Eagle River	4.0	2	Oil				
Elk Mound	92.4	2	Gas, Oil	Concord	437.2	4	Gas	Glenmore	1.2	2	Wind				
Flambeu	21.2	3	Hydro ^b	Germantown 1, 2, 3, 4	294.8	4	Oil	Lincoln	9.2	14	Wind				
Genoa 3	345.6	1	Coal, Oil	Germantown 5	106.9	1	Gas	Oneida Casino	4.0	2	Oil				
J.P. Madgett	387.0	1	Coal, Oil	Milwaukee	11.0	1	Coal	Pulliam 31	83.0	1	Gas				
Seven Mile Creek	4.1	3	LFG ⁱ	Paris	781.2	4	Gas	Pulliam 3-5	110.0	3	Coal				
Various Biogas Methane	2.4	3	Gas	Pleasant Prairie 1, 2	1233.0	2	Coal	Pulliam 6-8	300.2	3	Coal				
Madison Gas and Electric Co.				Pleasant Prairie 3	2.0	1	Oil	Various Hydro	57.2	38	Hydro ^b				
Blount Street 3, 4, 5, 6, 7	177.5	5	Coal, RDF ^c	Port Washington 1-3	1158.0	3	Gas	Various Solar	0.0	8	Solar				
Diesel	54.0	1	Oil	S. Oak Creek 5-8	1191.6	4	Coal	W. Marinette 31, 32, 34	166.6	3	Gas				
Fitchburg 1, 2	57.6	2	Gas	S. Oak Creek 9	19.6	1	Gas	Weston 1-3	492.1	3	Coal				
Nine Springs	16.2	1	Gas	Valley 1, 2	272.0	2	Coal	Weston 31, 32	72.5	2	Gas				
Rosiere	11.2	17	Wind	Valley 3	2.7	1	Oil	Municipal Utilities							
Sycamore	41.6	2	Gas	Various Hydro	13.6	8	Hydro ^b	Manitowoc, City of	127.0	3	Coal, RDF ^c , Coke				
Various Hydrogen	0.0	1	Hydrogen	Various Solar	0.0	3	Solar	Manitowoc, City of	11.0	2	Gas				
Various Solar	0.0	8	Solar	Wisconsin Power and Light Co.				Menasha, City of	21.1	3	Coal				
West Campus	168.5	3	Gas	Blackhawk 3, 4	50.0	2	Gas	Merchant/IPP							
Northern States Power Co.				Cedar Ridge	67.7	41	Wind	Kewaunee	560.1	1	Nuclear				
Bay Front 4, 5, 6	68.0	3	Wood, Coal	Edgewater 3	60.0	1	Coal	Point Beach	1073.6	1	Nuclear				
Flambeau	16.0	1	Gas	Nelson Dewey 1, 2	200.0	2	Coal	Statewide Utilities							
French Island 1, 2	31.3	2	Wood, RDF ^c	Rock River 1, 2	150.0	2	Gas	Statewide	401.2	197	Renewables				
French Island 3, 4	157.6	2	Oil	Rock River 3-6	144.0	4	Gas	Statewide	8481.8	77	Coal				
Various Hydro	237.4	62	Hydro ^b	Sheepskin	40.0	1	Gas	Statewide	573.7	344	Hydro ^b				
Wheaton 1-6	322.0	6	Gas, Oil	South Fond Du Lac	172.0	2	Gas	Statewide	7271.8	94	Natural Gas				
Shared Ownership				Valley Trail	2.4	3	LFG ⁱ	Statewide	805.6	107	Petroleum				
Columbia 1 ^f	512.0	1	Coal	Various Hydro	37.9	14	Hydro ^b	Statewide	448.9	63	Wind				
Columbia 2 ^f	511.0	1	Coal	Various Solar	0.0	5	Solar	Statewide Totals ^j	17983.0	882	All				
Edgewater 4 ^g	330.0	1	Coal												
Edgewater 5 ^h	380.0	1	Coal												
W. Marinette 33 ^e	83.5	1	Gas												
Weston 4 ^d	500.0	1	Coal												
Elm Road C1 ^k	600.0	1	Coal												

^a Does not include non-utility generation, all electric cooperative or all municipal utility.

^b Hydroelectric capacity differs from sums on other tables due to different data sources

^c RDF is Refuse Derived Fuel.

^d The Weston 4 unit is owned by Wisconsin Public Service Corp. (70%) and Dairyland Power Cooperative (30%).

^e The West Marinette 33 unit is jointly owned by Wisconsin Public Service Corp. (68%) and the City of Marshfield (32%).

^f The Columbia 1 and 2 units are owned by Alliant Energy (46.2%), Wisconsin Public Service Corp. (31.8%) and Madison Gas & Electric Co. (22.0%).

^g The Edgewater 4 unit is owned by Alliant Energy (68.2%) and Wisconsin Public Service Corp. (31.8%).

^h The Edgewater 5 unit is owned by Alliant Energy (75%) and Wisconsin Electric Power Co. (25%).

ⁱ LFG is Landfill Gas

^j Statewide totals here are slightly different from capacity totals on other pages in this section because this table does not include unknown fuel (88.9 MW) or nuclear reactors (1,633.7 MW). Nuclear reactors are not included because they are owned by Independent Power Producers, not utilities.

^k The Elm Road C1 unit is owned by Wisconsin Electric Power Co. (81.67%), WPPI Energy (10%) and Madison Gas and Electric (8.33%).

Source: U.S. Department of Energy, Energy Information Administration, Existing Electric Generating Units in the United States by State, Company and Plant, <http://www.eia.doe.gov/cneaf/electricity/page/capacity/capacity.html> (through 2007); Public Service Commission of Wisconsin, unpublished data (2008); Annual report of Dairyland Power Cooperative submitted to the U.S. Department of Agriculture, Rural Utilities Service (2008-2009).

CHAPTER 3

Renewable Energy

A Quick Guide to Renewable Energy



Biomass is organic matter (plant material, vegetation, agriculture waste, forestry waste) used as a fuel or source of energy. Use of biomass as an energy source results in little net production of carbon dioxide because the CO₂ generated during combustion of plant material equals the CO₂ consumed during the lifecycle of the plant. A map of biomass density across the United States can be found in the Map Appendix.

Renewable energy resources play a key role in Wisconsin's efforts to achieve the Governor's 25 x '25 goal, and to reduce dependence on imported fuels. According to Wisconsin Statutes 196.374(1)(j), a renewable resource "derives energy from any source other than coal, petroleum products, nuclear power, or ...natural gas."



Wind power uses turbines to generate electricity for distribution on the electric grid and/or to displace energy normally purchased from the grid. A map of wind production sites and wind energy potential across Wisconsin can be found in the Map Appendix.

Biogas is produced from the state's landfills and agricultural manure digesters. Often, biogas is included under the heading biomass. In this statistics book, we break out biogas from biomass to provide further definition and detail about these resources in the state.



Solar thermal uses sunlight to generate heat for applications such as water heating without fossil fuels.



Hydro power uses the kinetic energy of moving water to generate electricity for distribution on the electric grid. A map of hydroelectric sites in Wisconsin can be found in the Map Appendix.



Solar photovoltaic uses sunlight to generate electricity to displace energy normally purchased from the electric grid, or to add energy to the electric grid. A map of solar intensity across the United States Wisconsin can be found in the Map Appendix.

Ethanol is a renewable transportation fuel primarily made from corn. It is used as the oxygenate in reformulated gasoline sold in southeastern Wisconsin and as E10 and E85 throughout the state. A listing of ethanol facilities is on the OEI website at: <http://energyindependence.wi.gov/docview.asp?docid=11272&locid=160>.

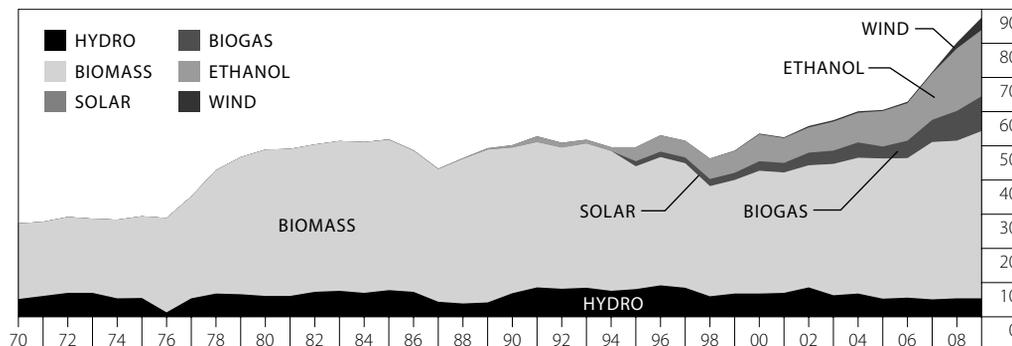


Wisconsin Renewable Energy Production, by Type of Fuel

This table includes all renewable energy used in Wisconsin for generating electricity and for other applications that displace fossil fuels (e.g., space heating, transportation fuel).

All the figures for solar energy, biomass and biogas were historically revised in 2007 to more accurately represent a revision to methodology and data sources. For example, this table does not include estimated passive solar, municipal solid waste or other refuse derived fuels, (e.g., railroad ties, tires) except where defined by law as a renewable fuel.

1970-2009 TRILLIONS OF BTU



1970-2009 TRILLIONS OF BTU AND PERCENT OF TOTAL

Year	Hydro	Biomass	Solar	Biogas	Ethanol ^a	Wind	Total
1970	5.2	22.1	0.0	0.0	0.0	0.00	27.3
1975	5.5	23.9	0.0	0.0	0.0	0.00	29.4
1980	6.1	42.8	0.0	0.0	0.0	0.00	48.9
1985 ^r	7.8	44.0	0.0	0.0	0.1	0.00	51.9
1990 ^r	6.9	42.6	0.0	0.0	0.7	0.00	50.2
1995 ^r	8.1	35.9	0.0	1.5	4.1	0.00	49.6
2000 ^r	6.8	35.9	0.0	2.8	7.9	0.16	53.6
2005 ^r	5.3	41.0	0.00652	3.5	10.4	0.32	60.5
2006 ^r	5.6	40.8	0.01227	5.1	11.0	0.35	62.8
2007 ^r	5.1	46.0	0.01674	6.5	13.6	0.37	71.5
2008 ^r	5.4	46.1	0.02728	8.7	18.3	1.66	80.3
2009^p	5.4	48.9	0.03528	10.2	19.4	3.59	87.4

^a Ethanol is blended with a petroleum-based fuel to produce reformulated gasoline, E10 and E85.

^p Preliminary estimates.

^r Revised.

Source: Public Service Commission of Wisconsin, unpublished data compiled from annual reports (2007-2009); Focus on Energy, aggregated data (2005-2009); survey data from conversations and emails with utilities, independent operators of landfills and/or waste water treatment plants, and public schools (2007-2009); Department of Revenue *Monthly Motor Fuel Consumption Report* (2000-2009); Energy Center of Wisconsin, *Wisconsin Agricultural Biogas Casebook* (2008); Wisconsin Department of Natural Resources, Annual Survey of Point Source Emissions, unpublished (1972-2009); Wisconsin Department of Administration, Division of Energy, "Wisconsin Residential Wood Energy Model," unpublished (1981-2009); Public Service Commission of Wisconsin, Focus on Energy Evaluation *Semiannual Report (Second Half of 2009)*, April 23, 2010 (2009) http://www.focusonenergy.com/files/Document_Management_System/Evaluation/semiannualecondhalf2009_evaluationreport.pdf; U.S. Department of Energy, Energy Information Administration, *Estimates of U.S. Wood Energy Consumption from 1949 to 1981* (August 1983); Compiled from renewable energy tables in this publication.

OVERALL
RENEWABLE
ENERGY USE
8.9%

Overall renewable energy use in Wisconsin increased 8.9 percent in 2009. Ethanol use in the transportation sector increased 5.8 percent. Hydro generation includes electricity generation by Wisconsin utilities and dams owned by industrial users (e.g., paper mills). Solar and wind energy figures include distributed energy sold to utilities by residential and commercial users.

Maps of Wisconsin's hydroelectric sites, wind installations ("wind farms") and U.S. potential for biomass and solar can be found in the Map Appendix in the back of this book.

Wisconsin Renewable Energy Production, by Economic Sector

**TOTAL
END-USE
ENERGY
6.4%**

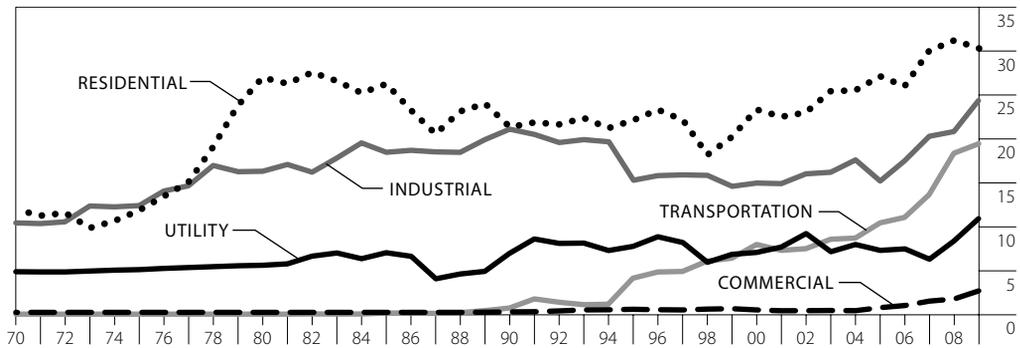
Wisconsin's total end-use energy increased by 6.4 percent. The residential and industrial sectors use the most renewable energy, primarily due to woodburning in these sectors. Residential data also include solar hot water and photovoltaic systems, and wind power. Data reported in the electric sector represents resource energy, meaning that the renewable fuels are used to generate electricity which is sold through the grid. Transportation sector renewable energy measures use of ethanol blended with gasoline and sold as E10 and E85.

Maps of Wisconsin's hydroelectric sites, wind installations ("wind farms") and U.S. potential for biomass and solar can be found in the Map Appendix in the back of this book.

This table includes all renewable energy used in Wisconsin for generating electricity and for other applications that displace fossil fuels (e.g., space heating, transportation fuel).

In 2007, the figures in this table were revised to remove non-metered resources such as passive solar energy and resources not considered renewable under Wisconsin law (e.g., municipal solid waste and refuse derived fuel such as railroad ties and tires). This impacted all sectors when compared to previous versions of this publication.

1970-2009 TRILLIONS OF BTU



1970-2009 TRILLIONS OF BTU AND PERCENT OF TOTAL

Year	Residential	Commercial	Industrial	Electric Utility	Transportation	Total Resources	Total End Use
1970	11.9	0.2	10.4	4.8	0.0	27.3	22.5
1975	11.8	0.2	12.3	5.1	0.0	29.4	24.3
1980 ^r	26.9	0.2	16.2	5.6	0.0	48.9	43.4
1985 ^r	26.2	0.2	18.4	7.0	0.1	51.9	44.9
1990 ^r	21.3	0.3	21.0	6.9	0.7	50.2	43.3
1995 ^r	22.0	0.6	15.2	7.7	4.1	49.6	41.9
2000 ^r	23.3	0.5	14.9	7.0	7.9	53.6	46.6
2005 ^r	27.0	0.7	15.1	7.2	10.4	60.5	53.3
2006 ^r	25.9	1.0	17.4	7.4	11.0	62.7	55.3
2007 ^r	30.0	1.5	20.2	6.2	13.6	71.5	65.3
2008 ^r	31.1	1.7	20.8	8.3	18.3	80.3	71.9
2009^p	30.2	2.7	24.3	10.9	19.4	87.4	76.6

^p Preliminary estimates.

^r Revised.

Source: Focus on Energy via the Wisconsin Energy Conservation Corporation, unpublished, aggregated data (2005-2009); survey data from conversations and emails with utilities, independent operators of landfills and/or waste water treatment plants, and public schools (2007-2009); Department of Revenue *Monthly Motor Fuel Consumption Report* (2000-2009); Energy Center of Wisconsin *Wisconsin Agricultural Biogas Casebook* (2008); Public Service Commission of Wisconsin, unpublished data compiled from utility annual reports (1970-2009), <http://psc.wi.gov/apps/annreport/default>.

Wisconsin Wood Use, by Economic Sector

In previous versions of this book, the electric sector was included in this table. Electric sector data is included in tables elsewhere in this chapter.

1970-2009 TRILLIONS OF BTU AND PERCENT OF TOTAL

Year	Residential ^a		Commercial ^b		Industrial		Total
1970	11.9	53.8%	0.20	0.9%	10.0	45.2%	22.1
1975	11.8	49.4%	0.20	0.8%	11.9	49.8%	23.9
1980	26.9	62.9%	0.20	0.5%	15.7	36.7%	42.8
1985 ^r	26.2	59.5%	0.20	0.5%	17.6	40.0%	44.0
1990 ^r	21.3	51.2%	0.26	0.6%	20.0	48.2%	41.5
1995 ^r	22.0	62.5%	0.55	1.6%	12.7	35.9%	35.3
1996 ^r	23.2	63.1%	0.50	1.4%	13.1	35.6%	36.9
1997 ^r	22.1	62.0%	0.48	1.3%	13.1	36.7%	35.6
1998 ^r	18.1	57.5%	0.57	1.8%	12.8	40.7%	31.5
1999 ^r	20.1	62.4%	0.62	1.9%	11.5	35.7%	32.3
2000 ^r	23.3	66.5%	0.48	1.4%	11.2	32.1%	35.0
2001 ^r	22.4	65.7%	0.38	1.1%	11.3	33.2%	34.2
2002 ^r	22.9	65.9%	0.37	1.1%	11.5	33.1%	34.8
2003 ^r	25.3	67.8%	0.36	1.0%	11.7	31.3%	37.4
2004 ^r	25.4	66.2%	0.32	0.8%	12.7	33.0%	38.5
2005 ^r	27.0	68.5%	0.27	0.7%	12.2	30.8%	39.5
2006 ^r	25.9	69.6%	0.24	0.7%	11.0	29.7%	37.2
2007 ^r	29.9	70.3%	0.44	1.0%	12.2	28.6%	42.6
2008 ^r	31.1	71.7%	0.54	1.2%	11.7	27.0%	43.4
2009^p	30.2	66.9%	0.80	1.8%	14.2	31.4%	45.2

a Revisions by the federal Bureau of Economic Activity, shifting the baseline year from 2000 to 2005, resulted in changes in the GDP, which impacted estimates of residential woodburning.

b Commercial sector figures are revised to reflect data incorrectly assigned to the electric production sector which are now correctly categorized with wood/biomass for non-electric production.

p Preliminary estimates.

r Revised.

Source: U.S. Department of Energy, Energy Information Administration, *Estimates of U.S. Wood Energy Consumption from 1949 to 1981* (August 1983); Wisconsin Department of Natural Resources, *Annual Survey of Point Source Emissions*, unpublished (1972-2009); USDA Forest Service, *Residential Fuelwood Consumption and Production in Wisconsin* (1994); Wisconsin Department of Administration, Division of Energy, "Wisconsin Residential Wood Energy Model," unpublished (1981-2009), and *Directory of Wisconsin Wood Burning Facilities* (1995).

WOOD
ENERGY USE
4.1%

Wood energy use in Wisconsin increased by 4.1 percent in 2009. This table shows wood used in Wisconsin for applications that displace the use of fossil fuels, such as space heating or water heating. Wood used in this table does not represent wood used to generate electricity.

Residential wood use is estimated using a variety of factors including heating degree days, cost of other winter fuels and gross domestic product, the efficiency factor of wood, and the number of households in Wisconsin. The Commercial sector wood use includes schools, hospitals, wholesalers and retailers, and construction.

A map of biomass potential distribution across the United States can be found in the Map Appendix in the back of this book

Wisconsin Manufacturing Industry Use of Wood Fuel, by Industry Group

The use of wood and wood products as fuel by Wisconsin industries is concentrated among businesses that use or produce a wood product. Lumber mills burn sawdust, bark and scrap wood as a boiler fuel and for kiln drying boards. Furniture and paper companies use scrap wood and wood byproducts for process steam, heating and generating electricity. Wood in Wisconsin is a renewable resource for heating as well as electricity generation.

A map of biomass potential distribution across the United States can be found in the Map Appendix in the back of the book.

1972-2009 THOUSANDS OF TONS AND TRILLIONS OF BTU^a

Year	Lumber		Furniture		Paper & Allied		Other Manufacturing		Total	
	(Tons)	(Btu)	(Tons)	(Btu)	(Tons)	(Btu)	(Tons)	(Btu)	(Tons)	(Btu)
1972	391.2	4.42	13.2	0.15	508.5	5.75	16.1	0.18	929.0	10.50
1975	437.2	4.94	24.5	0.28	575.6	6.50	17.1	0.19	1,054.4	11.91
1980	447.5	5.06	56.9	0.64	872.8	9.86	12.0	0.14	1,389.2	15.70
1985	427.3	4.83	53.9	0.61	1,046.7	11.83	33.5	0.38	1,561.4	17.64
1990	490.9	5.55	64.0	0.72	1,186.5	13.41	30.0	0.34	1,771.4	20.02
1995	480.6	5.43	29.3	0.33	592.3	6.69	19.9	0.22	1,122.1	12.68
1996	435.9	4.93	29.9	0.34	676.8	7.65	18.6	0.21	1,161.2	13.12
1997	402.2	4.54	23.2	0.26	712.3	8.05	17.6	0.20	1,155.2	13.05
1998	408.1	4.61	22.1	0.25	693.2	7.83	10.9	0.12	1,134.2	12.82
1999	455.4	5.15	22.7	0.26	535.1	6.05	7.9	0.09	1,021.1	11.54
2000	432.3	4.89	20.1	0.23	534.5	6.04	7.5	0.08	994.4	11.24
2001	419.9	4.74	19.0	0.21	554.5	6.27	8.9	0.10	1,002.3	11.33
2002	415.2	4.69	17.2	0.19	577.5	6.53	9.0	0.10	1,019.0	11.51
2003	384.3	4.34	15.3	0.17	626.9	7.08	8.2	0.09	1,034.7	11.69
2004	434.5	4.91	13.5	0.15	665.5	7.52	10.5	0.12	1,124.0	12.70
2005	421.8	4.77	10.8	0.12	633.4	7.16	10.5	0.12	1,076.5	12.16
2006	356.1	4.02	7.6	0.09	597.3	6.75	16.5	0.19	977.4	11.05
2007	361.3	4.08	7.5	0.08	690.4	7.80	19.3	0.22	1,078.5	12.19
2008	300.0	3.39	5.6	0.06	712.1	8.05	20.7	0.23	1,038.4	11.73
2009^p	256.7	2.90	4.0	0.05	971.6	10.98	21.8	0.25	1,254.1	14.17

^a Gross heating values of wood range from 8 MMBtu per ton to 17 MMBtu per ton, due in part to differences in moisture content. In this table, 11.3 MMBtu per ton is used, based on estimates of moisture content and type of wood used in Wisconsin.

^p Preliminary.

Source: Estimates by the Wisconsin Office of Energy Independence, based on Wisconsin Department of Natural Resources, Annual Survey of Point Source Emissions, unpublished (1972-2009); Employment Research Associates, *Biomass Resources: Generating Jobs and Energy*, Technical Papers (January 1986); Department of Administration, Division of Energy, Directory of Wisconsin Wood Burning Facilities (1995).

Wisconsin Electric Utility Use of Wood Fuel

1970-2009

Year	Tons	Billions of Btu
1970-1975	0	0
1980	76,282	740
1985	155,717	1,666
1990	299,464	3,112
1995	327,201	3,506
1996	339,803	3,837
1997	304,618	3,326
1998	334,231	3,871
1999	330,491	3,765
2000	296,739	3,430
2001	301,580	3,484
2002	283,774	3,260
2003	267,446	3,154
2004	242,973	2,877
2005	253,638	2,961
2006	288,907	3,482
2007	315,811	3,437
2008	342,684	3,735
2009	362,471	3,868

WOOD ENERGY USED FOR ELECTRICITY

In the utility sector, Northern States Power (NSP)/Xcel Energy uses wood for their electricity-generation fuel at the Bay Front and French Island generating plants.

Wood energy used for electricity in Wisconsin increased in 2009 when NSP increased wood usage at its Bay Front plant.

These figures represent resource energy, before conversion of wood fuel to electricity.

NSP began using wood fuel at Bay Front in 1976 and at its French Island facility in 1980.

These are the only electric utility generation sites in Wisconsin using significant amounts of wood.

A map of biomass potential distribution across the United States can be found in the Map Appendix.

Source: Wisconsin Department of Natural Resources, Annual Survey of Point Source Emissions, unpublished (1972-1994); annual reports of various Wisconsin electric generating utilities (1995-2009). <http://psc.wi.gov/apps/annreport/default>

Wisconsin Electric Utility and Non-Utility Hydroelectric Generation

ELECTRIC
UTILITY
HYDROELECTRIC
PRODUCTION
7.9%

Total Wisconsin hydroelectric production — utility and non-utility — decreased 7.9 percent from 2008 to 2009. Because hydroelectric production is impacted by rainfall, among other factors, precipitation inches are provided in this table. In 2009, total precipitation in Wisconsin fell by 11.7 percent from 2008.

A map of Wisconsin's hydroelectric sites can be found in the Map Appendix in the back of the book.

1970-2009 MILLIONS OF kWh

Year	Wisconsin Operated Utility Plant Location		Total Utility	Wisconsin Non-Utility	Total Wisconsin	Total Wisconsin Precipitation (inches per year)
	Wisconsin ^{a,b}	Michigan				
1970	1,413.2	448.1	1,861.3	110.0	1,523.2	32.0
1975	1,482.9	450.3	1,933.2	129.4	1,612.3	32.4
1980	1,628.3	488.9	2,117.2	160.4	1,788.7	32.5
1985	2,046.3	543.6	2,589.9	235.9	2,282.2	37.0
1990	1,791.0	340.2	2,131.2	223.4	2,014.4	36.2
1995	2,097.1	440.1	2,537.2	281.4	2,378.5	32.9
1996	2,401.9	500.7	2,902.6	294.1	2,696.0	32.8
1997	2,182.2	458.5	2,640.7	301.1	2,483.3	28.6
1998	1,517.8	324.0	1,841.8	229.6	1,747.4	32.7
1999	1,734.0	416.1	2,150.1	250.6	1,984.6	34.0
2000	1,749.4	369.6	2,119.0	241.4	1,990.8	34.8
2001	1,887.6	383.3	2,270.9	168.6	2,056.2	35.5
2002	2,282.9	485.8	2,768.7	232.1	2,515.0	35.2
2003	1,623.4	373.4	1,996.8	219.9	1,843.3	28.4
2004	1,748.4	401.0	2,149.4	232.3	1,980.7	35.3
2005 ^r	1,499.0	338.6	1,837.6	51.7	1,550.7	29.2
2006 ^r	1,446.0	326.3	1,772.3	180.9	1,626.9	30.7
2007 ^r	1,314.0	272.6	1,586.6	169.2	1,483.2	34.0
2008 ^r	1,428.0	272.6	1,700.6	157.6	1,585.6	33.6
2009^p	1,352.7	251.2	1,603.9	108.2	1,460.9	29.7

^a Including Wisconsin power cooperatives.

^b From 1970 to 1989, data were sourced from the Public Service Commission bulletins; from 1990 to 2008, data are sourced from the federal Energy Information Administration (EIA). Beginning in 2009, data are from the Wisconsin Public Service Commission. Totals here may not match other hydroelectric totals in the book due to different data sources.

^p Preliminary estimates.

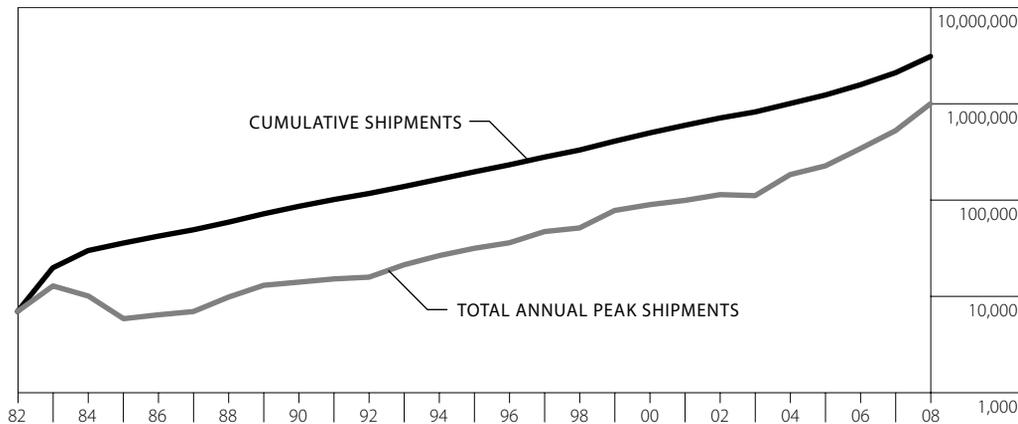
^r Revised.

Source: Public Service Commission of Wisconsin, Accounts and Finance Division, *Generating Plants Operated by Wisconsin Electric Utilities*, Bulletin #46 (1971-1994); U.S. Department of Agriculture, Rural Electrification Administration, *Annual Statistical Report*, REA Bulletin 1-1 (1971-1994); Wisconsin Department of Administration, Division of Energy, Wisconsin Hydroelectric Generation Model, unpublished (1994); National Oceanic and Atmospheric Administration, *Monthly State Heating Degree Days, Historical Climatology Series 5-1* (April 2004); U.S. Department of Energy, Energy Information Administration, *Electric Power Monthly* [DOE/EIA-0226 (2010/03)] (March 2010), http://www.eia.doe.gov/cneaf/electricity/epa/epa_sprdshts.html; Public Service Commission of Wisconsin, unpublished electrical production data (2005-2009).

U. S. Photovoltaic Modules and Cell Shipments and Conversion Efficiency

1982-2008 PHOTOVOLTAIC SHIPMENTS (KILOWATTS)

The table also includes information about conversion efficiency, which measures the fraction of solar energy that is converted into electrical energy. PV modules average a conversion efficiency of about 15 percent for Crystalline Silicon and about 10 percent for Amorphous Silicon.



Year	Photovoltaic Shipments ^a		Average Energy Conversion Efficiency Photovoltaic					
	Shipments Total Annual Peak Kilowatts	Cumulative Kilowatts	Crystalline Silicon			Thin-Film Silicon		Concentrator Silicon
			Single Crystal	Cast	Ribbon	Amorphous Silicon	Other	
1982	6,897	6,897						
1985	5,769	35,198						
1990	13,837	84,719						
1995	31,059	193,328						
1996	35,464	228,792						
1997	46,354	275,146						
1998	50,562	325,708						
1999	76,787	402,495						
2000	88,221	490,716						
2001	97,666	588,382						
2002	112,090	700,472						
2003	109,357	809,829						
2004	181,116	990,945						
2005	222,916	1,213,861						
2006	337,268	1,551,129						
2007	517,684	2,068,813	17	14	12	8	12	35
2008 ^P	986,504	3,055,317	19	14	13	8	12	34

^a Total shipments in the table represent shipment from outside and within the United States, and do not include export shipments to other countries. Source: U.S. Department of Energy, Energy Information Administration, *Annual Energy Review* [DOE/EIA-0384(2009)] (August 2010), table 10.8 (2009) www.eia.doe.gov/aer; U. S. Department of Energy, Energy Information Administration, December 2009, Form EIA-63B, *Annual Photovoltaic Module/Cell Manufacturers Survey*, Table 3.8; "Average Energy Conversion Efficiency of Photovoltaic Cells and Modules Shipped", 2007-2008 (2009).

Shipments of photovoltaic (PV) modules and cells are measured in peak kilowatts (KW), also known as the rated capacity (how much power can be produced under standardized test conditions). Data in the table show KWs of shipments for each year, as well as cumulative shipments since the Energy Information Administration (EIA) began collecting these data.

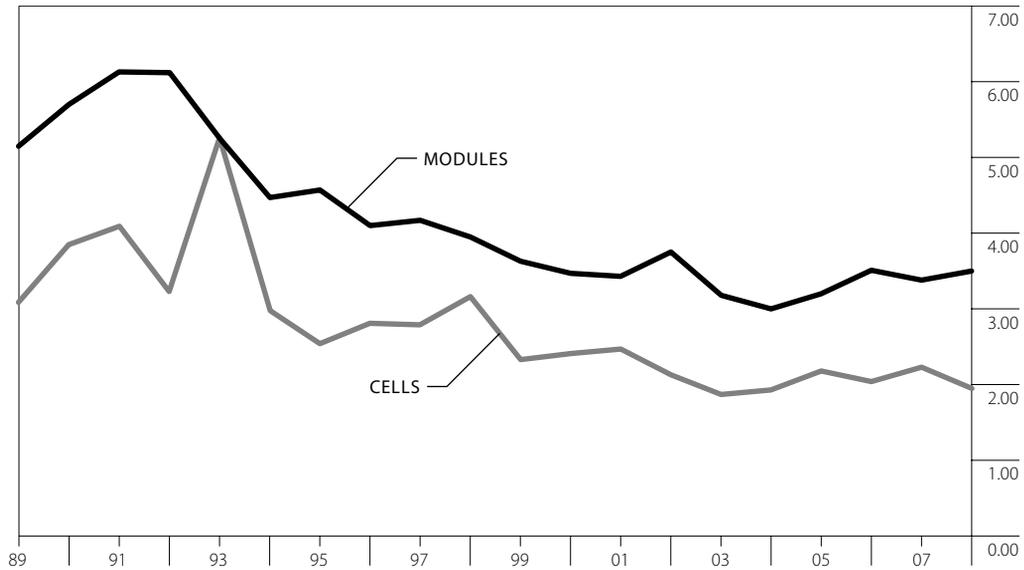
Since 1982 total shipments of PV systems have exceeded 3,000 Megawatts (MW). Since 2003 annual shipments of PV systems have been doubling every 18 months, an annual average growth of nearly 60 percent. The volume of shipments is a good proxy for the growth of PV in the commercial, industrial and residential sectors and demonstrates a steady growth in the purchase and installation of PV in the United States.

U. S. Photovoltaic Modules and Cell Prices

Growth in photovoltaic (PV) is demonstrated by falling prices. From 1990 to 2008, PV systems shipment prices fell by a factor of two. A PV module is an integrated assembly of PV cells that generate direct current power for PV systems. The price per watt of a module (about \$3/watt) is about 55 percent higher than the cost of PV cells (about \$2/watt).

A small grid-connected fix-mounted PV system has a retail price of about \$7 per watt installed. The PV modules comprise about half of that price. In Wisconsin, the cost of purchasing and installing PV power systems can be offset through the involvement of the Focus on Energy Program, the state's rate-payer funded energy efficiency program.

1989-2008 DOLLARS PER PEAK WATT



Year	Dollars per Peak Watt (nominal ^a dollars)	
	Modules	Cells
1989	5.14	3.08
1990	5.69	3.84
1995	4.56	2.53
1996	4.09	2.80
1997	4.16	2.78
1998	3.94	3.15
1999	3.62	2.32
2000	3.46	2.40
2001	3.42	2.46
2002	3.74	2.12
2003	3.17	1.86
2004	2.99	1.92
2005	3.19	2.17
2006	3.50	2.03
2007	3.37	2.22
2008 ^p	3.49	1.94

^a Nominal dollars represent the prices during the year cited, they are not adjusted for inflation.

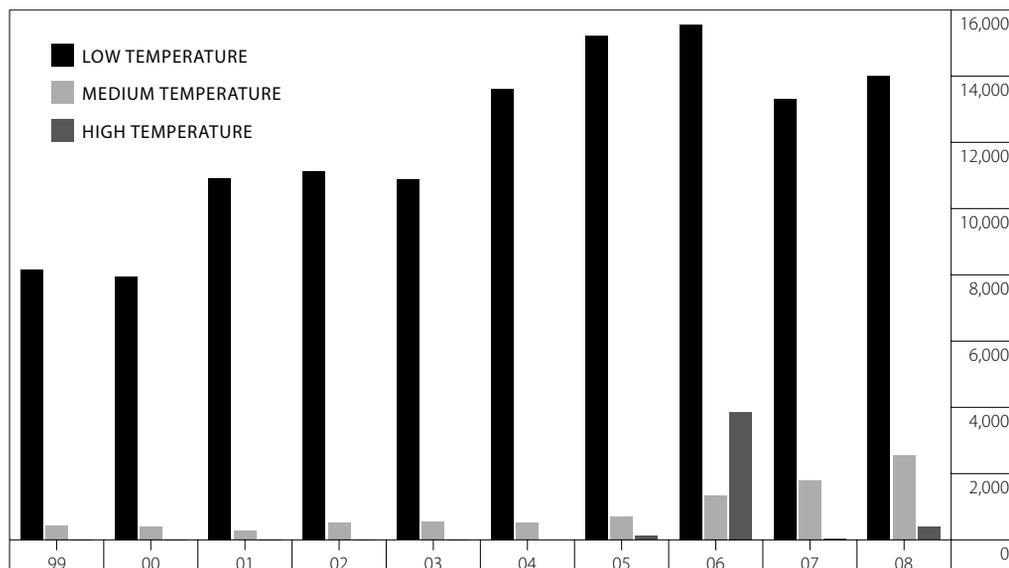
^p Preliminary.

Source: U.S. Department of Energy, Energy Information Administration, *Annual Energy Review* [DOE/EIA-0384(2009) (August 2010)], table 10.8 (2009) www.eia.doe.gov/aer; U. S. Department of Energy, Energy Information Administration, December 2009, Form EIA-63B, *Annual Photovoltaic Module/Cell Manufacturers Survey*, Table 3.8, "Average Energy Conversion Efficiency of Photovoltaic Cells and Modules Shipped", 2007-2008 (2009).

U. S. Solar Thermal Collector Shipments and Prices

1999-2008 THOUSANDS OF SQUARE FEET

In Wisconsin medium temperature solar thermal systems can range from \$100-\$200 per square foot, depending on the size of the system, the quality of the system and the labor involved in the installation. A solar thermal system sized for a residential home is typically 40-64 square feet of collector area, or 1 square foot of medium-temperature solar thermal collector for every gallon of hot water used within the household per day.



1999-2008 THOUSANDS OF SQUARE FEET AND PERCENT OF ALL SHIPMENTS

Year	Low Temperature		Medium Temperature		High Temperature		Total
1999	8,152	95.0%	427	5.0%	4	0.0%	8,583
2000	7,948	95.2%	400	4.8%	5	0.1%	8,353
2001	10,919	97.6%	268	2.4%	2	0.0%	11,189
2002	11,126	95.4%	535	4.6%	2	0.0%	11,663
2003	10,877	95.0%	560	4.9%	7	0.1%	11,444
2004	13,608	96.4%	506	3.6%	0	0.0%	14,114
2005	15,224	94.9%	702	4.4%	115	0.7%	16,041
2006	15,546	74.9%	1,346	6.5%	3,852	18.6%	20,744
2007	13,323	87.9%	1,797	11.9%	33	0.2%	15,153
2008	14,015	82.6%	2,560	15.1%	388	2.3%	16,963

Solar thermal collectors displace fossil fuels by using solar energy to heat water. Data in the table below represents national solar thermal collector shipments; these figures are not specific to Wisconsin. Solar thermal shipments can be used as a rough proxy for increased national interest in using solar power for water heating.

Different collectors heat water to different temperatures, for different applications. In 2008, low temperature collectors, used primarily for seasonal pool heating, comprise 83 percent of the shipments. Medium temperature collectors, used for domestic water heating, comprise only 15 percent of all shipments in the United States. High temperature solar collectors are used for energy generation applications in the sunniest parts of the country.

Source: U.S. Department of Energy, Energy Information Administration, *Solar Thermal Collector Manufacturing Activities*, 2008 (2009), table 2.12, <http://www.eia.doe.gov/cneaf/solar.renewables/page/solarthermal/solarthermal.html>

Wisconsin Renewable Energy Electricity Generated and Purchased

RENEWABLE
ELECTRICITY
GENERATION
25.5%

In 2009, Wisconsin's electric utilities and non-utilities, such as paper mills, increased their generation of electricity from renewable energy sources by 25.5 percent. The primary renewable energy source used was hydropower, which represents 34.8 percent of Wisconsin's renewable electricity generation.

Sales of renewable energy generated in Wisconsin comprise approximately 6.4 percent of total electric sales in Wisconsin, an increase of 33.5 percent over 2008.

Wind power in this table represents wind power from in-state wind production facilities, and does not include generation at out-of-state sites owned by, or purchased by, Wisconsin utilities. Increases in wind generation represent efforts of Wisconsin's utilities to add wind power to their overall energy portfolio to meet requirements of the Renewable Portfolio Standard (RPS).

In this table, biomass includes wood, paper pellets and black liquor. Biogas includes methane burned at landfills, waste water treatment facilities, and agricultural manure digesters to generate electricity. Solar generation comes primarily from distributed energy sources such as residences with photovoltaic installations that sell power to the electric utility for distribution on the electric grid.

In 2007 these figures were revised from previous versions of this publication to remove resources that are not considered renewable under Wisconsin law (e.g., municipal solid waste or refuse derived fuels).

Maps of Wisconsin's hydroelectric sites, wind installations ("wind farms") and U.S. potential for biomass and solar can be found in the Map Appendix in the back of the book.

1990-2009 MILLIONS OF KWH AND PERCENT OF TOTAL

Year	Hydro		Biomass		Biogas		Wind		Solar		Total
1990	2,014.4	96.7%	68.1	3.3%	0.0	0.0%	0.0	0.0%	0.00	0.0%	2,082.5
1995	2,378.5	93.5%	54.2	2.1%	110.1	4.3%	0.0	0.0%	0.00	0.0%	2,542.8
1996	2,696.0	94.1%	56.5	2.0%	112.8	3.9%	0.0	0.0%	0.00	0.0%	2,865.3
1997	2,483.3	93.3%	57.5	2.2%	121.2	4.6%	0.0	0.0%	0.00	0.0%	2,662.0
1998	1,747.4	89.1%	60.9	3.1%	151.2	7.7%	2.2	0.1%	0.00	0.0%	1,961.7
1999	1,984.6	89.2%	68.6	3.1%	147.4	6.6%	23.7	1.1%	0.00	0.0%	2,224.3
2000	1,990.8	86.1%	78.1	3.4%	197.2	8.5%	46.6	2.0%	0.00	0.0%	2,312.7
2001	2,056.2	85.2%	83.0	3.4%	203.3	8.4%	70.2	2.9%	0.00	0.0%	2,412.7
2002	2,515.0	84.9%	70.6	2.4%	267.3	9.0%	111.1	3.7%	0.03	0.0%	2,964.0
2003	1,843.3	79.9%	79.4	3.4%	280.5	12.2%	104.0	4.5%	0.12	0.0%	2,307.3
2004	1,980.7	79.2%	98.1	3.9%	317.5	12.7%	105.3	4.2%	0.30	0.0%	2,501.9
2005 ^r	1,550.7	76.9%	148.2	7.3%	224.3	11.1%	93.5	4.6%	0.46	0.0%	2,017.2
2006 ^r	1,626.9	56.7%	815.8	28.4%	322.2	11.2%	102.7	3.6%	0.91	0.0%	2,868.5
2007 ^r	1,483.2	50.8%	914.4	31.3%	412.6	14.1%	110.4	3.8%	1.57	0.1%	2,922.2
2008 ^r	1,585.6	47.5%	698.6	20.9%	563.6	16.9%	488.4	14.6%	3.45	0.1%	3,339.6
2009^p	1,460.9	34.8%	1,017.2	24.3%	657.1	15.7%	1,051.6	25.1%	5.31	0.1%	4,192.2

^p Preliminary estimates.

^r Revised.

Source: Public Service Commission of Wisconsin, unpublished data compiled from annual reports (2007-2009); Focus on Energy via the Wisconsin Energy Conservation Corporation, unpublished, aggregated data (2005-2009); survey data from conversations and emails with utilities, independent operators of landfills and/or waste water treatment plants, and public schools (2007-2009); Department of Revenue *Monthly Motor Fuel Consumption Report* (2000-2009); Energy Center of Wisconsin *Wisconsin Agricultural Biogas Casebook* (2008); Public Service Commission of Wisconsin, Focus on Energy Evaluation *Semiannual Report (Second Half of 2009)*, April 23, 2010 (2009)
http://www.focusonenergy.com/files/Document_Management_System/Evaluation/semiannalsecondhalf2009_evaluationreport.pdf

CHAPTER 4

Energy Efficiency Indices

Local Planning Efforts Spur Energy Independence

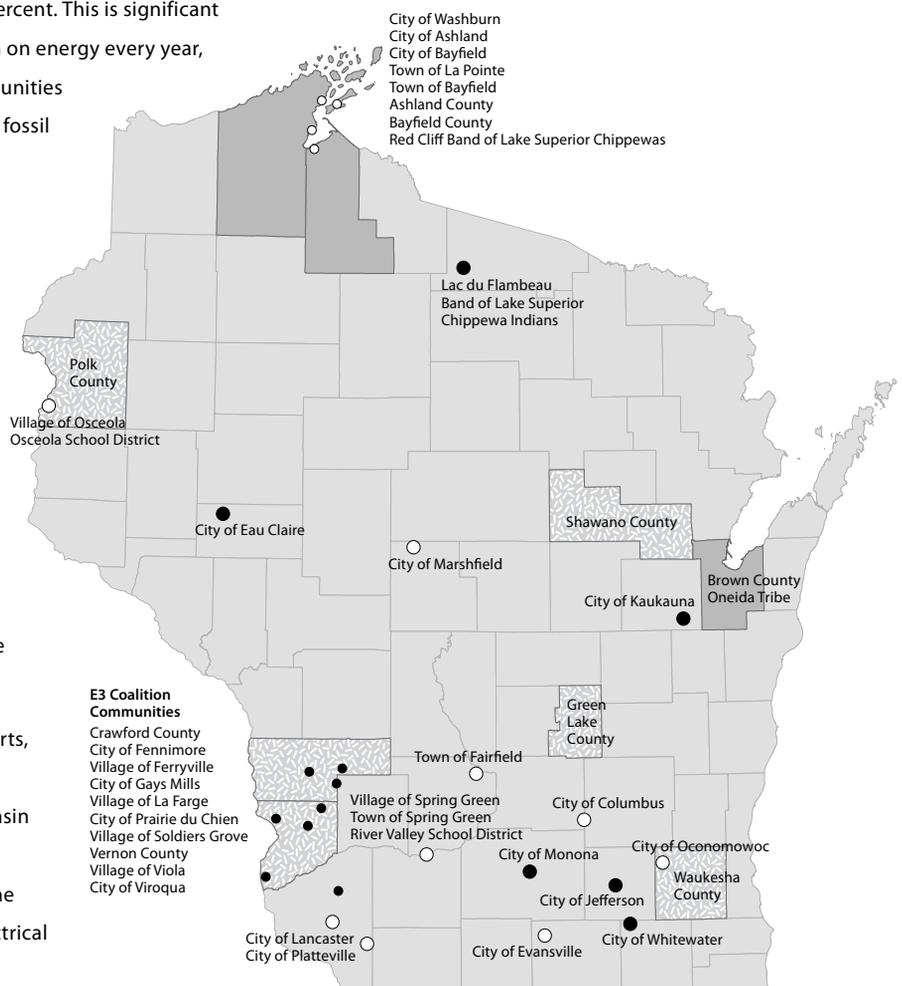
During 2009 and 2010 Wisconsin gave 21 awards to almost 50 communities and counties across the state to engage in planning processes to reduce energy consumption. Communities receiving an Energy Independent (EI) Pilot grant conducted research to establish baseline energy consumption from which they worked to develop strategies to source 25 percent of their electricity and 25 percent of their transportation fuels from renewable sources by 2025.

This process, which fostered the development of community-level peer relationships across the state, saw the development of 21 plans to achieve the energy sourcing and reduction goals. Through the EI Pilot program, communities have found ways to reduce their overall fossil fuel-based energy consumption by at least 30 percent. This is significant considering that Wisconsinites spend \$18 billion on energy every year, and most of those dollars leave our state. Communities are finding ways to reduce their dependence on fossil fuels and generate jobs in Wisconsin.

Two independent reports released by the Office of Energy Independence—and compiled by the Local Government Institute and the Energy Center of Wisconsin—reveal how EI Pilot Communities from the 2009 award cycle were able to accomplish 98 percent of their collective energy consumption goals. The information gathered by the EI Pilot Communities will assist Wisconsin local units of government, including the more than 140 EI Communities, to decide which strategies will work best with their unique assets and capitalize on the diversity of their resources.

To support the EI Pilot Communities in their efforts, the Office of Energy Independence collaborated with UW-Extension, Focus on Energy, the Wisconsin Counties Association, the Wisconsin Alliance for Cities, the Wisconsin League of Municipalities, the Wisconsin Towns Association, the Municipal Electrical Utilities of Wisconsin and WPPI Energy.

The first round of 10 awards were funded through the State Energy Program, while the second round of 11 awards in 2010 were funded through the Energy Efficiency and Conservation Block Grant through the American Recovery and Reinvestment Act.



WISCONSIN'S EI PILOT COMMUNITIES

- 2009 EI Pilot – Community
- 2010 EI Pilot – Community
- 2009 EI Pilot – County
- ▨ 2010 EI Pilot – County

Indices of Wisconsin Energy Efficiency

**TOTAL
ENERGY USE
PER \$1,000
OF GROSS
STATE PRODUCT**

1.7%

In 2009, Wisconsin Commercial Energy Use per Employee decreased by 1.9 percent; Industrial Energy Use per \$1,000 Manufacturing Value Added decreased 5.3 percent and is 37.4 percent lower than in 1970. Agricultural Energy Use per Acre increased 15.2 percent in 2009, from 1.5 to 1.7 MMBtu/acre.

Energy efficiency activities in the residential and commercial sectors are measured primarily by recording the number of buildings that have received professional audits, installed energy efficiency improvements or were certified as meeting energy efficiency building codes.

These indices can be useful in evaluating energy efficiency trends in Wisconsin. Total Energy Use per \$1,000 of Gross State Product (GSP), and Electricity Use per \$1,000 of GSP trended downward by 1.7 and 2.9 percent respectively.

1970-2009 MILLIONS OF BTU

Year	Total Energy Use Per \$1,000 GSP ^a	Electric Energy Use Per \$1,000 GSP ^a	Residential Energy Use Per Capita ^b	Commercial Energy Use Per Employee ^d	Industrial Energy Use Per \$1,000 Manufacturing Value Added ^{a,c}	Agricultural Energy Use Per Acre
1970	12.5	0.92	74.0		10.4	1.1
1975	11.9	1.04	74.2		8.4	1.2
1980 ^r	10.4	1.05	75.7		7.2	1.4
1985 ^r	9.5	1.07	71.2		7.1	1.4
1990 ^r	9.3	1.10	71.7	161.5	7.4	1.2
1995 ^r	8.9	1.10	77.6	165.9	6.9	1.3
1996 ^r	8.7	1.07	78.1	166.3	6.6	1.3
1997 ^r	8.3	1.04	74.0	161.5	6.8	1.3
1998 ^r	7.8	1.03	69.0	156.3	6.4	1.2
1999 ^r	7.8	1.01	72.9	161.7	6.4	1.3
2000 ^r	7.8	1.01	74.8	160.5	6.4	1.2
2001 ^r	7.7	1.02	74.2	159.8	6.8	1.2
2002 ^r	7.6	1.02	76.3	161.9	6.4	1.3
2003 ^r	7.5	1.00	79.5	151.5	6.2	1.3
2004 ^r	7.4	0.99	78.1	147.2	6.6	1.2
2005 ^r	7.3	1.02	77.2	155.9	6.4	1.2
2006 ^r	7.0	1.00	72.3	151.4	6.1	1.5
2007 ^r	7.2	1.01	77.4	160.2	6.3	1.5
2008 ^r	7.3	0.98	78.4	164.2	6.9	1.5
2009^p	7.1	0.96	75.4	161.0	6.5	1.7

^a Manufacturing Value Added and Gross State Product in 2009 dollars, deflated with Gross Domestic Product Implicit Price Deflator.

^b Not adjusted for yearly variations in temperature.

^c Value added data for Wisconsin not available. Value added estimated using U.S. and Wisconsin trends.

^d Per Employee Data not available prior to 1990 due to change in coding from SIC to NAICS.

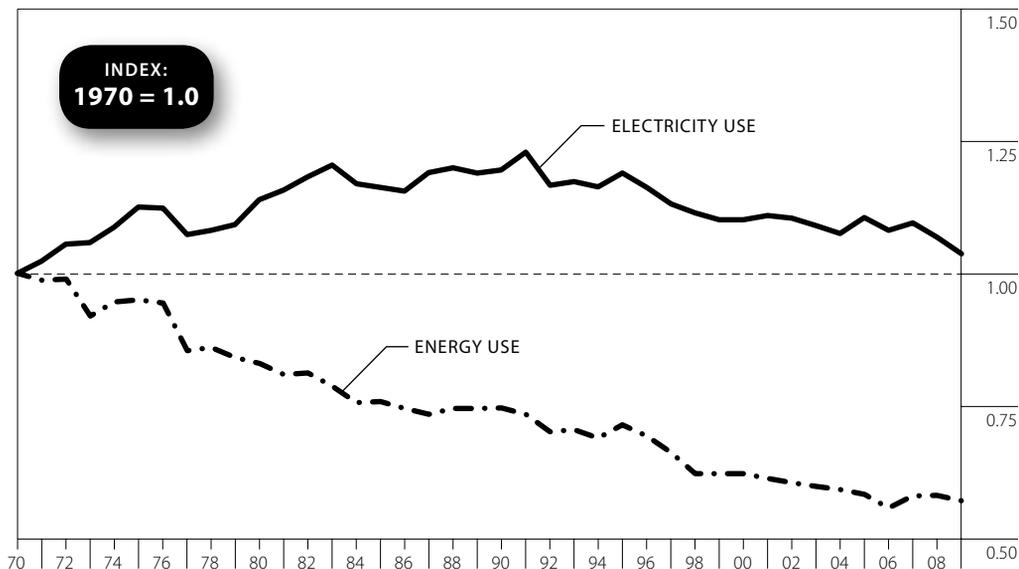
^p Preliminary data.

^r Revised.

Source: Wisconsin Department of Workforce Development employment data, <http://worknet.wisconsin.gov/worknet/dalau.aspx?menuselection=da>; U.S. Department of Commerce, *Annual Survey and Census of Manufacturers* <http://www.census.gov/mcd/asm-as3.html> (1972-2009); Wisconsin Department of Agriculture, Trade and Consumer Protection, *Wisconsin's Agricultural Statistics, 2009*; other tables in this publication used for household estimates, gross state product, total resource energy use and use by sector.

Indices of Wisconsin Energy Efficiency

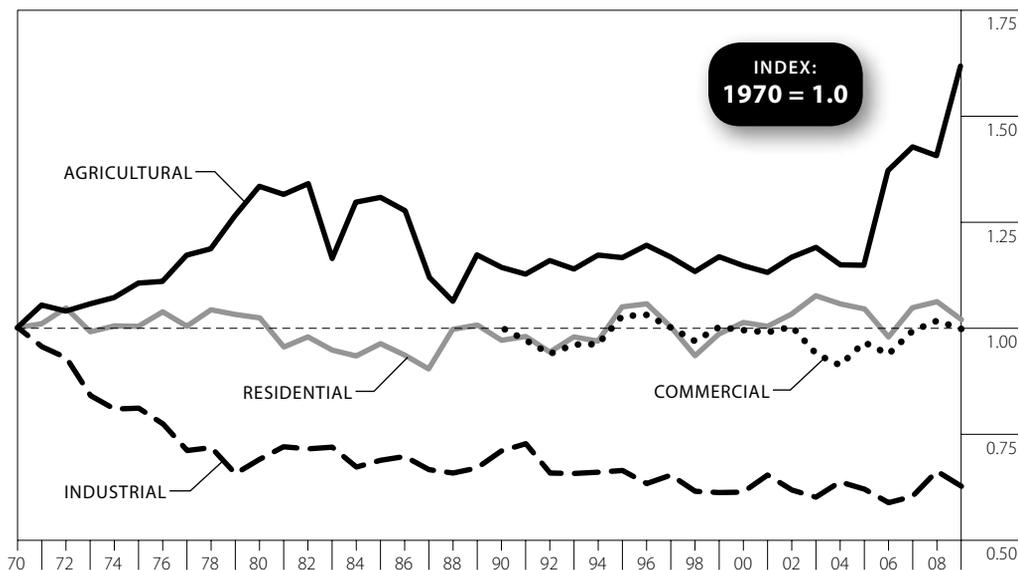
1970-2009 ENERGY AND ELECTRICITY USE PER DOLLAR OF GROSS STATE PRODUCT^a



 WISCONSIN
 ENERGY USE
 PER DOLLAR OF
 GROSS STATE
 PRODUCT

—————
 WISCONSIN
 ELECTRICITY USE
 PER DOLLAR OF
 GROSS STATE
 PRODUCT

1970-2009 ENERGY INDICES BY ECONOMIC SECTOR^a



—————
 RESIDENTIAL
 ENERGY USE PER
 CAPITA

.....
 COMMERCIAL
 ENERGY USE PER
 EMPLOYEE

 INDUSTRIAL
 ENERGY USE
 PER UNIT
 MANUFACTURING
 VALUE ADDED
 OUTPUT

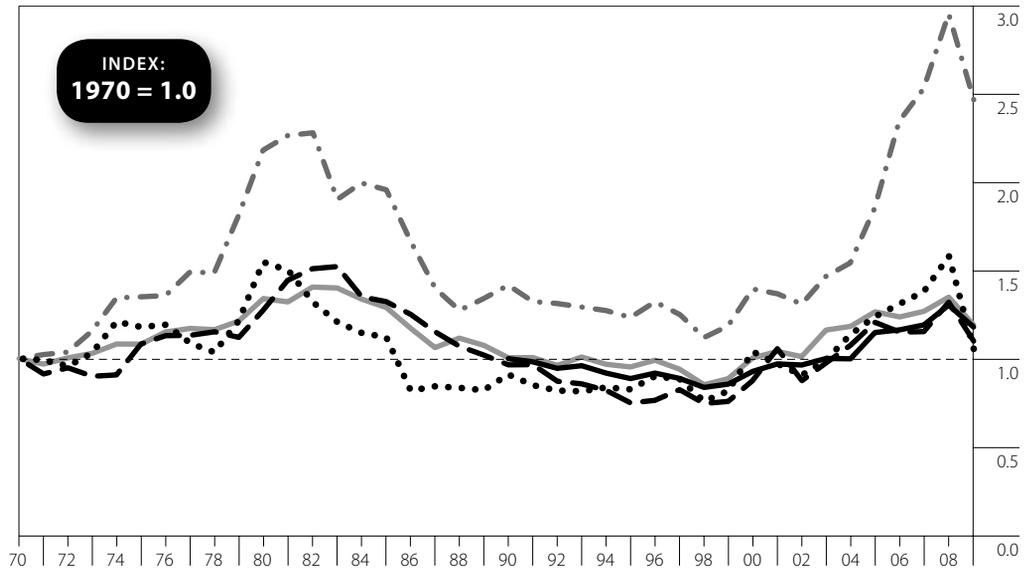
—————
 AGRICULTURAL
 ENERGY USE PER
 ACRE

^a All data, except commercial employment data, normalized to 1.0 in 1970, an arbitrary baseline to which all other years can be compared. Commercial employment data normalized to 1990, when industrial codes changed from SIC to NAICS.

Source: Wisconsin Office of Energy Independence.

Indices of Wisconsin Energy Expenditures, 2009 Dollars

1970-2009 2009 DOLLARS



.....
AGRICULTURAL
PER ACRE

—————
RESIDENTIAL
PER HOUSEHOLD

.....
TRANSPORTATION
PER VEHICLE

— · — · —
COMMERCIAL
PER EMPLOYEE

—————
INDUSTRIAL
PER \$1,000 VALUE
ADDED

EXPENDITURES
PER VEHICLE
32.8%

In 2009, Wisconsin saw across the board decreases in energy expenditure indices: the Expenditures per Vehicle decreased 32.8 percent, Commercial Expenditures per Employee fell by 9.4 percent, Agricultural Expenditures per acre decreased by 16.1 percent, Residential Expenditures per household were 11.5 percent below 2008, and Industrial Expenditures per \$1,000 of Value Added decreased by 16.4 percent.

Year	Agricultural Expenditures Per Acre	Commercial Expenditures Per Employee ^a	Residential Expenditures Per Household	Industrial Expenditures Per \$1,000 Value Added	Transportation Expenditures Per Vehicle
1970 ^r	13		1,642	36	1,365
1975 ^r	18		1,778	39	1,610
1980 ^r	29		2,200	46	2,111
1985 ^r	26		2,118	48	1,531
1990 ^r	19	1,211	1,651	35	1,242
1995 ^r	16	1,074	1,566	27	1,128
2000 ^r	18	1,124	1,648	32	1,419
2001 ^r	18	1,175	1,709	38	1,326
2002 ^r	17	1,168	1,661	32	1,237
2003 ^r	19	1,212	1,908	36	1,355
2004 ^r	20	1,211	1,943	39	1,552
2005 ^r	24	1,390	2,078	44	1,690
2006 ^r	31	1,409	2,030	42	1,788
2007 ^r	33	1,442	2,082	42	1,885
2008 ^r	39	1,577	2,212	48	2,150
2009 ^p	33	1,429	1,958	40	1,445

^a All data, except commercial employment data, normalized to 1.0 in 1970, an arbitrary baseline to which all other years can be compared. Commercial employment data normalized to 1990, when industrial codes changed from SIC to NAICS.

^p Preliminary estimate.

^r Revised.

Source: Compiled from tables in this publication for Wisconsin residential, commercial, industrial, agricultural and transportation energy use.

Wisconsin Per Capita Resource Energy Consumption, by Type of Fuel

1970-2009 MILLIONS OF BTU

Year	Petroleum	Natural Gas	Coal	Renewable	Nuclear	Electric Imports ^a	Total
1970 ^r	103.6	74.7	80.4	6.2	0.4	-6.4	258.9
1975 ^r	104.0	80.0	57.4	6.4	24.3	-4.5	267.8
1980 ^r	96.6	73.2	69.0	10.4	22.7	-1.4	270.5
1982 ^r	85.3	65.9	67.6	10.7	23.5	2.3	255.2
1985 ^r	86.8	64.3	78.9	10.9	25.0	-0.4	265.6
1990 ^r	90.8	62.6	84.1	10.3	24.8	17.9	290.5
1995 ^r	92.2	74.2	90.3	9.7	23.1	24.0	313.4
1996 ^r	94.3	77.9	94.0	10.2	21.1	15.5	312.9
1997 ^r	94.1	76.5	97.5	9.8	8.1	24.9	310.9
1998 ^r	93.1	68.4	93.9	8.8	19.2	20.4	303.7
1999 ^r	95.5	70.5	95.0	9.1	23.3	18.8	312.2
2000 ^r	93.7	73.2	96.6	10.0	23.0	18.3	314.8
2001 ^r	93.6	66.6	96.5	9.7	23.0	22.5	311.9
2002 ^r	94.7	70.6	93.4	10.3	24.7	18.4	312.0
2003 ^r	93.0	71.9	96.2	10.5	24.1	15.9	311.7
2004 ^r	95.5	69.2	97.5	10.9	23.3	17.0	313.4
2005 ^r	91.4	74.3	96.0	10.9	14.8	22.5	309.8
2006 ^r	89.5	67.0	92.6	11.3	23.7	14.5	298.6
2007 ^r	89.4	71.6	92.1	12.8	24.9	21.2	311.9
2008 ^r	85.6	73.3	98.9	14.3	23.3	18.6	313.9
2009^p	83.3	69.2	88.2	15.5	24.2	16.9	297.3

PER CAPITA
RESOURCE
ENERGY
CONSUMPTION

5.3%

Wisconsin's per capita resource energy consumption decreased 5.3 percent in 2009. However, compared to the low point in 1982, 2009 per capita energy use in Wisconsin is 16.5 percent higher.

^a "Electric Imports" is the estimated resource energy used in other states or Canada to produce the electricity imported into Wisconsin. This resource energy is estimated assuming 11,300 Btu of resource energy per kWh imported into Wisconsin. A negative sign indicates that resource energy was used in Wisconsin to produce electricity that was exported.

^p Preliminary estimates.

^r Revised.

Source: Compiled from tables in this publication for Wisconsin petroleum, natural gas, coal and renewable energy use, electric imports and population.

Wisconsin Residential Electricity and Natural Gas Use Per Customer

ELECTRICITY
USE PER
CUSTOMER

2.6%

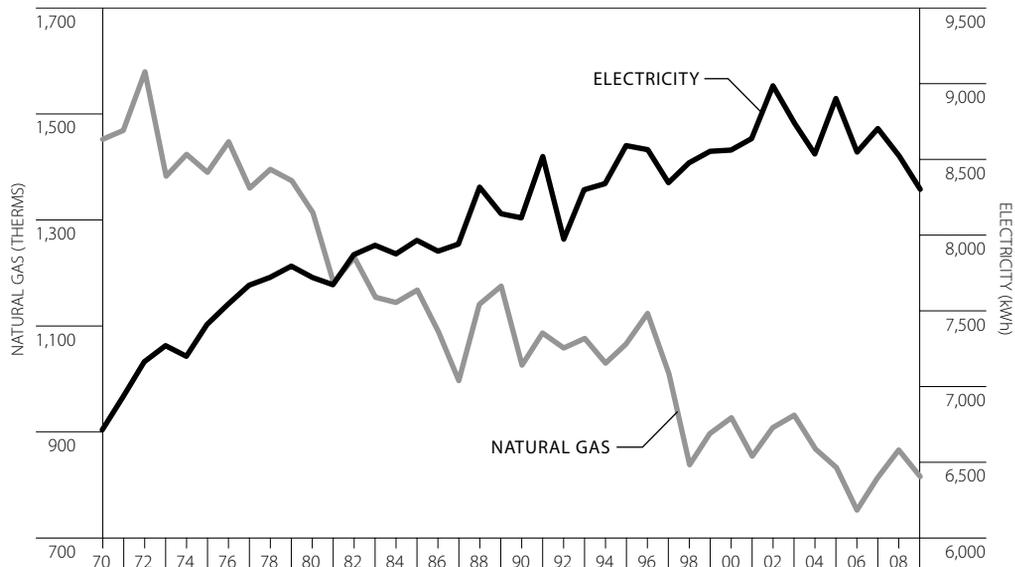
NATURAL GAS
USE PER
CUSTOMER

5.7%

Electricity use per customer decreased 2.6 percent in 2009, while natural gas use decreased 5.7 percent. The decrease in natural gas relates to the decrease in Heating Degree Days (HDD) in 2009—a 3.4 percent decrease compared to 2008. To learn more about HDDs, see the Miscellaneous chapter of this publication.

The natural gas data in this series have been completely revised to correct consistency issues created by multiple data sources. These data are from AF2 reports submitted to the Public Service Commission of Wisconsin by natural gas utilities in the state.

1970-2009



Year	Natural Gas ^a		Electricity	
	Number of Customers (Thousands)	Use Per Customer (Therms)	Number of Customers (Thousands)	Use Per Customer (kWh)
1970 ^r	750.4	1,451	1,429	6,711
1975 ^r	858.5	1,388	1,607	7,407
1980 ^r	922.1	1,313	1,801	7,716
1985 ^r	1,007.5	1,166	1,870	7,960
1990 ^r	1,117.0	1,023	2,017	8,109
1995 ^r	1,284.4	1,065	2,170	8,586
2000 ^r	1,459.0	925	2,329	8,557
2001 ^r	1,484.5	852	2,365	8,634
2002 ^r	1,514.7	907	2,404	8,976
2003 ^r	1,541.5	930	2,445	8,736
2004 ^r	1,569.7	867	2,486	8,526
2005 ^r	1,592.6	832	2,526	8,890
2006 ^r	1,611.8	750	2,550	8,540
2007 ^r	1,632.2	812	2,573	8,697
2008 ^r	1,646.6	864	2,580	8,519
2009^p	1,656.5	815	2,585	8,300

^a U. S. Department of Energy/Energy Information Administration data from EIA forms 176 and 861.

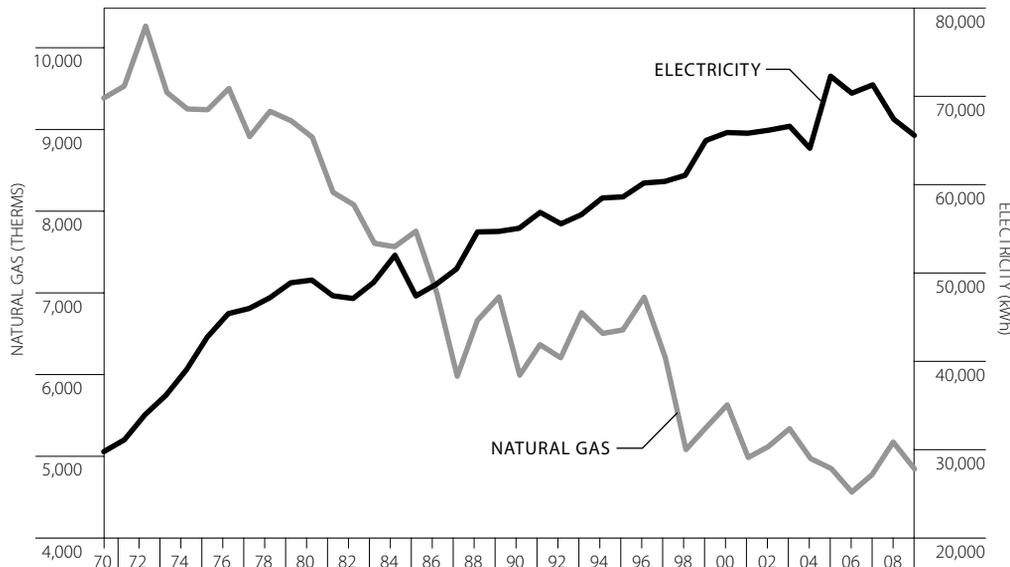
^p Preliminary estimates.

^r Revised.

Source: Edison Electric Institute, *Statistical Yearbook* (1971-1996); Public Service Commission of Wisconsin, Accounts and Finance Division, *Statistics of Wisconsin Public Utilities*, Bulletin #8 (1970-1979), Public Service Commission of Wisconsin, form PSC-AF 2 *Gas Sales and Sales Ratio* (1980-2009); U.S. Department of Energy, *Electric Sales and Revenues 1993-2000* [DOE/EIA-0540(2000)] (November 2001).

Wisconsin Commercial Electricity and Natural Gas Use Per Customer

1970-2009



Year	Natural Gas		Electricity	
	Number of Customers (Thousands)	Use Per Customer (Therms)	Number of Customers (Thousands)	Use Per Customer (kWh)
1970 ^r	50.8	9,377	167	29,701
1975 ^r	65.7	9,234	178	42,709
1980 ^r	85.0	8,900	193	49,115
1985 ^r	90.0	7,742	224	47,292
1990 ^r	106.0	5,973	229	54,990
1995 ^r	125.5	6,540	254	58,540
2000 ^r	140.4	5,615	278	65,817
2001 ^r	144.1	4,974	284	65,741
2002 ^r	149.8	5,112	290	66,081
2003 ^r	150.1	5,327	301	66,522
2004 ^r	151.9	4,966	302	63,963
2005 ^r	155.1	4,843	312	72,150
2006 ^r	159.1	4,552	324	70,266
2007 ^r	160.6	4,768	330	71,203
2008 ^r	163.0	5,160	334	67,352
2009^p	164.2	4,840	337	65,514

^p Preliminary estimates.

^r Revised.

Source: Edison Electric Institute, *Statistical Yearbook* (1971-1996); Public Service Commission of Wisconsin, Accounts and Finance Division, *Statistics of Wisconsin Public Utilities*, Bulletin #8 (1970-1979), Public Service Commission of Wisconsin, form PSC-AF 2 *Gas Sales and Sales Ratio* (1980-2009); U.S. Department of Energy, *Electric Sales and Revenues 1993-2000* [DOE/EIA-0540(2000)] (November 2001).

ELECTRICITY
USE PER
CUSTOMER
2.7%
NATURAL GAS
USE PER
CUSTOMER
6.2%

Commercial electricity use per customer in 2009 decreased 2.7 percent, while natural gas use per customer decreased 6.2 percent. The decrease in natural gas relates to the decrease in Heating Degree Days (HDD) in 2009—a 3.4 percent decrease compared to 2008. To learn more about HDDs, see the Miscellaneous chapter in this publication.

The natural gas data in this series have been completely revised to correct consistency issues created by multiple data sources. These data are from AF2 reports submitted to the Public Service Commission of Wisconsin by natural gas utilities in the state.

Focus on Energy Tracked Energy Savings

Focus on Energy is Wisconsin's rate-payer funded energy efficiency and renewable energy program. It works with energy consumers—individuals, business, industry, government—to evaluate and help fund energy efficiency and renewable energy efforts.

The table shows annual first-year^c energy savings in Wisconsin due to Focus on Energy efforts. Gross electricity savings are shown in kilowatt hours (kWhs), while gross natural gas savings are shown in therms. The percent column shows the percent of statewide sales, by sector, represented by the verified gross savings.

The efforts of Focus on Energy undergo regular evaluation by independent contractors who certify program-tracked savings. The verified gross kWh, KW and therm savings have been verified by a third-party contractor.

2001-2009 MILLIONS OF kWhs, THERMS AND DOLLARS

	Verified kWh Saved	Percent of Statewide Sector ^a kWh Saved	Verified Therms Saved	Percent of Statewide Sector Sales ^b Therms Saved	Dollar Value of Energy Saved	Number of Participants
July 1, 2001 - June 30, 2005						
Total^c	721.38	0.267%	34,381,560	0.222%	\$105,699,296	606,814
Business	406.94	0.217%	27,656,423	0.113%	\$61,672,168	16,185
Residential	288.33	0.349%	6,167,861	0.277%	\$40,983,110	590,479
Renewables	26.11		557,276		\$3,044,018	150
July 1, 2005 - June 30, 2006						
Total	218.88	0.312%	13,042,574	0.332%	\$35,302,670	218,375
Business	131.86	0.269%	9,418,597	0.355%	\$21,304,737	13,125
Residential	73.96	0.350%	1,573,063	0.123%	\$10,501,316	205,162
Renewables	13.06		2,050,914		\$3,496,617	88
July 1, 2006 - June 30, 2007						
Total	238.19	0.338%	13,694,192	0.354%	\$37,176,173	216,716
Business	151.01	0.306%	11,513,742	0.443%	\$24,677,173	12,874
Residential	78.66	0.372%	1,506,976	0.118%	\$10,958,228	203,725
Renewables	8.52		673,474		\$1,540,772	117
July 1, 2007 - December 31, 2008						
Total	599.07	0.536%	26,622,537	0.434%	\$83,682,846	589,290
Business	412.28	0.557%	20,247,680	0.501%	\$54,616,641	30,479
Residential	179.79	0.567%	4,145,352	0.198%	\$25,934,036	558,811
Renewables	6.99		2,229,505		\$3,132,169	
January 1, 2009 - December 31, 2009						
Total	639.82	0.971%	30,548,374	0.780%	\$89,801,328	439,883
Business	505.83	1.111%	21,595,276	0.842%	\$64,243,317	25,086
Residential	117.06	0.574%	3,595,277	0.267%	\$18,018,014	414,335
Renewables	16.93		5,357,821		\$7,539,997	462
July 1, 2001 - December 31, 2009						
Total Saved	2417.34		118,289,237		\$351,662,313	2,071,504
Business	1607.93		90,431,718		\$226,514,036	97,749
Residential	737.80		16,988,529		\$106,394,704	1,972,512
Renewables	71.61		10,868,990		\$18,753,573	1,243

a Statewide sector sales are estimated for the non-annual reporting periods using annual data from the Wisconsin Electric Utility Sales, by Economic Sector table in Chapter Two of this publication.

b Statewide sector sales are estimated for the non-annual reporting periods using annual data from the Wisconsin Natural Gas Use, by Economic Sector table in Chapter Two of this publication. Data from this chapter are converted from tBtus to Therms for the purpose of calculation.

c Annual, first-year energy savings are what an energy saving measure accomplished during the first year, as opposed to lifetime savings.

Source: Public Service Commission of Wisconsin, Focus on Energy Evaluation *Semiannual Report (Second Half of 2009)*, April 23, 2010 (2009) http://www.focusonenergy.com/files/Document_Management_System/Evaluation/semiannualecondhalf2009_evaluationreport.pdf

Focus on Energy Ranked Energy Savings Measures

2001-2009 ENERGY SAVING ACTIVITIES RANKED BY OVERALL SAVINGS

Electricity	Business Programs		Residential Programs	
	Savings (Million kWh)	Percent Overall Savings	Savings (Million kWh)	Percent Overall Savings
Compact Fluorescent Lights (CFL)	259.12	16.1%	475.22	64.4%
ECM ^a Furnace			73.78	10.0%
High Bay Fluorescent	227.12	14.1%		
Hot Water ^b			23.69	3.2%
Lighting (other than listed) ^c	142.55	8.9%	61.09	8.3%
Other ^d	177.45	11.0%	45.11	6.1%
T8/T5 Fluorescent Lighting	230.97	14.4%		
Electric Total Verified kWh Savings – All Efforts	1,607.93		737.80	

Natural Gas	Business Programs		Residential Programs	
	Savings (Therm)	Percent Overall Savings	Savings (Therm)	Percent Overall Savings
Boiler Equipment/Other Heating	9,898,346	10.9%	4,676,628	27.5%
Building Shell			4,145,848	24.4%
Clothes Washer			1,146,806	6.8%
ECM ^a Furnace			1,757,863	10.3%
Energy Recovery ^e	12,661,566	14.0%		
Hot Water ^b			2,829,958	16.7%
HVAC	8,652,763	9.6%		
Process ^f	10,963,729	12.1%		
Steam Trap ^g	8,745,568	9.7%		
Natural Gas Total Verified kWh Savings – All Efforts	90,431,718		16,988,529	

a Electronically commutative motors (ECM) differ from conventional motors in their overall efficiency.

b Hot water refers to a variety of different measures to improve hot water heating and usage efficiency.

c Lighting improvements such as efficient lighting fixtures, torchieres, and ceiling fans, and motion/occupancy sensors.

d Other includes a wide variety of improvements.

e Recovery of exhaust heat from natural gas combustion.

f Process efforts include in-line energy efficiency and heat capture, primarily in industrial applications. May also include efficiency improvements to compressed air usage.

g Steam trap improvement to avoid loss of thermal energy.

Source: Public Service Commission of Wisconsin, Focus on Energy Evaluation *Semiannual Report (Second Half of 2009)*, April 23, 2010 (2009) http://www.focusonenergy.com/files/Document_Management_Syst0em/Evaluation/semiannualsecondhalf2009_evaluationreport.pdf

The table shows the five energy savings efforts funded by Focus on Energy that reaped the largest energy savings benefit. The measures are different for the business and residential sectors, and are listed according to the saved energy (e.g., kWhs or therms).

As Focus on Energy has grown, energy savings across Wisconsin have increased. In 2009, verified gross savings are about one percent of annual sales of both electricity and natural gas. The work of Focus on Energy helps to reduce overall consumption of fossil-fuel based energy and increase energy efficiency across the state.

Energy Consumption by Major New Household Appliances

.....
REFRIGERATOR

- - - -
WASHING MACHINE

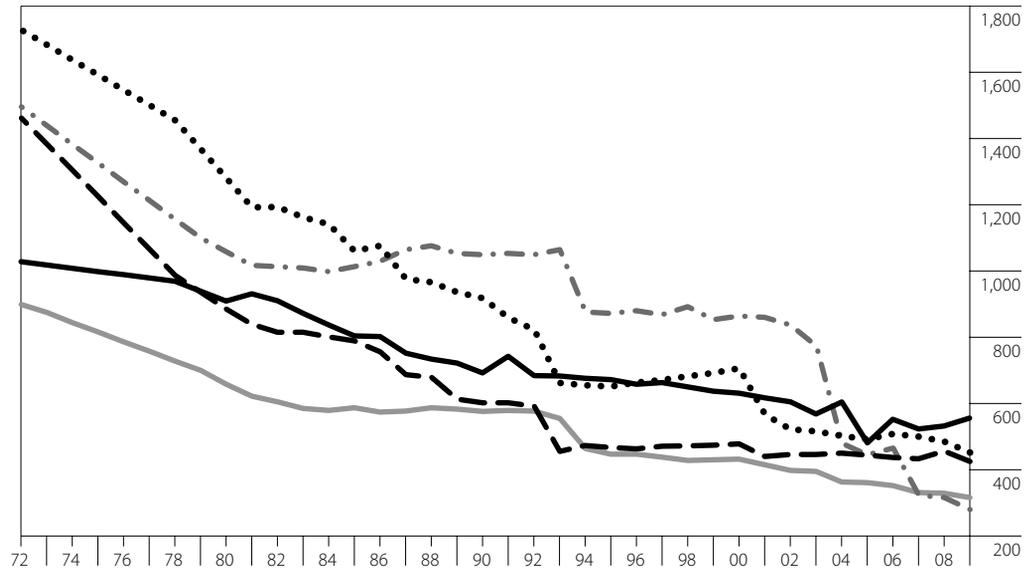
FREEZER

—
ROOM A/C

—
DISHWASHER

Since 1980, energy usage of new household appliances sold in the U.S. has decreased from 38.9 percent to 73.7 percent, depending upon the appliance. From 1994 to 2000, average usage remained essentially unchanged. However, changes in federal energy efficiency standards since 2000 have reduced average new appliance energy consumption from 11.1 percent for freezers to 67.8 percent for washing machines. Appliance data makes it easier to understand residential energy use trends.

1972-2009 AVERAGE kWh PER YEAR



Year	Room A/C ^a	Washing Machine ^b	Dishwasher ^b	Refrigerator ^c	Freezer ^c
1972	1,026	1,494	897	1,726	1,460
1980	907	1,056	656	1,278	883
1985	802	1,011	585	1,058	787
1990	690	1,047	574	916	600
1995	670	870	445	649	465
2000 ^e	629	862	430	704	476
2001 ^e	615	858	413	565	438
2002	603	835	396	520	444
2003	566	772	393	514	444
2004 ^e	602	478	361	500	448
2005	478	443	359	490	442
2006	550	463	350	506	435
2007 ^e	521	321	329	498	431
2008	530	314	327	483	454
2009 ^p	554	278	314	450	423
Best Available ^f	556	238	324	420	370
Energy Star ^d	475	122	180	410	315

^a Room air conditioner assumes 600 hours per year.

^b Loads per year: washing machine (392), dishwasher (215). Energy use assumes electric water heater.

^c Refrigerator and freezer values estimated.

^d U.S. Environmental Protection Agency (EPA) Energy Star efficiency values for average size appliance.

^e Refrigerator and freezer standards increased July 1, 2001. Air conditioner standards increased October 1, 2000. Clothes washer standards increased January 1, 2004 and January 1, 2007. Dishwasher standards increased May 14, 1994 and January 1, 2010.

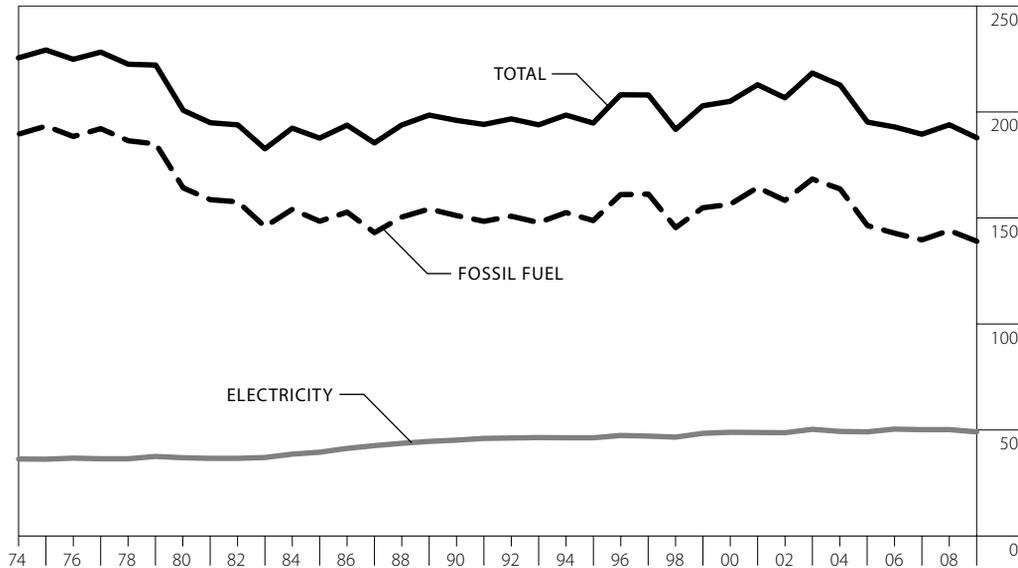
^f Best available (most energy efficient) appliance that can be purchased for the average size and type sold today.

^p Preliminary.

Source: Association of Home Appliance Manufacturers (AHAM) Information Center.

Energy Use in State Owned Buildings

1974-2009 THOUSANDS OF BTU PER GROSS SQUARE FOOT PER YEAR



Fiscal Year	Fossil Fuel	Electricity	Total Energy BTU/GSF	Total Energy Weather-Adjusted ^a	Million Gross Square Feet
1974	189.2	36.0	225.2		42.7
1975	193.0	35.9	228.9		43.6
1980	163.9	36.6	200.5		46.2
1985	148.1	39.2	187.3		47.9
1990	150.8	44.9	195.7		49.7
1995	148.4	46.0	194.4		52.6
2000	156.1	48.6	204.7		55.4
2001	164.0	48.5	212.5		56.6
2002	157.9	48.4	206.3		57.9
2003	168.0	50.0	218.0		58.9
2004	163.4	49.0	212.4		59.4
2005 ^{a,r}	146.1	48.8	194.9	194.9	67.8
2006 ^r	142.5	50.1	192.6	194.5	68.3
2007 ^r	139.3	49.8	189.2	188.6	69.6
2008 ^r	143.8	49.9	193.6	186.0	70.8
2009 ^p	138.7	48.8	187.5	179.4	71.5

^a Weather-adjusted data are not available previous to 2005.

^b http://www.wisgov.state.wi.us/journal_media_detail.asp?locid=19&prid=1907

^p Preliminary estimates.

^r Revised.

Source: State of Wisconsin, Department of Administration; *Energy Use in State Owned Facilities, Report for Fiscal Year 2009*. <http://www.doa.state.wi.us/docview.asp?docid=7596&locid=4>

**TOTAL
ENERGY USE
PER GSF
3.6%
IN 2009**

In 2009, total energy use per gross square foot (GSF), adjusted for weather, decreased 3.6 percent from 2008.

Since 1974, overall use per GSF in state owned buildings fell 16.7 percent. Electricity use has increased 35.6 percent per GSF between 1974 and 2009, while fossil fuel use decreased 26.7 percent.

Energy use in state-owned buildings was weather-corrected back to 2005 to meet the requirements set forth in Executive Order 145^b that addressed energy usage in state facilities. All data are based on the State Fiscal Year, July 1 – June 30, for example the data for 2009 are for the period July 1, 2008 to June 30, 2009.

Low Income Units Weatherized Through State- and Utility-Supported Programs

NUMBER
OF UNITS
WEATHERIZED
21%

The number of units weatherized^a in 2009 increased by 21 percent over 2008. This is due in part to an increase in funding through the American Recovery and Reinvestment Act (ARRA) of 2009.

The Wisconsin Division of Energy Services, under the Department of Administration, contracts with various agencies throughout the state to provide weatherization services to the low-income population. Agencies include community action agencies, housing authorities, tribes, local governments, and other non-profit organizations.

The Weatherization Assistance Program was created under Title IV of the Energy Conservation and Production Act of 1976, and was designed to cut heating bills and save imported oil. See <http://www.homeenergyplus.wi.gov/> for local information.

1980-2009

Year ^d	Department of Administration ^b	Wisconsin Utilities	Combined Totals
1980	5,811	—	5,811
1985	7,355	4,139	11,494
1990	9,302	3,384	12,686
1995	6,126	5,455	11,581
1996	4,575	6,651	11,226
1997	4,530	4,626	9,156
1998	3,854	4,848	8,702
1999	3,703	5,700	9,403
2000 ^c	4,246	6,434	10,680
2001	4,867	3,378	8,245
2002 ^e	5,948	1,493	7,441
2003	7,368	0	7,368
2004	8,027	0	8,027
2005	8,721	0	8,721
2006	9,057	0	9,057
2007	10,215	0	10,215
2008	8,643	0	8,643
2009 ^p	10,455	0	10,455
Total	215,813	81,227	297,040

a Weatherization is any job in which either the state or a utility, or both, installs envelope efficiency measures, appliance efficiency measures, heating equipment replacement/retrofits, or any combination of these.

b In July 1992, the Low Income Weatherization Assistance Program was transferred from the Department of Health and Family Services to the Department of Administration.

c Estimates.

d In 1992, the program year was changed to April-March.

e Wisconsin's Public Benefits Program began in October 2000. This program has transitioned responsibility for weatherizing low-income households from the utilities to the Department of Administration, Division of Energy. The transition was completed at the end of December 2002.

p Preliminary estimate.

Source: Public Service Commission of Wisconsin, Division of Energy Planning and Programs, unpublished annual data; Wisconsin Department of Health and Family Services, Energy Services Section, unpublished annual data; Department of Administration (DOA), Division of Energy Services, *Annual Weatherization Production*, report to U.S. DOE for 2008, and unpublished data (2009).

Reported Building Activity Affected by Wisconsin Energy Codes

1979-2009

Year	New One and Two Family Units ^b	New Manufactured Dwelling Units ^{c,f,g}	Manufactured Homes (HUD Certified) ^f	New & Altered Public and Commercial Buildings ^d	Existing Rental Properties ^e	Total
1979	NA	NA	NA	4,332		4,332
1980	3,302	906		3,818		8,026
1985	6,146	1,147		6,380	2,267	15,940
1990	10,286	1,253		7,378	4,849	23,766
1995	12,846	1,991		8,434	6,955	30,226
1996	14,051	2,108		8,088	7,162	31,409
1997	13,390	1,826		7,341	7,488	30,045
1998	14,662	1,856		6,793	7,616	30,927
1999	13,282	2,292		7,387	7,270	30,231
2000	14,799	2,085		6,606	7,510	31,000
2001	14,653	1,926		6,501	6,296	29,376
2002	15,479	1,933		6,516	6,318	30,246
2003	18,851	1,999		6,455	5,136	32,441
2004	18,641	2,141	2,016	6,658	5,221	34,677
2005	19,762	1,962	1,710	6,810	4,948	35,192
2006	14,767	1,596	1,124	8,932	4,181	30,600
2007 ^g	13,393		698	6,034	3,538	23,663
2008	9,004		413	4,840	2,671	16,928
2009^p	6,911		207	3,565	2,680	13,363

BUILDINGS
CERTIFIED
IN 2009
DECREASED
21.1%

More than 13,000 buildings were certified in 2009 as meeting Wisconsin's energy efficiency building codes^a, a 21.1 percent decrease from 2008. The number of buildings certified peaked in 2005 with 35,192.

The codes, developed and enforced by the Wisconsin Department of Commerce or local code officials, establish minimum energy standards for new construction, major renovation and existing rental units.

a Includes Chapter Commerce 22 of the Uniform Dwelling Code; Chapter Commerce 63 of the Commercial Building Code; and Chapter Commerce 67 (State Rental Unit Energy Efficiency Standards).

b Based on Uniform Dwelling Code permits issued. Through 2004, communities with a population of fewer than 2,500 could opt out from code enforcement and may not have issued permits. Previous numbers may have included some manufactured dwelling units.

c Reporting is required for all manufactured dwelling units. These dwelling units meet state standards and are generally delivered to the dwelling site on a flatbed.

d Includes new building and alteration plans submitted and approved by the state under general building code provisions. Some projects are exempt from plan review or were locally approved instead.

e Properties certified as meeting code requirements during current year, regardless of year of actual transfer of ownership.

f These dwelling units meet federal HUD standards, which are lower than state standards, have a chassis and generally are towed to the dwelling site.

g From 2007 forward, this category is fully captured in the One and Two Family Dwelling total.

p Preliminary.

NA – Not applicable. Rental Unit Energy Efficiency Code effective January 1, 1985 and Uniform Dwelling Code Effective June 1, 1980.

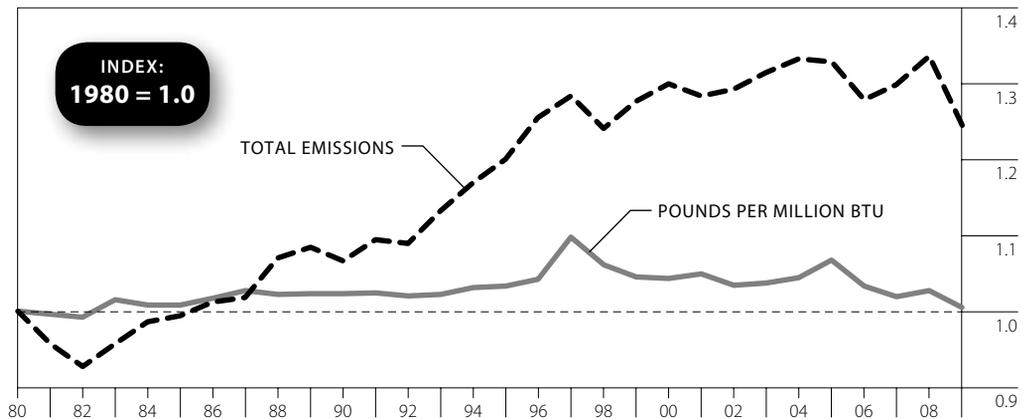
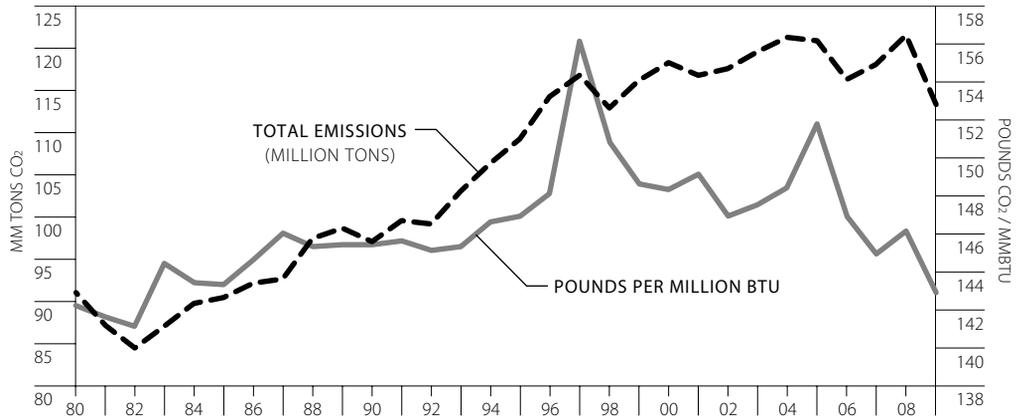
Source: Department of Commerce, Division of Safety and Buildings, internal data files.

Wisconsin Carbon Dioxide Emissions from Energy Use

CO₂
EMISSIONS
2.2%

Wisconsin's CO₂ emissions from energy (pounds per MMBtu) decreased 2.2 percent in 2009. Since 1990, total CO₂ emissions, in millions of tons, have increased 16.8 percent, but 2009 levels reflect a decrease of 6.7 percent from 2008.

1980-2009 MILLIONS OF TONS AND POUNDS PER MILLION BTU^a



Year	Tons CO ₂ (Millions)	Pounds CO ₂ Per MMBtu
1980	91.0	142.2
1985	90.4	143.3
1990	97.0	145.4
1995	109.2	146.9
2000	118.2	148.3
2005	120.8	151.7
2006	116.2	146.9
2007	118.0	144.9
2008	121.4	146.1
2009 ^p	113.3	142.9

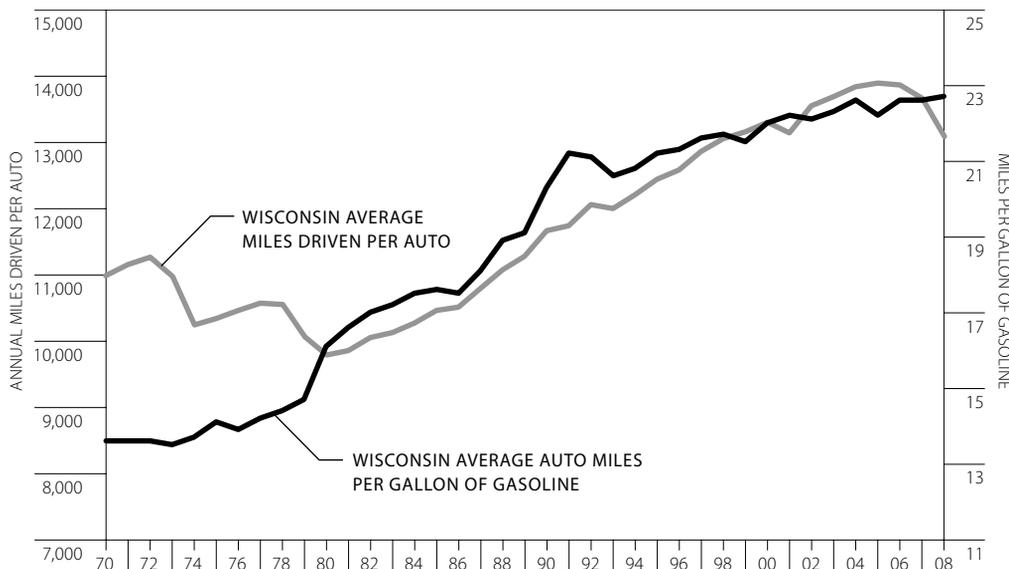
^a Does not include electric imports.

^p Preliminary estimates.

Source: Compiled from tables in this book for fuel use, and U.S. EPA emission factors.

Average Miles Driven Per Auto and Average Auto Miles Per Gallon of Gasoline, Wisconsin and United States

1970-2008



**AVERAGE
NUMBER OF
MILES DRIVEN
ANNUALLY
4.2%**

The average number of miles driven annually per automobile in Wisconsin decreased 4.2 percent in 2008. It is 33.8 percent higher than in 1980 and 11.0 percent higher than the U.S. average. Fuel efficiency has been relatively stagnant since 1991 because of the increasing number of less fuel efficient large cars sold each year. Wisconsin cars were 66.9 percent more fuel efficient in 2008 than in 1970.

Year	Average Annual Miles Per Auto ^{a,b}		Average Auto Miles Per Gallon of Gasoline ^{a,b}	
	Wisconsin	U.S.	Wisconsin	U.S.
1970	10,980	9,892	13.6	13.5
1975	10,332	9,309	14.1	14.0
1980	9,782	8,813	16.1	16.0
1985	10,455	9,419	17.6	17.5
1990	11,659	10,504	20.3	20.2
1995	12,435	11,203	21.2	21.1
2000	13,293	11,976	22.0	21.9
2001	13,132	11,831	22.2	22.1
2002	13,544	12,202	22.1	22.0
2003	13,681	12,325	22.3	22.2
2004	13,831	12,460	22.6	22.5
2005	13,886	12,510	22.2	22.1
2006	13,858	12,485	22.6	22.5
2007 ^r	13,657	12,304	22.6	22.5
2008 ^p	13,085	11,788	22.7	22.6

^a Wisconsin and U.S. figures come from different sources and may not be directly comparable.

^b Does not include minivans, pickups or sport utility vehicles.

^p Preliminary estimates.

^r Revised.

Source: Wisconsin Department of Transportation, Division of Planning and Budget, Bureau of Policy Planning and Analysis, personal communication (1993); U.S. Department of Energy, Energy Information Administration, *Monthly Energy Review*, table 1.8 [DOE/EIA-0035 (2010/03)] (March 2010) <http://www.eia.doe.gov/emeu/mer/>.

CHAPTER 5

United States Energy Use

Wisconsin Communities Save Energy and Money

Retrofits and lighting projects in 82 Wisconsin communities are expected to create 125 jobs and save more than \$1.6 million in energy costs annually.

Funded with \$9.5 million through the American Recovery and Reinvestment Act (ARRA), the Energy Efficiency and Conservation Block Grant (EECBG) program's municipal awardees are improving lighting and retrofitting village halls, community centers, libraries and public works buildings to decrease their overall energy consumption.

Town of Eagle Point



In Eagle Point, a historic building built during the Depression's Works Progress Administration is

receiving some much needed upgrades thanks to the commitment of the community and the ARRA.

The historic town hall, built in 1938, is a beautiful, structurally sound building but with un-insulated walls, original single-pane windows, out-dated lighting and an oil-fired furnace—an expensive building for the community to operate.

In the Fall of 2009, the community voted to save the building and make energy upgrades not only to the town hall but also to the town maintenance shop/fire station.

With funding from EECBG of \$201,900, efficient windows, lighting, HVAC and insulation have been installed while maintaining the historical nature of the building. Plus, the community installed accessibility ramps so that everyone can enjoy this historic building for many years to come.

The community projects an energy savings of more than 70,000 kWhs, 24,000 Therms, and 404,000 pounds of carbon dioxide over the next three years.

Town of Albion



The Town of Albion, population of nearly 1,800, is a rural community that decided to optimize the energy efficiency of their

municipal operations to save energy costs and keep their community working.

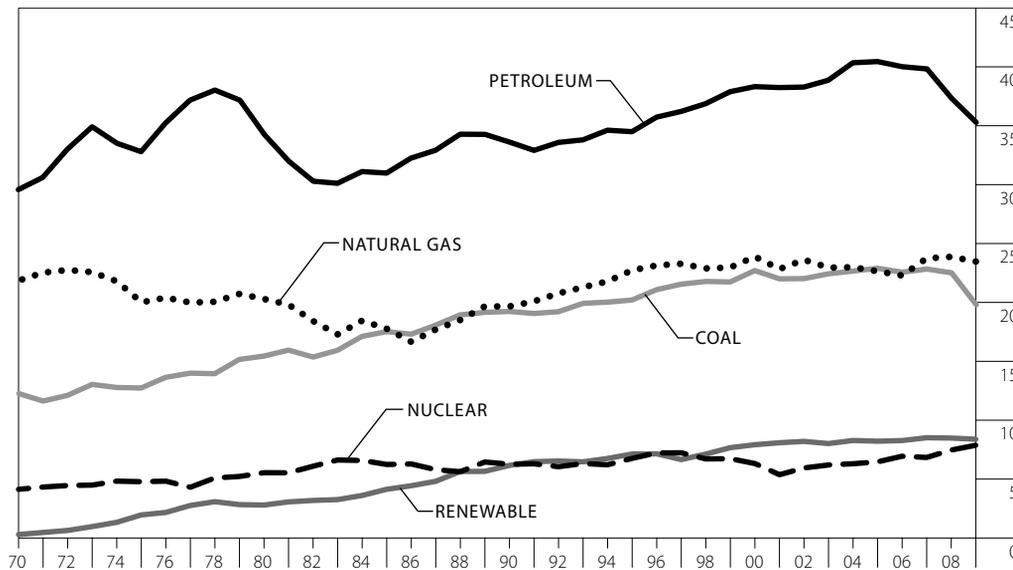
The County Clerk's Office, built in 1961 out of cement block, had the worst energy efficiency rating based on the ASHRAE scale of 1 to 99 (1 = highly efficient to 99 = worst efficiency). The Clerk's Office ranked 99th, Town Hall 56th and the Town Garage 84th. The inefficiency of these three buildings resulted in extremely high annual energy expenditures. The Village was paying more than \$9.80 per square foot for energy costs in the Clerk's Office!

With \$126,500 from EECBG and more than \$270,000 leveraged by the community, the town upgraded the three buildings and built an energy efficient addition onto the Town Hall for the Clerk's Office to occupy.

The three year energy savings from these efforts are projected to save more than 24,000 kWhs, 13,000 Therms, and 203,000 pounds of carbon dioxide.

United States Resource Energy Consumption, by Type of Fuel

1970-2009 QUADRILLIONS OF BTU



1970-2009 QUADRILLIONS OF BTU AND PERCENT OF TOTAL

Year	Petroleum		Natural Gas		Coal		Nuclear		Renewable ^a		Total ^b
1970 ^r	29.5	43.5%	21.8	32.1%	12.2	18.0%	0.2	0.4%	4.1	6.0%	67.8
1975 ^r	32.7	45.5%	19.9	27.7%	12.7	17.6%	1.9	2.6%	4.7	6.6%	72.0
1980 ^r	34.2	43.8%	20.2	25.9%	15.4	19.7%	2.7	3.5%	5.5	7.0%	78.1
1985 ^r	30.9	40.4%	17.7	23.1%	17.5	22.8%	4.1	5.3%	6.2	8.1%	76.5
1990 ^r	33.6	39.6%	19.6	23.2%	19.2	22.7%	6.1	7.2%	6.2	7.3%	84.7
1995 ^r	34.4	37.8%	22.7	24.9%	20.2	22.1%	7.1	7.8%	6.7	7.4%	91.2
2000 ^r	38.3	38.7%	23.8	24.1%	22.6	22.9%	7.9	7.9%	6.3	6.3%	99.0
2001 ^r	38.2	39.6%	22.8	23.6%	21.9	22.8%	8.0	8.3%	5.3	5.5%	96.3
2002 ^r	38.2	39.1%	23.6	24.1%	22.0	22.4%	8.1	8.3%	5.9	6.0%	97.9
2003 ^r	38.8	39.5%	22.9	23.3%	22.4	22.8%	8.0	8.1%	6.1	6.3%	98.2
2004 ^r	40.3	40.2%	22.9	22.9%	22.6	22.5%	8.2	8.2%	6.2	6.2%	100.3
2005 ^r	40.4	40.2%	22.6	22.5%	22.8	22.7%	8.2	8.1%	6.4	6.4%	100.5
2006 ^r	40.0	40.0%	22.2	22.3%	22.5	22.5%	8.2	8.2%	6.9	6.9%	99.9
2007 ^r	39.8	39.2%	23.7	23.3%	22.8	22.4%	8.5	8.3%	6.8	6.7%	101.6
2008 ^r	37.3	37.5%	23.8	23.9%	22.5	22.6%	8.4	8.5%	7.4	7.4%	99.5
2009 ^p	35.2	37.1%	23.4	24.7%	19.8	20.8%	8.3	8.8%	7.8	8.2%	94.9

^a Includes net imports of electricity.

^b Totals vary slightly from U.S. resource consumption totals elsewhere in this publication because they do not include net imports of electricity.

^p Preliminary.

^r Revised.

Source: U.S. Department of Energy, Energy Information Administration, *Monthly Energy Review*, Table 1.3 [DOE/EIA-0035 (2010/03)] (March 2010). <http://www.eia.doe.gov/emeu/mer> Annual data at: <http://www.eia.doe.gov/emeu/aer>

U.S. ENERGY CONSUMPTION
4.6%

In 2009, total energy consumption in the United States decreased 4.6 percent.

PETROLEUM
5.5%
COAL
12.0%
NATURAL GAS
1.7%
NUCLEAR
1.2%

There were decreases for petroleum (5.5 percent), coal (12.0 percent), natural gas (1.7 percent), and nuclear (1.2 percent).

RENEWABLE
5.5%

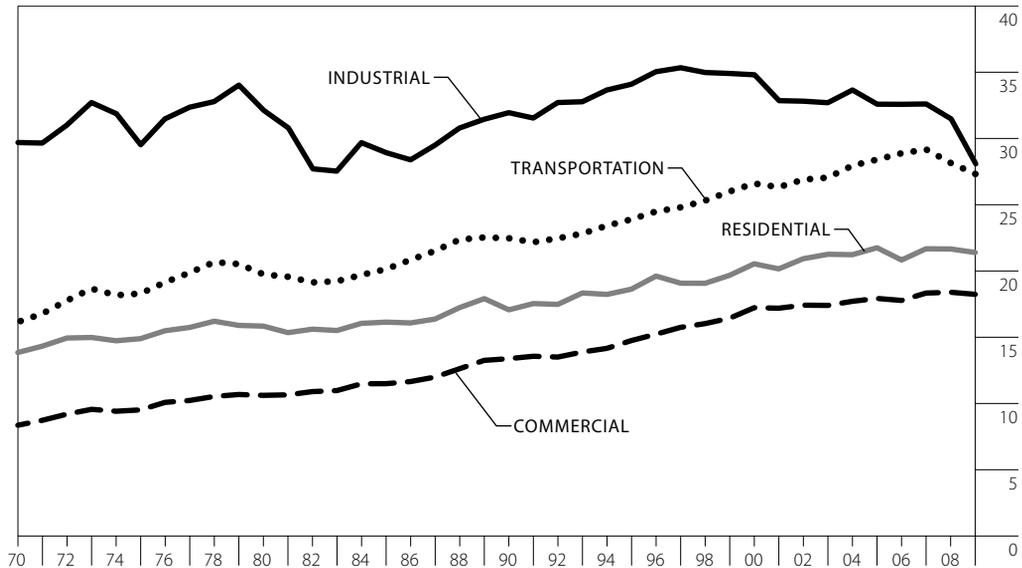
Only renewable fuels saw an increase in consumption (5.5 percent).

United States Resource Energy Consumption, by Economic Sector

INDUSTRIAL
10.5%
COMMERCIAL
0.5%
RESIDENTIAL
1.4%
TRANSPORTATION
2.8%

During 2009, all sectors^a saw a decrease in consumption. The industrial sector saw the largest decrease (10.5 percent), while the commercial sector saw a slight decrease (0.5 percent). The residential and transportation sectors saw decreases of 1.4 percent and 2.8 percent respectively.

1970-2009 QUADRILLIONS OF BTU



1970-2009 QUADRILLIONS OF BTU AND PERCENT OF TOTAL

Year	Residential ^a		Commercial ^a		Industrial		Transportation		Total ^b
1970 ^r	13.8	20.3%	8.3	12.2%	29.6	43.7%	16.1	23.7%	67.8
1975 ^r	14.8	20.6%	9.5	13.1%	29.4	40.9%	18.2	25.3%	72.0
1980 ^r	15.8	20.2%	10.6	13.5%	32.1	41.1%	19.7	25.2%	78.1
1985 ^r	16.1	21.0%	11.4	15.0%	28.9	37.8%	20.1	26.3%	76.5
1990 ^r	17.0	20.1%	13.3	15.8%	31.9	37.7%	22.4	26.5%	84.7
1995 ^r	18.6	20.4%	14.7	16.1%	33.9	37.2%	23.8	26.2%	91.2
2000	20.5	20.7%	17.2	17.4%	34.8	35.1%	26.5	26.8%	99.0
2001	20.1	20.9%	17.1	17.8%	32.8	34.1%	26.3	27.3%	96.3
2002	20.9	21.3%	17.4	17.7%	32.8	33.5%	26.8	27.4%	97.9
2003	21.2	21.6%	17.4	17.7%	32.6	33.2%	27.0	27.5%	98.2
2004	21.2	21.1%	17.7	17.6%	33.6	33.5%	27.9	27.8%	100.3
2005	21.7	21.6%	17.9	17.8%	32.5	32.4%	28.4	28.2%	100.5
2006	20.8	20.8%	17.7	17.8%	32.5	32.6%	28.8	28.9%	99.9
2007 ^r	21.6	21.3%	18.3	18.0%	32.6	32.1%	29.1	28.7%	101.6
2008 ^r	21.6	21.7%	18.3	18.4%	31.4	31.6%	28.1	28.2%	99.5
2009 ^p	21.3	22.5%	18.2	19.2%	28.1	29.6%	27.3	28.7%	94.9

^a Agricultural energy use allocated between residential and commercial sectors.

^b Numbers may not match with previous pages due to independent rounding.

^p Preliminary.

^r Revised.

Source: U.S. Department of Energy, Energy Information Administration, *Monthly Energy Review* Table 2. [DOE/EIA 0035 (2010/03) (March 2010). <http://www.eia.doe.gov/emeu/mer/> Annual data: <http://www.eia.doe.gov/emeu/aer/>

Sources of U.S. Crude Oil and Petroleum Products

1975-2009 THOUSANDS OF BARRELS PER DAY

Year	U.S. Petroleum Use	U.S. Field Production ^a	U.S. Crude Oil Production from Oil Wells	Natural Gas Plant Liquids from U.S. Natural Gas Wells ^b	Crude Oil from Wells in Lower 48 States	U.S. Crude Oil & Product Exports	U.S. Crude Oil & Product Imports (Total) ^c	U.S. Crude Oil and Product Imports from OPEC	Imports as a Percent of U.S. Petroleum Use	OPEC Imports as a Percent of U.S. Imports	Imports as a Percent of U.S. Crude Oil Production & Imports
1975	16,322	10,007	8,375	1,633	8,183	209	6,056	3,601	37.1%	59.5%	42.0%
1980	17,506	10,170	8,597	1,573	6,980	544	6,909	4,300	39.5%	62.2%	44.6%
1985	15,726	10,581	8,971	1,609	7,146	781	5,067	1,830	32.2%	36.1%	36.1%
1990	16,988	8,914	7,355	1,559	5,582	857	8,018	4,296	47.2%	53.6%	52.2%
1995	17,725	8,322	6,560	1,762	5,076	949	8,835	4,002	49.8%	45.3%	57.4%
1996	18,309	8,295	6,465	1,830	5,071	981	9,478	4,211	51.8%	44.4%	59.4%
1997	18,620	8,269	6,452	1,817	5,156	1,003	10,162	4,569	54.6%	45.0%	61.2%
1998	18,917	8,011	6,252	1,759	5,077	945	10,708	4,905	56.6%	45.8%	63.1%
1999	19,519	7,731	5,881	1,850	4,832	940	10,852	4,953	55.6%	45.6%	64.9%
2000	19,701	7,733	5,822	1,911	4,851	1,040	11,459	5,203	58.2%	45.4%	66.3%
2001	19,649	7,670	5,801	1,868	4,839	971	11,871	5,528	60.4%	46.6%	67.2%
2002	19,761	7,626	5,746	1,880	4,761	984	11,530	4,605	58.3%	39.9%	66.7%
2003	20,034	7,400	5,681	1,719	4,706	1,027	12,264	5,162	61.2%	42.1%	68.3%
2004	20,731	7,228	5,419	1,809	4,510	1,048	13,145	5,701	63.4%	43.4%	70.8%
2005	20,802	6,895	5,178	1,717	4,314	1,165	13,714	5,587	65.9%	40.7%	72.6%
2006	20,687	6,841	5,102	1,739	4,361	1,317	13,707	5,517	66.3%	40.2%	72.9%
2007	20,680	6,847	5,064	1,783	4,342	1,433	13,468	5,980	65.1%	44.4%	72.7%
2008 ^r	19,498	6,734	4,950	1,784	4,268	1,802	12,915	5,954	66.2%	46.1%	72.3%
2009 ^p	18,686	7,196	5,310	1,886	4,665	2,026	11,726	4,786	62.8%	40.8%	68.8%

^a Includes crude oil, natural gas plant liquids and a small amount of other hydrocarbons and alcohol.

^b Natural gas liquids recovered from natural gas in gas processing plants and, in some situations, from natural gas field facilities.

^c Includes crude oil imports for the Strategic Petroleum Reserve (SPR).

^p Preliminary.

^r Revised.

Source: U.S. Department of Energy, Energy Information Administration, *Monthly Energy Review* Tables 3.1, 3.3a and 3.3b [DOE/EIA-0035(2010/03)] (March 2010) <http://www.eia.doe.gov/emeu/mer> Annual data: <http://www.eia.doe.gov/emeu/aer>

U.S.
PETROLEUM USE
4.2%

In 2009, U.S. petroleum use decreased 4.2 percent. U.S. imports of crude oil and petroleum products decreased 9.2 percent, and imports from OPEC decreased 19.6 percent.

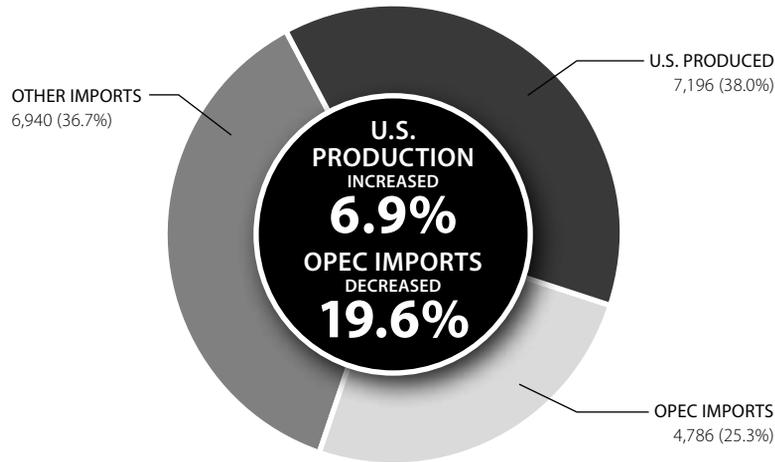
Since 1985, U.S. consumption of petroleum products has increased almost 18.8 percent. During this same period, U.S. crude oil production has decreased 40.8 percent (lower 48 production fell 34.7 percent).

This resulted in a 131.4 percent increase in imports since 1985, with a corresponding 161.5 percent increase in imports from the Organization of Petroleum Exporting Countries (OPEC).

2009 U.S. Petroleum Use Domestically Produced and Imported

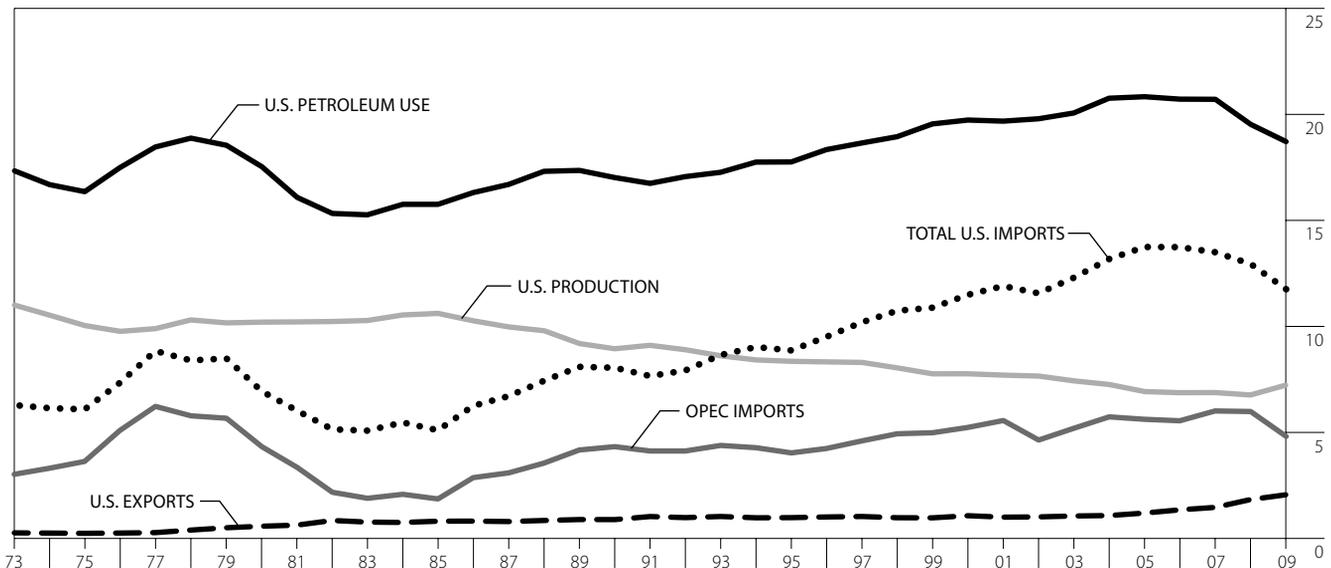
In 2009, U.S. production increased 6.9 percent.
OPEC imports decreased 19.6 percent.

2009 THOUSANDS OF BARRELS PER DAY



U.S. Petroleum Use, Production, Imports and Exports

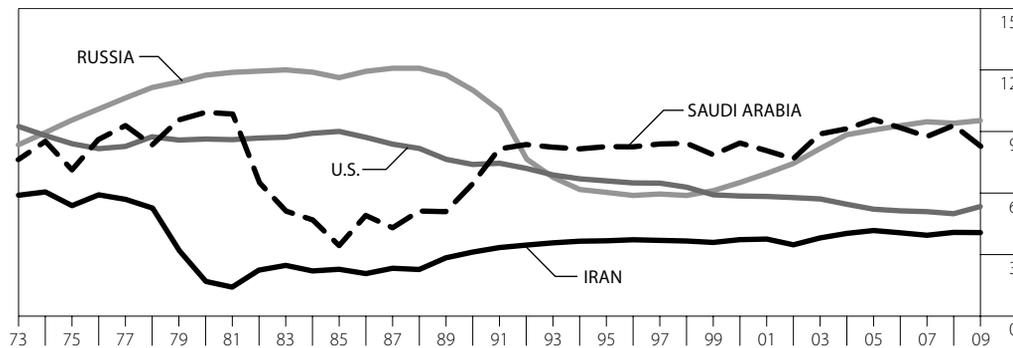
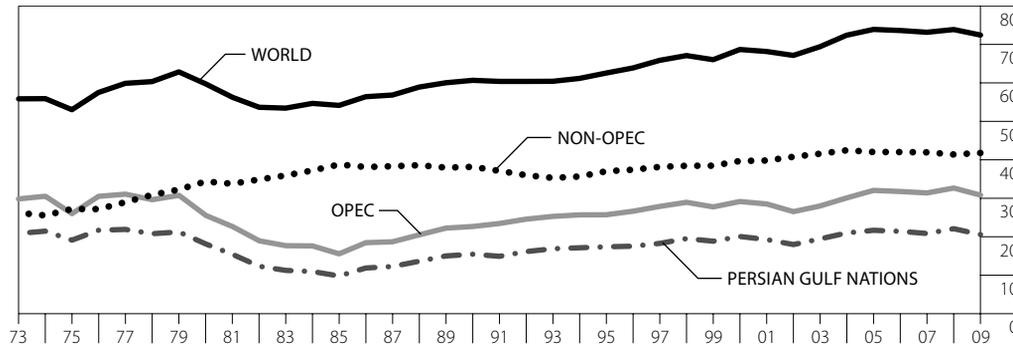
1973-2009 MILLIONS OF BARRELS PER DAY



Source: U.S. Department of Energy, Energy Information Administration, *Monthly Energy Review* [DOE/EIA-0035(2010/03)] (March 2010).

World Crude Oil Production

1973-2009 MILLION BARRELS PER DAY



Year	World	Non-OPEC	OPEC ^b	Persian Gulf Nations ^c	Major Crude Oil Producers			
					U.S.	Saudi Arabia	Iran	Russia ^a
1973	55.68	26.02	29.66	20.67	9.21	7.60	5.86	8.32
1975	52.83	27.04	25.79	18.93	8.37	7.08	5.35	9.52
1980	59.56	34.18	25.38	17.96	8.60	9.90	1.66	11.71
1985	53.97	38.60	15.37	9.63	8.97	3.39	2.25	11.59
1990	60.49	38.00	22.49	15.28	7.36	6.41	3.09	10.98
1995	62.39	36.85	25.54	17.21	6.56	8.23	3.64	6.00
2000	68.50	39.52	28.98	19.89	5.82	8.40	3.70	6.48
2005 ^r	73.72	41.85	31.87	21.50	5.18	9.55	4.14	9.04
2006 ^r	73.44	41.84	31.59	21.23	5.10	9.15	4.03	9.25
2007 ^r	72.98	41.77	31.21	20.67	5.06	8.72	3.91	9.44
2008 ^r	73.69	41.21	32.48	21.91	4.96	9.26	4.05	9.37
2009^p	72.26	41.61	30.65	20.40	5.31	8.25	4.04	9.50

^a Prior to 1992, production was for the former U.S.S.R.

^b The OPEC countries include the Persian Gulf nations (with the exception of Bahrain) and Algeria, Indonesia, Libya, Nigeria and Venezuela. Ecuador rejoined OPEC in 2007 while Indonesia left OPEC at the end of 2008.

^c The Persian Gulf nations are Bahrain, Iran, Iraq, Kuwait, Qatar, Saudi Arabia, the United Arab Emirates, and the Neutral Zone.

^d This figure does not include oil sands or other unconventional oil sources.

^p Preliminary.

^r Revised.

Source: U.S. Department of Energy, Energy Information Administration, *Monthly Energy Review* Tables 11.1a and 11.1b [DOE/EIA-0035 (2009/05)] (May 2009). <http://www.eia.doe.gov/emeu/mer/inter.html>. Annual data: <http://www.eia.doe.gov/emeu/aer>

**WORLD
CRUDE OIL
1.9%**

In 2009, world production of crude oil was 72.26 million barrels per day, a decrease of 1.9 percent from a year ago^d. The Organization of Petroleum Exporting Countries (OPEC) produced 42.4 percent of the world's crude oil in 2009.

The top four producers of crude oil in 2009 were Russia (13.1 percent), Saudi Arabia (11.4 percent), the U.S. (7.3 percent) and Iran (5.6 percent).

United States Natural Gas Production, Imports, Consumption and Storage

CONSUMPTION

1.7%

In 2009, U.S. natural gas consumption decreased 1.7 percent.

PRODUCTION

4.0%

Domestic natural gas production increased 4.0 percent.

NET IMPORTS

10.6%

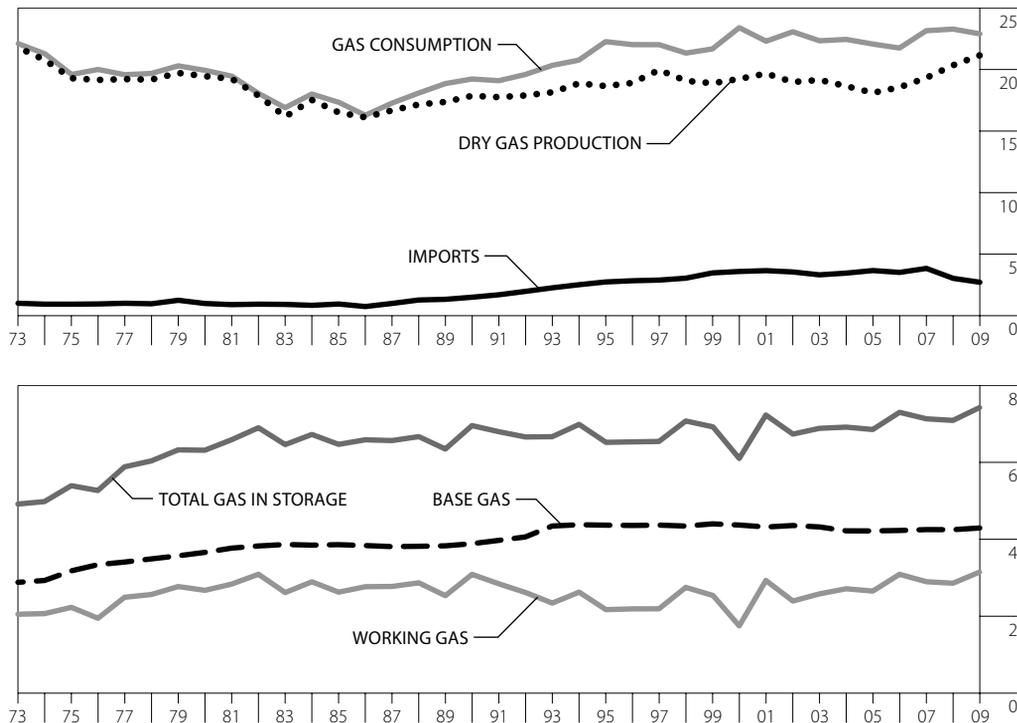
Net imports, primarily from Canada, decreased 10.6 percent.

GAS IN STORAGE

10.2%

Working gas^c in storage increased 10.2 percent.

1973-2009 TRILLIONS OF CUBIC FEET



Year	U.S. Dry Natural Gas Production ^a	Net Imports	Consumption	Natural Gas in Underground Storage – Year End		
				Base Gas ^b	Working Gas ^c	Total
1973	21.731	0.956	22.049	2.864	2.034	4.898
1975	19.236	0.880	19.538	3.162	2.212	5.374
1980	19.403	0.936	19.877	3.642	2.655	6.297
1985	16.454	0.894	17.281	3.842	2.607	6.449
1990	17.810	1.447	19.174	3.868	3.068	6.936
1995	18.599	2.687	22.207	4.349	2.153	6.502
2000	19.182	3.538	23.333	4.352	1.719	6.071
2005	18.051	3.612	22.011	4.200	2.635	6.835
2006	18.504	3.462	21.685	4.211	3.070	7.281
2007 ^r	19.266	3.785	23.097	4.234	2.879	7.113
2008 ^r	20.286	2.979	23.227	4.232	2.840	7.072
2009^p	21.095	2.664	22.842	4.276	3.131	7.407

^a Dry Natural Gas U.S. Production is natural gas used to heat homes and buildings, and to power industry after the natural gas liquids, such as liquid propane, are removed.

^b Base Gas is the volume of gas needed as permanent inventory to maintain adequate underground storage reservoir pressures and deliverability rates during the withdrawal season.

^c Working Gas is the gas that can be withdrawn from storage to heat buildings and power industry.

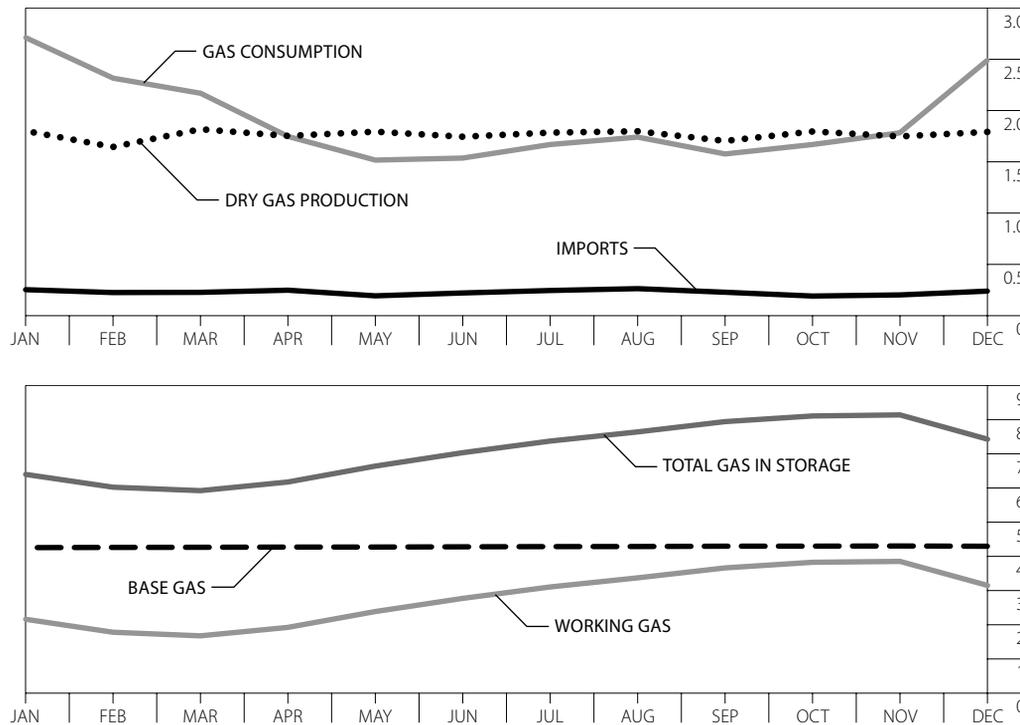
^p Preliminary.

^r Revised.

Source: U.S. Department of Energy, Energy Information Administration, *Monthly Energy Review* Tables 4.1 and 4.4. [DOE/EIA-0035 (2010/03)] (March 2010). <http://www.eia.doe.gov/emeu/mer>. Annual data: <http://www.eia.doe.gov/emeu/aer>

United States Monthly Natural Gas Production, Imports, Consumption and Storage

2009 TRILLIONS OF CUBIC FEET



100
CUBIC FEET
OF NATURAL GAS
= 1 THERM

1 THERM
= 100,000
BRITISH THERMAL
UNITS (BTU)

Domestic natural gas production and imports remain relatively constant throughout the year. However, consumption increases significantly during the winter heating months. To provide sufficient natural gas for the winter heating months, the working gas in storage is withdrawn during these months, while natural gas is injected into storage during the non-heating months. Therefore, natural gas in storage generally peaks in October or November and is at a minimum in March.

2008	U.S. Dry Natural Gas Production ^a	Net Imports	Consumption	Natural Gas in Underground Storage – Month End		
				Base Gas ^b	Working Gas ^c	Total
January	1.794	0.247	2.704	4.236	2.141	6.377
February	1.638	0.219	2.309	4.242	1.761	6.003
March	1.811	0.221	2.162	4.246	1.656	5.902
April	1.746	0.242	1.741	4.252	1.903	6.155
May	1.787	0.187	1.510	4.253	2.367	6.620
June	1.737	0.215	1.530	4.260	2.752	7.012
July	1.778	0.239	1.662	4.266	3.086	7.352
August	1.791	0.257	1.734	4.268	3.352	7.620
September	1.697	0.222	1.570	4.278	3.643	7.921
October	1.789	0.185	1.662	4.279	3.807	8.087
November	1.741	0.196	1.776	4.284	3.833	8.117
December	1.785	0.233	2.482	4.276	3.131	7.407
Total^d	21.095	2.664	22.842	Average 4.262	2.786	7.048

a Dry Natural Gas Production is natural gas used to heat homes and buildings, and to power industry after the natural gas liquids, such as liquid propane, are removed.
b Base Gas is the volume of gas needed as permanent inventory to maintain adequate underground storage reservoir pressures and deliverability rates during the withdrawal season.
c Working Gas is the gas that can be withdrawn from storage to heat buildings and power industry.
d Totals may not add due to rounding.

Source: U.S. Department of Energy, Energy Information Administration, *Monthly Energy Review*, Tables 4.1 and 4.4 [DOE/EIA-0035 (2010/03)] (March 2010). www.eia.doe.gov/emeu/mer

United States Coal Production, Net Exports, Consumption and Sector Usage

DOMESTIC PRODUCTION EXCEEDS DEMAND

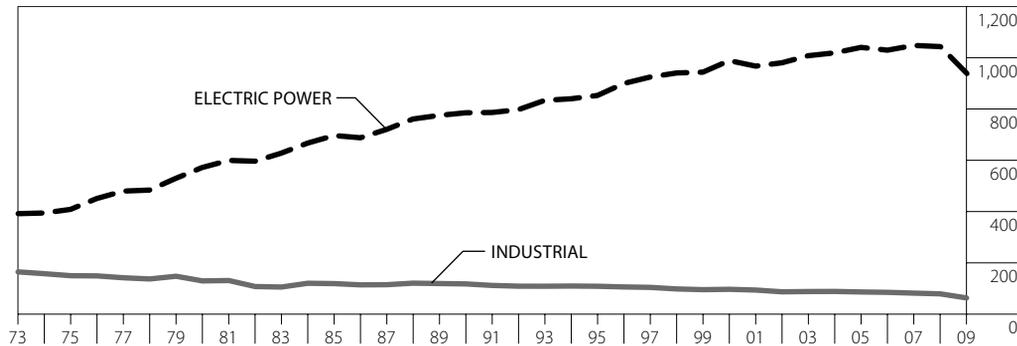
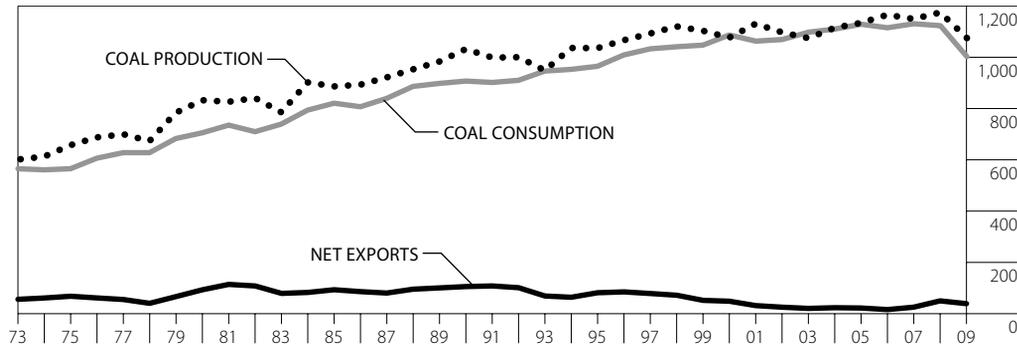
Unlike petroleum or natural gas, domestic production of coal exceeds demand, and the U.S. is a net exporter of coal.

IN THE U.S. 93.6% OF COAL GENERATES ELECTRIC POWER

IN WISCONSIN 87.1% OF ELECTRICAL POWER IS GENERATED WITH COAL

Of the coal used in the U.S., 93.6 percent goes to generating electric power, but 87.1 percent of Wisconsin's electricity is generated with coal. The Industrial sector uses 6.07 percent, with the residential and commercial sectors combined using 0.32 percent of total domestic consumption.

1973-2009 MILLIONS OF TONS



Year	Coal Production	Net Exports	Consumption	Coal Use by Sector		
				Res. & Com. ^a	Industrial	Electric Power
1973	598.6	53.5	562.6	11.1	162.1	389.2
1975	654.6	65.4	562.6	9.4	147.2	406.0
1980	829.7	90.5	702.7	6.5	127.0	569.3
1985 ^r	883.6	90.7	818.0	7.8	116.4	693.8
1990 ^r	1,029.1	103.1	904.5	6.7	115.2	782.6
1995 ^r	1,033.0	79.1	962.1	5.8	106.1	850.2
2000	1,073.6	46.0	1,084.1	4.1	94.1	985.8
2005	1,131.4	19.5	1,126.0	4.7	83.8	1,037.5
2006	1,162.8	13.4	1,112.3	3.2	82.4	1,026.6
2007	1,146.6	22.8	1,128.0	3.5	79.3	1,045.1
2008 ^r	1,171.8	47.3	1,120.5	3.5	76.5	1,040.6
2009^p	1,072.8	36.5	1,000.4	3.2	60.7	936.5

^a Res. & Com. represents residential and commercial.

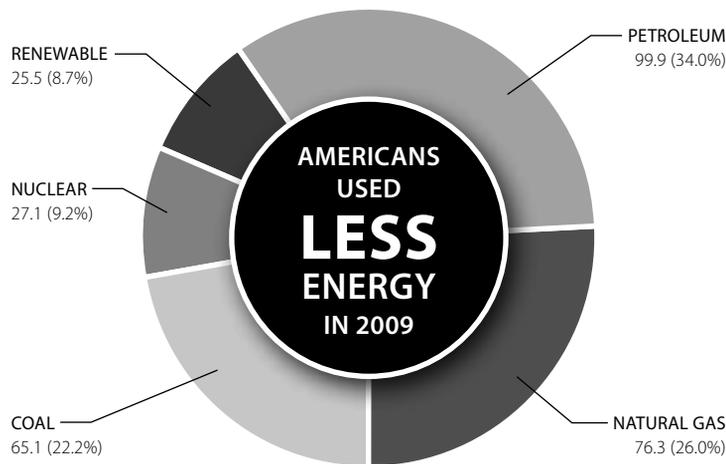
^p Preliminary.

^r Revised.

Source: U.S. Department of Energy, Energy Information Administration, *Monthly Energy Review*, Tables 6.1 and 6.2, [DOE/EIA-0035 (2010/03)] (March 2010). <http://www.eia.doe.gov/emeu/mer> Annual data: <http://www.eia.doe.gov/emeu/aer>

United States Per Capita Resource Energy Consumption, by Type of Fuel

2009 MILLIONS OF BTU AND PERCENT OF TOTAL



U.S. PER CAPITA ENERGY CONSUMPTION
4.9%

In 2009, U.S. per capita energy consumption decreased 4.9 percent.

1970-2009 MILLIONS OF BTU AND PERCENT OF TOTAL

Year	Petroleum ^a		Natural Gas		Coal		Nuclear		Renewables ^b		Total
1970 ^r	126.1	40.3%	106.3	33.9%	59.8	19.1%	1.2	0.4%	19.9	6.3%	313.2
1975 ^r	133.2	42.3%	92.4	29.3%	58.6	18.6%	8.8	2.8%	21.9	6.9%	314.8
1980 ^r	128.0	39.9%	89.1	27.7%	67.9	21.1%	12.1	3.8%	24.1	7.5%	321.1
1985 ^r	112.8	37.1%	74.4	24.5%	73.5	24.2%	17.1	5.6%	26.0	8.6%	303.8
1990 ^r	113.9	35.8%	78.5	24.7%	76.8	24.1%	24.5	7.7%	24.9	7.8%	318.6
1995 ^r	109.9	34.1%	85.1	26.4%	75.4	23.4%	26.6	8.2%	25.2	7.8%	322.3
1996 ^r	112.1	34.1%	85.7	26.1%	78.0	23.7%	26.3	8.0%	26.6	8.1%	328.7
1997 ^r	111.7	34.3%	85.2	26.1%	78.7	24.1%	24.2	7.4%	26.3	8.1%	326.0
1998 ^r	112.8	34.8%	82.8	25.6%	78.5	24.2%	25.6	7.9%	24.1	7.5%	323.8
1999 ^r	114.5	35.2%	82.1	25.2%	77.5	23.8%	27.3	8.4%	23.9	7.4%	325.3
2000 ^r	116.0	35.1%	84.4	25.5%	80.0	24.2%	27.9	8.4%	22.2	6.7%	330.5
2001 ^r	114.3	36.0%	79.9	25.1%	76.9	24.2%	28.2	8.9%	18.6	5.9%	317.8
2002 ^r	113.2	35.4%	81.9	25.6%	76.1	23.8%	28.3	8.8%	20.5	6.4%	320.0
2003 ^r	113.7	35.8%	78.9	24.8%	76.9	24.2%	27.4	8.6%	21.2	6.7%	318.0
2004 ^r	116.3	36.3%	78.3	24.4%	76.7	23.9%	28.1	8.8%	21.3	6.6%	320.6
2005 ^r	116.0	36.4%	76.4	24.0%	77.1	24.2%	27.6	8.7%	21.7	6.8%	318.7
2006 ^r	113.3	36.1%	74.4	23.7%	75.2	24.0%	27.5	8.8%	23.1	7.4%	313.5
2007 ^r	112.3	35.5%	78.5	24.8%	75.4	23.8%	28.0	8.8%	22.5	7.1%	316.8
2008 ^r	105.2	34.0%	78.2	25.3%	73.6	23.8%	27.7	9.0%	24.3	7.9%	309.0
2009^p	99.9	34.0%	76.3	26.0%	65.1	22.2%	27.1	9.2%	25.5	8.7%	293.9

^a To allow a more direct comparison with Wisconsin data, this figure excludes asphalt, road oil, lubricants, waxes, petroleum feedstocks and other petroleum products not used as energy sources.

^b Renewables includes biomass, hydro power, wood, solar, wind and geothermal.

^p Preliminary.

^r Revised.

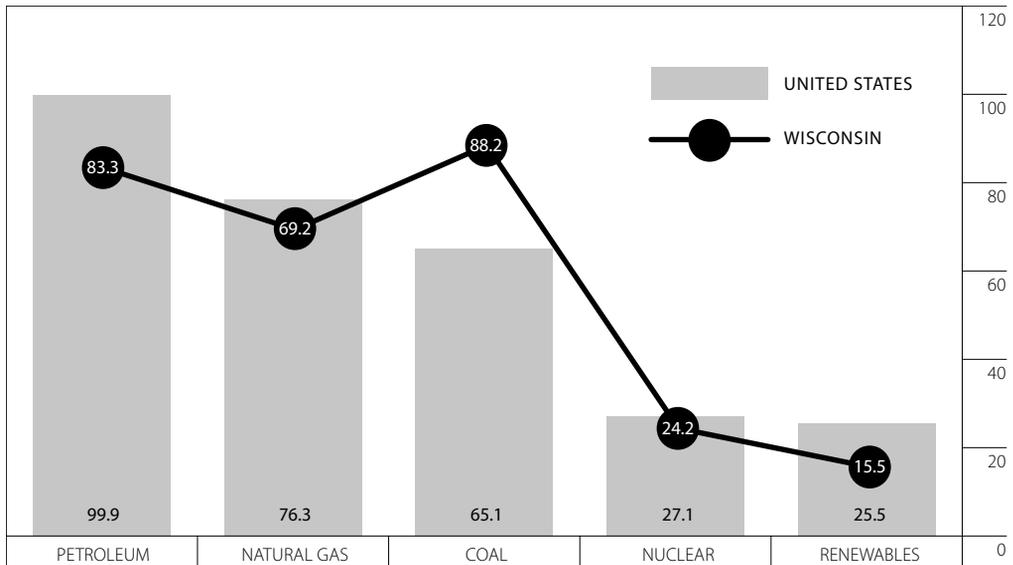
Source: U.S. Department of Energy, Energy Information Administration, *Monthly Energy Review* [DOE/EIA-0035 (2010/03)] (March 2010), Table 1.3, <http://www.eia.doe.gov/emeu/mer.StateEnergyDataConsumption> (1997-2009), Tables 7, F8, F9 and F10, <http://www.eia.doe.gov/emeu/states/~seds.html>

Wisconsin Per Capita Resource Energy Consumption as Percent of United States, by Type of Fuel

IN 2009
WISCONSIN USED 101.1%
 AS MUCH ENERGY PER CAPITA AS THE NATIONAL AVERAGE

In 2009, Wisconsin used 101.1 percent as much energy per capita as the national average. Wisconsin used significantly more coal than the national average because of the state's high use of electricity generated from coal. Wisconsin used less petroleum, natural gas, renewable and nuclear energy per capita than the national average.

2009 PER CAPITA RESOURCE ENERGY CONSUMPTION – MILLIONS OF BTU



1970-2009 WISCONSIN PER CAPITA RESOURCE ENERGY CONSUMPTION AS A PERCENT OF U.S.

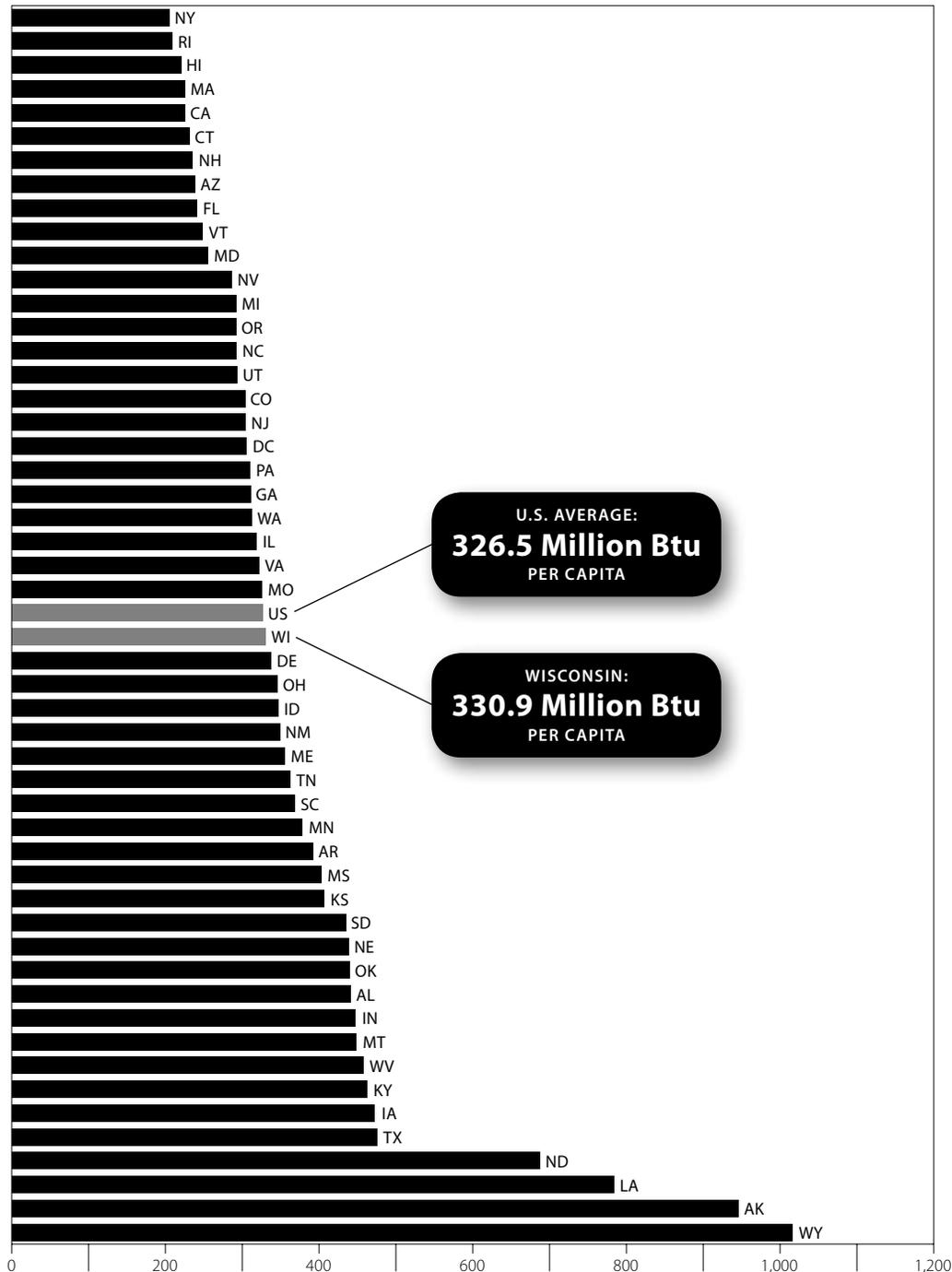
Year ^r	Petroleum ^a	Natural Gas	Coal	Nuclear	Renewables ^b	Total
1970	82.2%	70.2%	134.5%	32.5%	31.1%	82.6%
1975	78.1	86.6	98.0	276.7	29.4	85.0
1980	75.4	82.2	101.6	188.7	43.1	84.2
1985	77.0	86.4	107.4	145.9	42.1	87.4
1990	79.7	79.8	109.5	101.3	41.3	91.2
1995	83.9	87.2	119.7	86.9	38.4	97.3
2000	80.8	86.7	120.8	82.6	44.9	95.2
2001	81.9	83.4	125.5	81.6	52.2	98.1
2002	83.6	86.2	122.7	87.2	50.1	97.5
2003	81.8	91.2	125.2	87.9	49.6	98.0
2004	82.1	88.5	127.2	83.0	51.0	97.7
2005	78.8	97.3	124.5	53.5	50.4	97.2
2006	79.0	90.1	123.1	86.2	48.8	95.3
2007	79.6	91.2	122.1	88.8	56.8	98.5
2008	81.4	93.6	134.4	84.3	58.6	101.6
2009^p	83.3	90.7	135.5	89.3	60.7	101.1

^a This list excludes asphalt, road oil, lubricants, waxes, petroleum feedstocks and other petroleum products not used as energy sources.
^b Renewables includes biomass, biogas, hydro power, wood, solar and wind.
^p Preliminary estimates.
^r Revised. The numbers in this table are revised due to revisions conducted by the federal Bureau of Economic Activity as the benchmark year was moved from 2000 to 2005.

Source: Compiled from tables in this publication for United States and Wisconsin per capita resource energy use.

U.S. Per Capita Resource Energy Consumption, by State

2008 MILLIONS OF BTU PER CAPITA



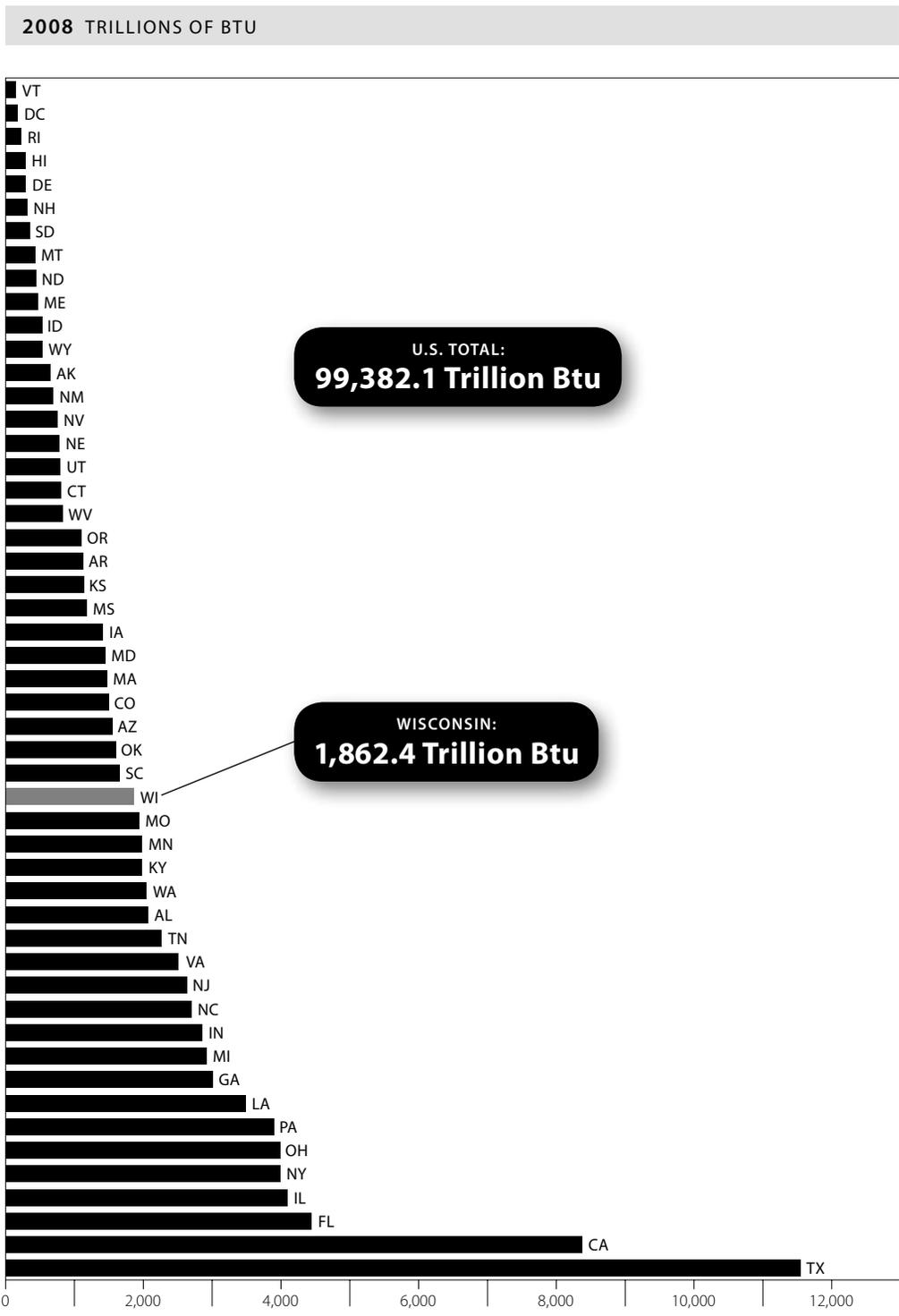
In 2008, when non-energy uses of petroleum are included (such as road oil, asphalt and lubricants), Wisconsin is the 29th largest state user in the nation, including the District of Columbia, in per capita energy consumption^a. At 330.9 million BTU per capita, Wisconsin's is 101 percent of the U.S. consumption at 326.5 million BTU per capita. This is an increase of 0.33 percent over 2007 when Wisconsin's per capita consumption was 98 percent of the U.S. per capita consumption.

^a Data reported in this table may differ from other tables because of different sources.

Source: U.S. Department of Energy, Energy Information Administration, *State Energy Data 2008: Consumption*, Table R2. http://www.eia.doe.gov/emeu/states/_seds.html

U.S. Resource Energy Consumption, by State

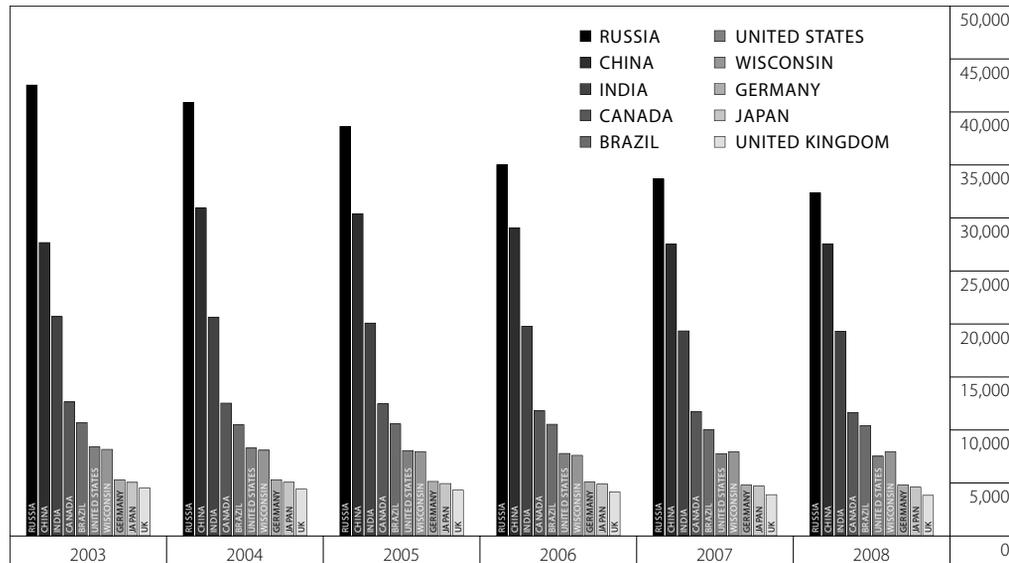
In 2008, when non-energy uses of petroleum are included (such as road oil, asphalt and lubricants), Wisconsin used 1.9 percent of total energy consumed in the United States^a. This is an increase over 2007 when Wisconsin used 1.8 percent of the total U.S. energy consumption.



^a Data reported in this table may differ from other tables because of different sources.
Source: U.S. Department of Energy, Energy Information Administration, *State Energy Data 2008: Consumption*, Table R1.
http://www.eia.doe.gov/emeu/states/_seds.html

Primary Energy Intensity, by Country and Region

2003-2008 BTU PER 2005 U.S. DOLLARS



	2003	2004	2005	2006	2007	2008
State						
Wisconsin	8,199	8,117	7,992	7,638	7,951	7,971
Country						
Canada	12,665	12,564	12,489	11,846	11,766	11,682
United States	8,428	8,313	8,086	7,816	7,794	7,547
Brazil	10,712	10,524	10,601	10,566	10,046	10,443
France	5,412	5,379	5,300	5,186	4,990	5,017
Germany	5,331	5,334	5,176	5,105	4,818	4,830
Italy	4,579	4,585	4,581	4,449	4,318	4,336
United Kingdom	4,549	4,449	4,355	4,181	3,927	3,860
Russia	42,568	40,919	38,655	35,037	33,706	32,406
China	27,708	30,954	30,412	29,105	27,571	27,594
India	20,713	20,679	20,118	19,803	19,375	19,338
Japan	5,087	5,094	4,975	4,917	4,747	4,630
Region						
North America	8,749	8,621	8,427	8,158	8,112	7,887
Central and South America	12,349	12,060	11,856	11,783	11,070	11,224
Europe	5,873	5,829	5,726	5,591	5,394	5,344
Eurasia	46,777	44,600	42,192	38,171	36,437	34,981
Middle East	20,938	20,601	21,181	20,598	19,577	19,700
Africa	15,459	15,335	15,110	14,354	14,056	14,213
Asia and Oceania	12,637	13,454	13,538	13,490	13,318	13,601
World	10,076	10,215	10,148	9,951	9,800	9,828

Source: U.S. Department of Energy, Energy Information Administration, International Energy Statistics, (2008)
<http://tonto.eia.doe.gov/cfapps/ipdbproject/IEDIndex3.cfm>

WORLD WIDE AVERAGE
9.8
kBtu/\$GDP

Energy intensity demonstrates the efficiency with which a country uses the energy it consumes, relative to its economic activity, the country's Gross Domestic Product (GDP).

The chart and graph show energy intensity as a factor of Btu per 2005 U.S. Dollars. The higher the intensity, the less efficiently energy is used, while lower intensity numbers show efficient energy consumption relative to other nations. Another way to describe energy intensity is that it measures how much energy a country requires to produce a dollar of GDP.

The world wide average is 9.8 kBtu/\$GDP. The U.S. is more efficient than the world at 7.5 kBtu/\$GDP. Wisconsin at 8.0 is a little less efficient than the national figure.

Primary Energy Usage and GDP, by Country and Region

Primary Resource energy use varies widely from country to country.

Industrialized countries such as those in North America and Western Europe each use about 2 percent of the annual worldwide primary energy consumption, while the U.S. uses significantly more at 20.2 percent.

Developing nations such as Russia (6.2 percent), China (17.3 percent) and India (4.1 percent) use a significantly larger share of the annual, worldwide primary energy with a smaller Gross Domestic Product.

Although the U. S. has a much larger economy, uses more energy and is more developed in terms of economic activity, the countries of Western Europe use energy more efficiently to drive their economy.

2008 QUADRILLION BTUs AND BILLIONS OF 2005 U.S. DOLLARS

Country	2008		Gross Domestic Product ^a		Primary Energy Intensity
	Quadrillion Btu	Percent of World Total	Billions of 2005 U. S. Dollars	Percent of World Total	Btu per 2005 U. S. Dollars
Country					
Canada	14.03	2.8%	1,201	2.4%	11,682
United States	99.53	20.2%	13,187	26.3%	7,547
Brazil	10.63	2.2%	1,018	2.0%	10,443
France	11.29	2.3%	2,251	4.5%	5,017
Germany	14.36	2.9%	2,973	5.9%	4,830
Italy	7.90	1.6%	1,822	3.6%	4,336
United Kingdom	9.35	1.9%	2,423	4.8%	3,860
Russia	30.43	6.2%	939	1.9%	32,406
China	85.06	17.3%	3,083	6.2%	27,594
India	19.95	4.1%	1,032	2.1%	19,338
Japan	22.30	4.5%	4,816	9.6%	4,630
Region					
North America	120.89	24.5%	15,328	30.6%	7,887
Central and South America	25.76	5.2%	2,295	4.6%	11,224
Europe	85.93	17.4%	16,080	32.1%	5,344
Eurasia	45.84	9.3%	1,310	2.6%	34,981
Middle East	25.50	5.2%	1,294	2.6%	19,700
Africa	16.13	3.3%	1,135	2.3%	14,213
Asia and Oceania	172.54	35.0%	12,686	25.3%	13,601
World	492.59		50,122		9,828

^a Gross Domestic Product is calculated using available data from the Energy Information Administration, International Energy Statistics data.

Source: U.S. Department of Energy, Energy Information Administration, International Energy Statistics, (2008)
<http://tonto.eia.doe.gov/cfapps/ipdbproject/IEDIndex3.cfm>.

CHAPTER 6

Wisconsin and U.S. Prices and Average Costs of Fuels

ZBB Energizes Storage Systems

As use of renewable energy grows, the need for reliable methods of renewable energy storage is increasing. Menomonee Falls based ZBB Energy Corporation, which manufactures zinc-bromide



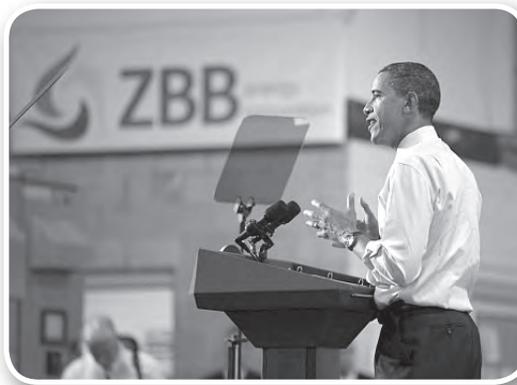
OFFICIAL WHITE HOUSE PHOTO BY CHUCK KENNEDY

flow batteries for renewable energy storage, is a familiar name in the renewable energy storage field. But one day in August, the company became a national name when President Obama visited the company and gave praise for its expansion of the renewable energy economy in the southeastern portion of the state.

"We're investing in 21st century infrastructure—roads and bridges, faster Internet access—projects that will lead to hundreds of thousands of private sector jobs, but will also lay the groundwork so that our kids and our grandkids can keep prospering," President Obama told workers at ZBB Energy Corp. in Menomonee Falls. "That's why I'm here today at ZBB, to jumpstart a homegrown, clean energy industry."

Earlier in the year ZBB Energy received a \$1.3 million loan from the State Energy Program (SEP) to help fund a plant expansion. The loan program is funded through the American Recovery and Reinvestment Act (ARRA) and administered through the Wisconsin Office of Energy Independence and the Wisconsin Department of Commerce. The loan, along with private investments, were used to purchase equipment and to provide working capital to expand the company's advanced battery products manufacturing capacity.

"And all this is part of steps we've taken in clean energy," the President said, "steps that have led to jobs manufacturing wind turbines and solar panels, building hybrid and electric vehicles, modernizing our electric grid so that we have more sources of renewable energy but we can also use it more effectively."



OFFICIAL WHITE HOUSE PHOTO BY CHUCK KENNEDY

The innovative work being done at ZBB is part of a larger effort to not only bring jobs home to the United States of America but to transform our energy future."

Wisconsin's Literally Green Energy Sector

Wisconsin's northern region, with its forests and agricultural lands, may prove to be a renewable energy source for the state.

With funding assistance from the Wisconsin Office of Energy Independence and Xcel Energy, the University of Wisconsin Extension in Bayfield is conducting two woody biomass trials in Ashland and Bayfield counties. The trials will analyze the local adaptability and feasibility of using hybrid poplar and hybrid willow clone plantings as a renewable source of biomass for electric generation. The trials will also evaluate establishment methods and provide educational opportunities for prospective woody biomass growers.

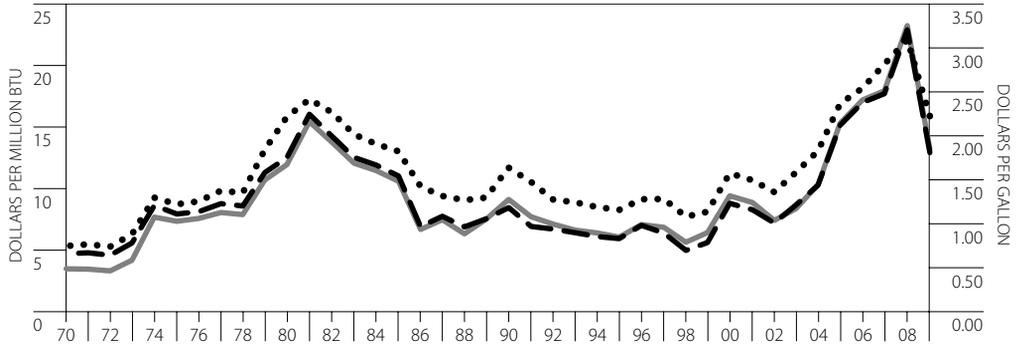
Woody biomass can be a key component for economic development for the northern region and Wisconsin's energy security.

Wisconsin Energy Prices

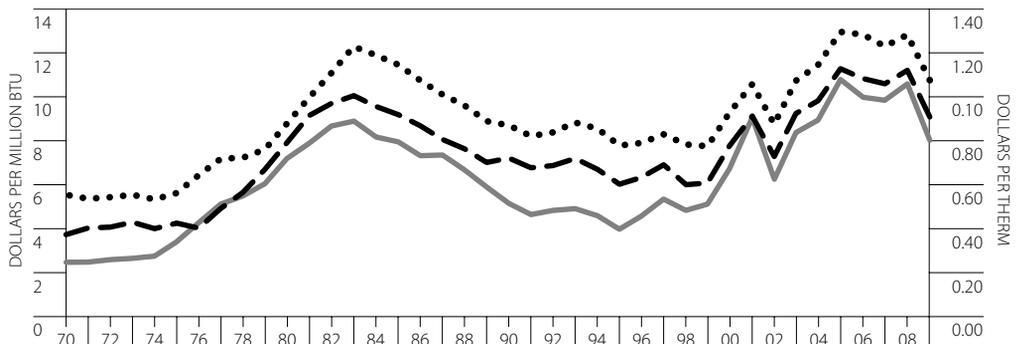
- RESIDENTIAL
- COMMERCIAL
- INDUSTRIAL

Historical prices can be presented in two ways—the current or nominal price, which was gathered during that year. The real or constant price which uses Gross Domestic Product price deflator for inflation. In other words, actual prices are adjusted to be comparable to 2009 prices, in “real” terms, with the effects of inflation removed. All prices are reported in current or nominal terms unless noted explicitly as being real, constant or inflation adjusted.

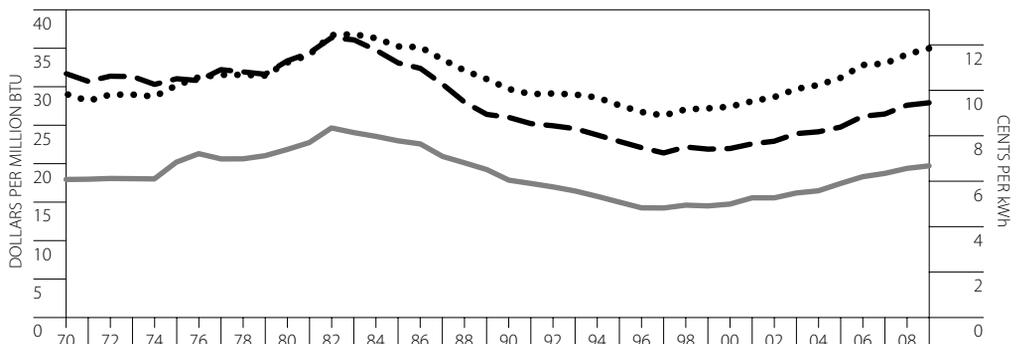
1970-2009 DISTILLATE PRICES (2009 DOLLARS)



1970-2009 NATURAL GAS PRICES (2009 DOLLARS)



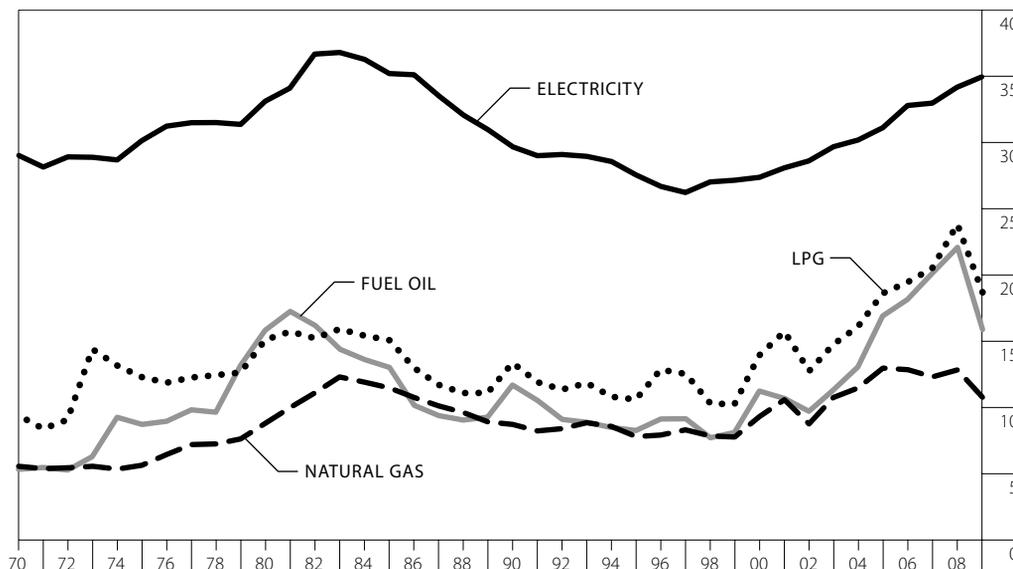
1970-2009 ELECTRICITY PRICES (2009 DOLLARS)



Source: Wisconsin Office of Energy Independence.

Wisconsin Residential Energy Prices, by Type of Fuel

1970-2009 DOLLARS PER MILLION BTU (2009 DOLLARS)



1970-2009 DOLLARS PER MILLION BTU

Year	Current Dollars				2009 Dollars ^a			
	Fuel Oil	LPG	Natural Gas	Electricity	Fuel Oil	LPG	Natural Gas	Electricity
1970 ^r	1.17	2.07	1.22	6.42	5.28	9.34	5.51	28.97
1975 ^r	2.65	3.74	1.71	9.20	8.67	12.23	5.59	30.09
1980 ^r	6.87	6.55	3.81	14.39	15.79	15.06	8.76	33.07
1985 ^r	7.28	8.43	6.41	19.72	12.98	15.03	11.43	35.15
1990 ^r	7.65	8.75	5.70	19.48	11.63	13.30	8.67	29.62
1995 ^r	6.10	7.84	5.76	20.42	8.21	10.55	7.75	27.49
2000 ^r	9.03	11.22	7.48	22.06	11.18	13.89	9.26	27.32
2005 ^r	15.37	16.92	11.77	28.30	16.88	18.57	12.92	31.07
2006 ^r	17.04	18.26	12.04	30.79	18.12	19.41	12.80	32.74
2007 ^r	19.43	19.80	11.86	31.85	20.08	20.47	12.26	32.92
2008 ^r	21.73	23.43	12.63	33.72	21.99	23.70	12.78	34.12
2009 ^p	15.87	18.67	10.74	34.90	15.87	18.67	10.74	34.90

^a 2009 dollar values computed with Gross National Product Implicit Price Deflator. See table on price indices.

^p Preliminary estimates.

^r Revised.

Source: U.S. Department of Energy, *State Btu Unit Price Data Base*, unpublished (May 1981); Wisconsin Office of Energy Independence, periodic telephone surveys of fuel oil and LP gas distributors and natural gas and electricity price monitoring reports (2001-2009); American Gas Association, *Gas Facts* (1971-2001); Edison Electric Institute, *Statistical Year Book* (1971-2003); Public Service Commission of Wisconsin, PSC AF 2 (2001-2009); U.S. Department of Energy/Energy Information Administration, *Natural Gas Annual* [DOE/EIA-0131(08)] (March 2010).

REAL PRICE
IN 2009 DOLLARS

FUEL OIL
27.8%

LPG
21.2%

NATURAL GAS
16.0%

In 2009, the real prices (2009 dollars) of residential energy fuels decreased for fuel oil and liquefied petroleum gas (LPG) by 27.8 and 21.2 percent respectively. Natural gas decreased by 16.0 percent.

REAL PRICE
IN 2009 DOLLARS

ELECTRICITY
2.3%

Electricity prices increased by 2.3 percent. The last four columns in the table at left show the prices after adjusting for inflation.

In 2009 dollars, Natural Gas prices have decreased by 16.9 percent from the 2005 peak price of \$12.92/MMBtu. The 2009 electric prices continue a trend of increasing prices since 1998.

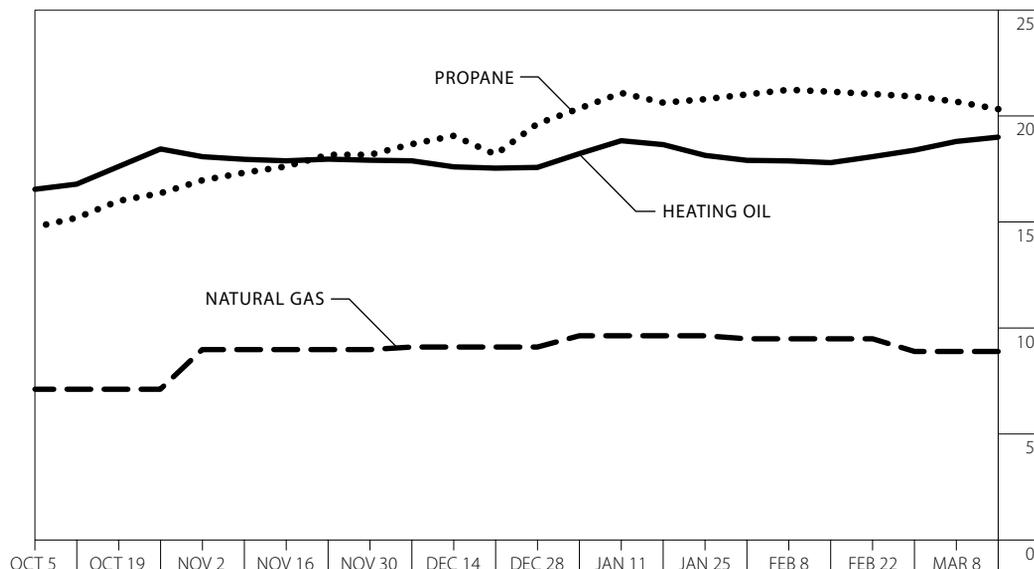
Wisconsin Residential Energy Prices, by Type of Fuel, Winter Heating Season

For the 2009-2010 winter heating season, heating oil peaked at the end of the season in March, propane prices peaked in mid-February, while natural gas prices peaked in January.

Natural gas pricing data presented here are different from other data in this book due to difference in data source and duration of the average. Heating Oil and LP data are from a weekly survey of federally-identified fuel wholesalers and retailers; data elsewhere in the book are derived from Public Service Commission utility data and the federal Energy Information Administration.

Most prices in the book are for the entire calendar year, while this is for the heating season (October – March).

2009-2010 DOLLARS PER MILLION BTU



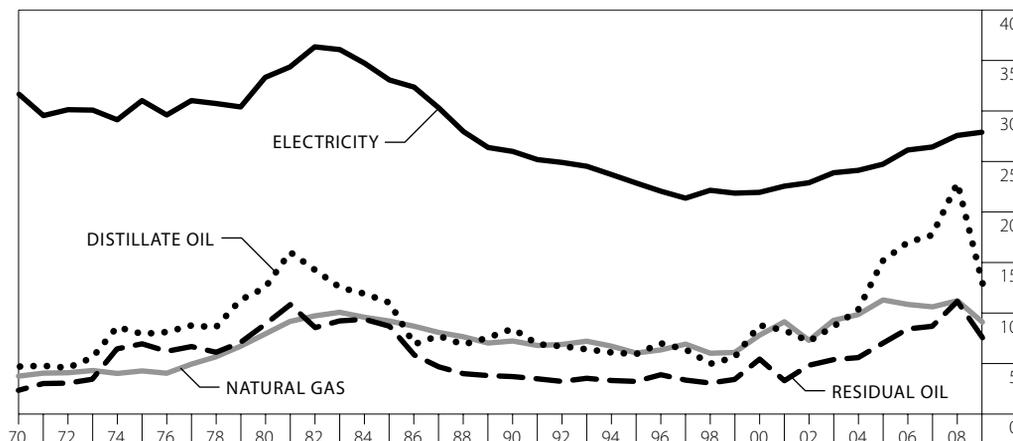
2009-2010 DOLLARS PER GALLON AND DOLLARS PER MILLION BTU

Date	Heating Oil		Propane		Natural Gas
	\$/Gallon	\$/MMBtu	\$/Gallon	\$/MMBtu	\$/MMBtu
2009-2010					
Oct. 5, 2009	2.29	16.51	1.41	14.73	7.08
Oct. 19, 2009	2.44	17.58	1.52	15.96	7.08
Nov. 2, 2009	2.50	18.05	1.62	16.93	8.95
Nov. 16, 2009	2.48	17.85	1.68	17.59	8.95
Nov. 30, 2009	2.48	17.88	1.73	18.14	8.95
Dec. 14, 2009	2.44	17.57	1.82	19.03	9.07
Dec. 28, 2009	2.43	17.54	1.87	19.60	9.07
Jan. 11, 2010	2.61	18.80	2.01	21.05	9.60
Jan. 25, 2010	2.51	18.11	1.98	20.76	9.60
Feb. 8, 2010	2.48	17.85	2.02	21.20	9.46
Feb. 22, 2010	2.50	18.05	2.01	21.00	9.46
Mar. 8, 2010	2.60	18.77	1.97	20.64	8.86
Average Price for the Heating Season	2.49	17.95	1.81	18.94	8.84

Source: Telephone survey of energy retailers conducted by the Office of Energy Independence throughout the winter heating season, starting October 6, 2009 and ending March 15, 2010; Wisconsin Natural Gas utility websites and public pricing information (2009).

Wisconsin Commercial Energy Prices, by Type of Fuel

1970-2009 DOLLARS PER MILLION BTU (2009 DOLLARS)



1970-2009 DOLLARS PER MILLION BTU

Year	Current Dollars				2009 Dollars ^a			
	Distillate Oil	Residual Oil ^p	Natural Gas	Electricity	Distillate Oil	Residual Oil ^p	Natural Gas	Electricity
1970 ^r	1.03	0.51	0.82	7.00	4.65	2.30	3.70	31.61
1975 ^r	2.41	2.11	1.29	9.46	7.88	6.90	4.22	30.95
1980 ^r	5.43	3.85	3.43	14.47	12.48	8.85	7.89	33.27
1982 ^r	7.17	4.29	4.88	18.31	14.20	8.50	9.67	36.28
1985 ^r	6.16	4.85	5.14	18.52	10.98	8.65	9.16	33.01
1990 ^r	5.52	2.41	4.72	17.05	8.39	3.66	7.18	25.93
1995 ^r	4.37	2.36	4.45	16.94	5.88	3.18	5.99	22.80
2000 ^r	7.06	4.34	6.26	17.67	8.74	5.38	7.75	21.88
2005 ^r	13.77	6.35	10.24	22.47	15.12	6.97	11.24	24.67
2006 ^r	15.93	7.88	10.16	24.52	16.94	8.38	10.80	26.07
2007 ^r	17.10	8.36	10.22	25.52	17.67	8.64	10.56	26.37
2008 ^r	22.42	10.93	11.03	27.19	22.69	11.06	11.16	27.51
2009 ^p	12.91	7.53	9.07	27.83	12.91	7.53	9.07	27.83

^a 2009 dollar values computed with Gross National Product Implicit Price Deflator. See table on price indices.

^b Beginning in 2009, the Residual Fuel Oil (RFO) price is for the Petroleum Administration Defense District (PADD) II. The PADD II includes 15 Midwestern states including Wisconsin. State-specific pricing data for RFO is withheld or not available according to publishing policies used by the Energy Information Administration (EIA).

^p Preliminary estimates.

^r Revised.

Source: U.S. Department of Energy, "State Btu Unit Price Data Base", unpublished (May 1981); *Petroleum Marketing Monthly*, (January 1985 - March 2008), and unpublished analysis of Wisconsin residual oil prices (1985-2006); American Gas Association, *Gas Facts* (1971-2001); Edison Electric Institute, *Statistical Year Book* (1971-2001); U.S. Department of Energy, *Electric Sales and Revenue 1993-1997* [DOE/EIA-0540 (97)] (December 1999), *Electric Power Monthly* [DOE/EIA-0226 (03/10)] (March 2010), *Natural Gas Annual, (1994-2008)* [DOE/EIA-0131(08)] (March 2010), and *Natural Gas Monthly, (1994-2009)* [DOE/EIA-0130(2010/04)] (April 2010); *Petroleum Marketing Annual (2007-2009)* [DOE/EIA-0487 (2009)] (August 2010), Tables 35 and 38; Oil Daily/Daily Oil and Gas Price Review, by subscription (2008-2009).

REAL PRICE
IN 2009 DOLLARS

DISTILLATE OIL

43.1%

RESIDUAL OIL

31.9%

NATURAL GAS

18.7%

In 2009, the real price of all fuels (in 2009 dollars) except electricity decreased: distillate oil (43.1 percent), residual oil (31.9 percent) and natural gas (18.7 percent).

REAL PRICE
IN 2009 DOLLARS

ELECTRICITY

1.2%

The real price of electricity increased by 1.2 percent. Electricity, the major energy expense in the commercial sector, is 16.3 percent lower than its 1982 peak price, adjusted for inflation.

Wisconsin Industrial Energy Prices, by Type of Fuel

**REAL PRICE
IN 2009 DOLLARS**

DISTILLATE OIL

42.7%

RESIDUAL OIL

31.9%

NATURAL GAS

24.0%

In 2009, the real prices of all industrial fuels, except coal and electricity, decreased. The price for distillate oil and residual oil decreased by 42.7 and 31.9 percent respectively, while the price for natural gas dropped by 24 percent.

**REAL PRICE
IN 2009 DOLLARS**

COAL

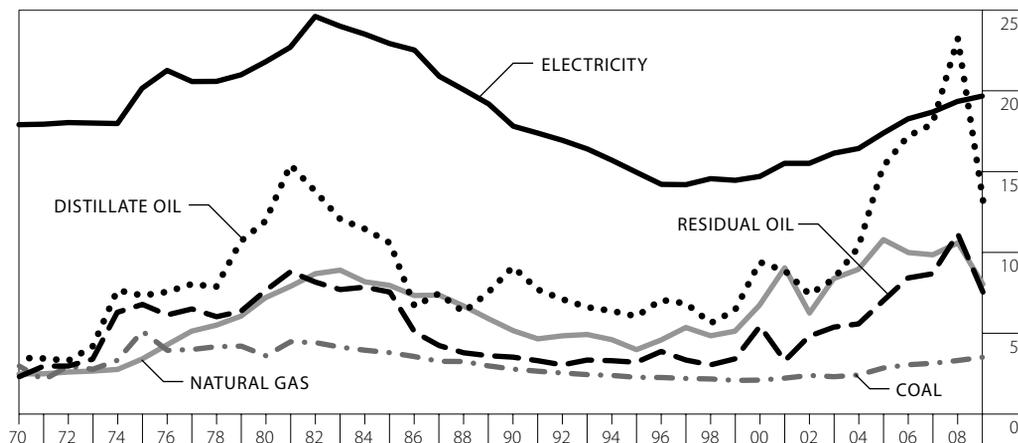
6.2%

ELECTRICITY

1.7%

Coal increased by 6.2 percent, and electricity by 1.7 percent, over 2008. The real prices of coal and electricity are 20.7 and 20.0 percent lower than their respective 1981 and 1982 price peaks, adjusted for inflation.

1970-2009 DOLLARS PER MILLION BTU (2009 DOLLARS)



1970-2009 DOLLARS PER MILLION BTU

Year	Current Dollars					2009 Dollars ^a				
	Distillate Oil	Residual Oil ^b	Natural Gas	Coal	Electricity	Distillate Oil	Residual Oil ^b	Natural Gas	Coal	Electricity
1970 ^r	0.76	0.50	0.54	0.65	3.96	3.43	2.26	2.44	2.93	17.86
1975 ^r	2.23	2.06	1.03	1.55	6.15	7.29	6.74	3.37	5.07	20.12
1980 ^r	5.18	3.31	3.12	1.55	9.46	11.91	7.61	7.17	3.56	21.76
1981 ^r	7.30	4.17	3.74	2.11	10.78	15.34	8.76	7.86	4.43	22.66
1982 ^r	6.92	4.10	4.36	2.21	12.39	13.71	8.12	8.64	4.38	24.55
1985 ^r	5.92	4.21	4.44	2.11	12.83	10.55	7.51	7.92	3.76	22.88
1990 ^r	5.95	2.29	3.37	1.80	11.69	9.05	3.48	5.12	2.74	17.77
1995 ^r	4.46	2.35	2.93	1.66	11.08	6.00	3.16	3.94	2.23	14.91
2000 ^r	7.55	4.34	5.42	1.66	11.84	9.35	5.38	6.71	2.06	14.66
2005 ^r	13.92	6.35	9.78	2.56	15.79	15.28	6.97	10.74	2.81	17.34
2006 ^r	16.13	7.88	9.36	2.83	17.14	17.15	8.38	9.95	3.01	18.22
2007 ^r	17.33	8.36	9.49	3.00	18.05	17.91	8.64	9.81	3.10	18.65
2008 ^r	22.76	10.93	10.42	3.23	19.07	23.03	11.06	10.54	3.27	19.30
2009 ^p	13.20	7.53	8.01	3.47	19.63	13.20	7.53	8.01	3.47	19.63

^a 2009 dollar values computed with Gross National Product Implicit Price Deflator. See table on price indices.

^b Beginning in 2009, the Residual Fuel Oil (RFO) price is for the Petroleum Administration Defense District (PADD) II. The PADD II includes 15 midwestern states including Wisconsin. State-specific pricing data for RFO is withheld or not available according to publishing policies used by the Energy Information Administration (EIA).

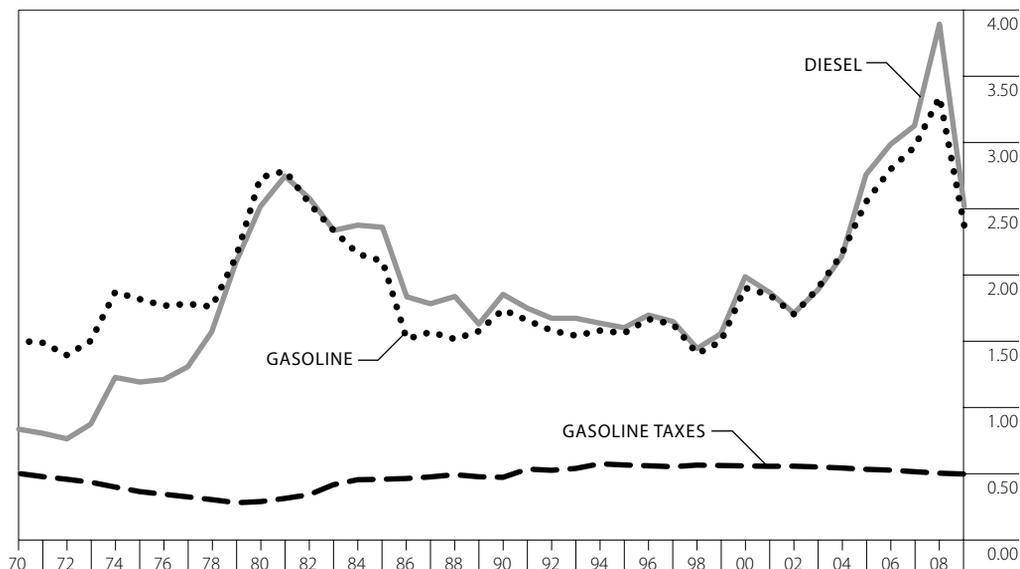
^p Preliminary estimates.

^r Revised.

Source: U.S. Department of Energy, "State Btu Unit Price Data Base", unpublished (May 1981); *State Energy Consumption, Price and Expenditure Report 1960-2008* http://www.eia.doe.gov/emeu/states/_seds.html, (June 2010); *Petroleum Marketing Monthly* (January 1985-March 2008); *Quarterly Coal Report*, Table 27 [DOE/EIA-0121(2009/4Q)] (April 2010), <http://www.eia.doe.gov/cneaf/coal/quarterly/qcr.pdf>; *Natural Gas Annual*, (1994-2008) [DOE/EIA-0131(08)] (March 2010); *Natural Gas Monthly, (1994-2009)* [DOE/EIA-0130(2010/04)] (April 2010); *Petroleum Marketing Annual* (2007-2009) [DOE/EIA-0487(2009)] (August 2010), Tables 35 and 38; *Oil Daily/Daily Oil and Gas Price Review*, by subscription (2008-2009).

Wisconsin Motor Gasoline and Diesel Fuel Retail Prices, by Grade and Type of Service

1970-2009 DOLLARS PER GALLON (2009 DOLLARS)



1970-2009 DOLLARS PER GALLON

Year	Current Dollars				2009 Dollars		
	Regular Unleaded Gasoline (Self-Service) ^a	Regular Reformulated Gasoline	Diesel Fuel ^b	Federal and State Taxes on Gasoline ^c	Regular Unleaded Gasoline (Self-Service) ^a	Diesel Fuel ^b	Federal and State Taxes on Gasoline ^c
1970	0.332		0.184	0.110	1.499	0.831	0.497
1975	0.554		0.363	0.110	1.812	1.187	0.360
1980	1.188		1.093	0.124	2.731	2.513	0.285
1985	1.178		1.321	0.254	2.100	2.355	0.453
1990	1.139		1.215	0.308	1.732	1.847	0.468
1995	1.156	1.181	1.186	0.417	1.556	1.597	0.561
2000	1.532	1.556	1.598	0.447	1.897	1.979	0.554
2005	2.321	2.338	2.510	0.481	2.548	2.755	0.528
2006	2.626	2.639	2.804	0.491	2.792	2.981	0.522
2007	2.867	2.849	3.021	0.493	2.963	3.123	0.510
2008 ^r	3.289	3.085	3.821	0.493	3.328	3.866	0.499
2009	2.374	2.384	2.518	0.493	2.374	2.518	0.493

^a Since 1991, more than 99 percent of the gasoline sold in Wisconsin has been unleaded. The price is for full service gasoline until 1979 when the price is changed to represent self-service gasoline.

^b From 1970 to 1988, the price is the full service price. Beginning in 1989 the price is the self-service price.

^c A state petroleum inspection fee is also charged. In 2009, this fee was 3 cents per gallon.

^d Nonattainment Areas are a designation of the federal Environmental Protection Agency. See <http://dnr.wi.gov/air/aq/ozone/nonattainment.htm> for additional information.

^r Revised.

Source: Wisconsin Division of the American Automobile Association, *Fuel Gauge Report*.

REAL PRICE
IN 2009 DOLLARS

GASOLINE
28.7%
FROM 2008

The real price of gasoline in 2009 was 28.7 percent lower than in 2008. Real gas prices in 2008 were the highest on record since data for this book were compiled in 1970. The real price of diesel fuel decreased by 34.9 percent since 2008.

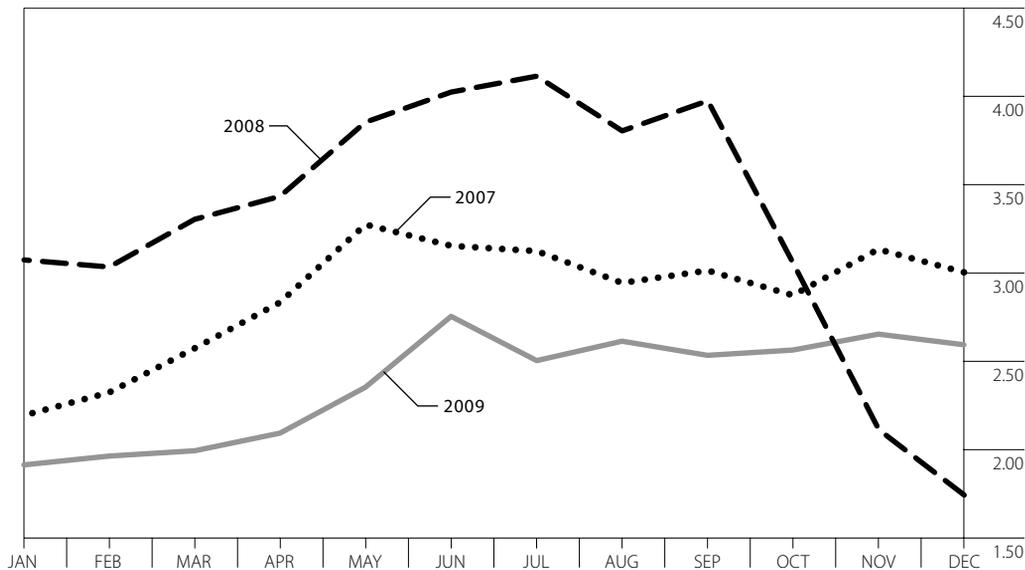
Starting on January 1, 1995, only reformulated gasoline could be sold in Wisconsin's Nonattainment Area—10 eastern and southeastern Wisconsin counties^d—in order to improve air quality.

Wisconsin Retail and Wholesale Self-Service Unleaded Motor Gasoline Prices, by Month

**2009
WHOLESALE
PRICE
UNLEADED
GASOLINE
31.1%**

The retail and wholesale prices are for unleaded, regular grade gasoline. The wholesale price of unleaded gasoline (before taxes and retail mark-up) decreased 31.1 percent in 2009, while the statewide retail price decreased 27.8 percent.

2007-2009 DOLLARS PER GALLON – RETAIL



2007-2009 DOLLARS PER GALLON

Month	2007		2008		2009	
	Retail ^a	Wholesale ^b	Retail ^a	Wholesale ^b	Retail ^a	Wholesale ^b
January	2.186	1.506	3.073	2.424	1.907	1.342
February	2.321	1.739	3.025	2.425	1.958	1.356
March	2.566	1.940	3.298	2.624	1.991	1.418
April	2.834	2.238	3.432	2.856	2.093	1.479
May	3.274	2.638	3.850	3.167	2.351	1.812
June	3.149	2.446	4.017	3.356	2.747	2.098
July	3.125	2.385	4.112	3.304	2.496	1.921
August	2.945	2.310	3.798	3.118	2.611	2.027
September	3.007	2.322	3.965	3.062	2.533	1.888
October	2.869	2.280	3.048	2.189	2.558	2.002
November	3.131	2.486	2.114	1.409	2.651	2.042
December	2.997	2.396	1.741	1.134	2.593	2.029
Average	2.867	2.224	3.289	2.589	2.374	1.785

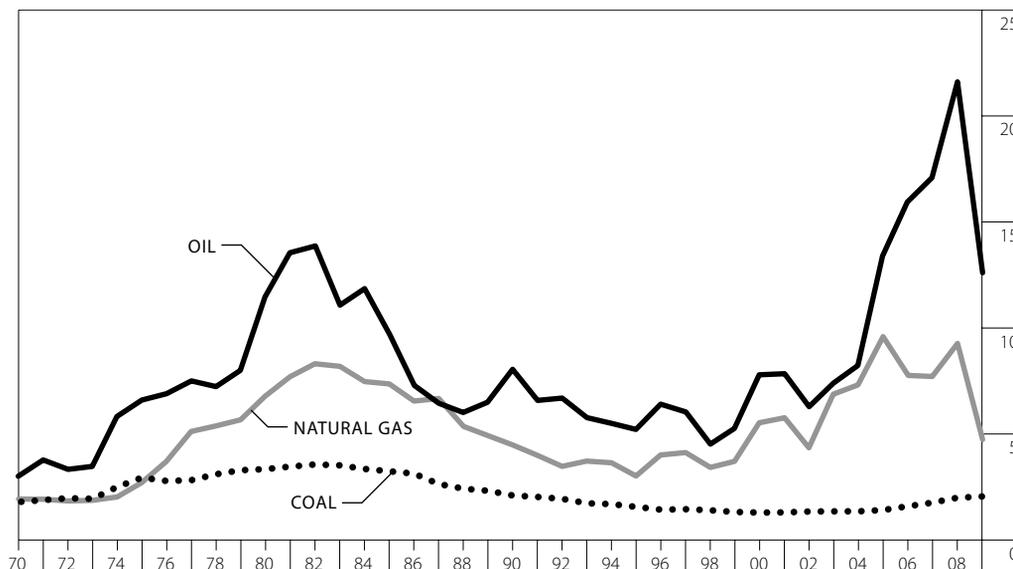
^a The retail and wholesale prices are for a blend of regular, unleaded conventional and reformulated gasolines.

^b The wholesale price refers to the delivered dealer tank wagon price.

Source: U. S. Department of Energy, Energy Information Administration, *Petroleum Marketing Annual 1993-2009*, Table 29. http://www.eia.doe.gov/oil_gas/petroleum/data_publications/petroleum_marketing_annual/pma.html; Wisconsin Division of the American Automobile Association, *Fuel Gauge Report* (1993-2009).

Wisconsin Electric Utility Average Costs of Fuel

1970-2009 DOLLARS PER MILLION BTU (2009 DOLLARS)



1970-2009 DOLLARS PER MILLION BTU

Year	Current Dollars ^{b,c}			2009 Dollars ^a		
	Oil	Natural Gas	Coal	Oil	Natural Gas	Coal
1970 ^r	0.66	0.42	0.39	2.98	1.90	1.76
1975 ^r	2.01	0.82	0.89	6.57	2.68	2.91
1980 ^r	4.98	2.94	1.44	11.45	6.76	3.31
1982 ^r	6.98	4.18	1.78	13.83	8.28	3.53
1985 ^r	5.43	4.11	1.80	9.68	7.33	3.21
1990 ^r	5.26	2.93	1.36	8.00	4.45	2.07
1995 ^r	3.85	2.21	1.14	5.18	2.98	1.53
2000 ^r	6.27	4.44	1.02	7.76	5.50	1.26
2005 ^r	12.19	8.68	1.26	13.38	9.53	1.38
2006 ^r	14.98	7.27	1.47	15.92	7.73	1.56
2007 ^r	16.52	7.43	1.67	17.07	7.68	1.73
2008 ^r	21.20	9.09	1.94	21.45	9.20	1.96
2009 ^p	12.60	4.73	2.02	12.60	4.73	2.02

^a 2009 dollar values computed with Gross National Product Implicit Price Deflator. See table on price indices.

^b Beginning in 1988, the U.S. DOE data source has been used.

^c Beginning in 1990, Statistical Yearbook natural gas data has been used.

^p Preliminary estimates.

^r Revised.

Source: Edison Electric Institute, *Statistical Yearbook* (1971-1996); American Gas Association, *Gas Facts* (1971-1990); U.S. Department of Energy, Energy Information Administration, *Electric Power Annual*, 1990-2000, [DOE/EIA-0348(2000)/1] (August 2001); *Electric Power Monthly*, Table 4.10B, 4.11B, and 4.13B [DOE/EIA-0226(2010/03)] (March 2010) www.eia.doe.gov/cneaf/electricity/epm/epm_sum.html

REAL COST IN 2009 DOLLARS

COAL
2.9%

In 2009, the real (2009 dollars) cost of coal used as electric utility fuel increased 2.9 percent.

REAL COST IN 2009 DOLLARS

NATURAL GAS
48.6%

OIL
41.3%

The utility cost of natural gas decreased 48.6 percent. Oil prices decreased 41.3 percent. Adjusted for inflation, coal prices are 42.7 percent down from their peak in 1982, also the peak year for oil prices. Natural gas prices peaked in 2009. Coal remained the lowest cost electric utility fossil fuel.

Wisconsin Electric Utility Coal Costs and Sulfur Content of Coal, by Utility Plant

WISCONSIN
UTILITY COAL HAS

64%

LESS SULFUR AND
COSTS

4.4%

LESS

IN CENTS PER MMBTU
THAN THE
AVERAGE COAL
USED IN THE U.S.

Wisconsin utility coal has 64 percent less sulfur and costs 4.4 percent less, in cents per MMBtu, than the average coal used in the United States.

Wisconsin utilities have been very successful in meeting and maintaining the 1993 goals of Wisconsin's acid rain control law through increased use of low sulfur coal. In 2009, the average Wisconsin coal cost, in cents per million Btu, increased 9.2 percent, while sulphur content decreased 5.3 percent.

2009

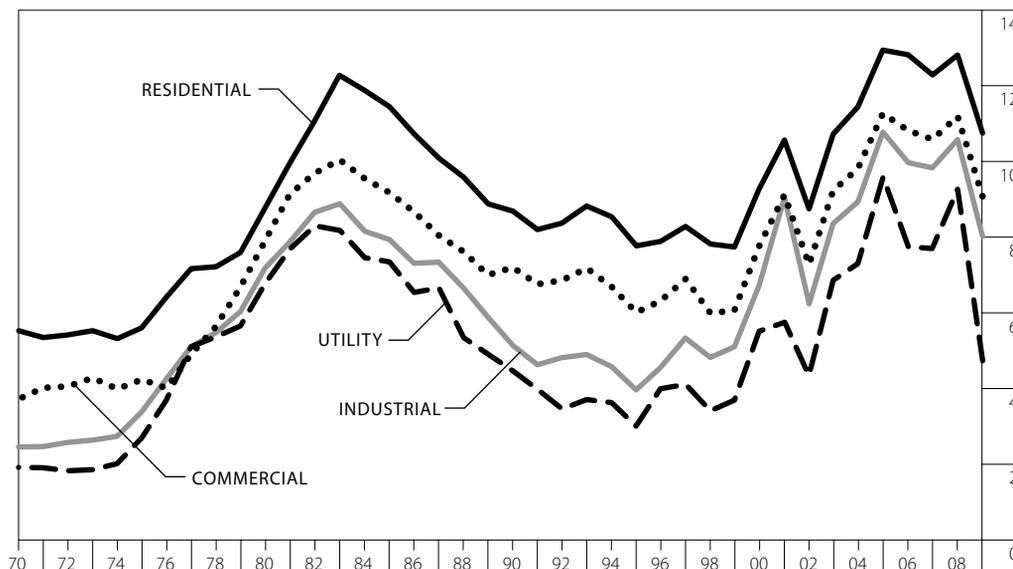
Plant	Receipts Thousand Tons	Average Btu Per Pound	Average Cents Per Million Btu	Average Dollars Per Ton	Average Percent Sulfur ^a
Dairyland Power Cooperative	2,717	9,026	242.7	43.82	0.59%
Alma - Madgett	1,732	9,037	222.8	40.27	0.53%
Genoa 3	985	9,007	278.0	50.07	0.65%
Madison Gas and Electric Co.	15	10,934	317.1	69.35	1.42%
Blount Street	15	10,934	317.1	69.35	1.42%
Manitowoc Public Utilities	155	13,404	160.5	43.04	1.41%
Manitowoc	155	13,404	160.5	43.04	1.41%
Northern States Power Co.	96	8,765	343.7	60.25	0.26%
Bay Front	96	8,765	343.7	60.25	0.26%
Wisconsin Electric Power Co.	9,425	8,705	216.1	37.63	0.30%
Oak Creek	2,566	8,735	229.0	40.01	0.21%
Pleasant Prairie	4,762	8,381	163.7	27.44	0.32%
Presque Isle	1,572	9,872	226.5	44.72	0.32%
Valley	525	11,701	368.3	86.18	0.48%
Wisconsin Power and Light Co.	7,061	8,750	187.4	32.80	0.32%
Columbia	4,053	8,468	156.4	26.49	0.32%
Edgewater	2,439	9,250	235.1	43.50	0.32%
Nelson Dewey	569	9,835	218.4	42.96	0.33%
Wisconsin Public Service Corp.	4,285	8,710	215.8	37.60	0.30%
Pulliam	946	8,670	218.8	37.94	0.26%
Weston	3,339	8,721	215.0	37.50	0.32%
Wisconsin	23,754	8,743	213.4	37.32	0.36%
United States	690,999	10,020	223.2	44.72	1.00%

^a Percent by weight.

Source: U.S. Department of Energy, EIA, *Electric Power Monthly*, [DOE/EIA-0226(2010/03)] (March 2010), Tables 2.5 and 4.2, http://www.eia.doe.gov/cneaf/electricity/epm/epm_sum.html; Annual reports of Wisconsin electric generating utilities (2009), <http://psc.wi.gov/apps/annreport/default.aspx>; Dairyland Power Cooperative, Rural Utility Service (RUS) report for 2009 (April 2010).

Wisconsin Natural Gas Prices, by Economic Sector

1970-2009 DOLLARS PER MILLION BTU (2009 DOLLARS)



IN 2009
NATURAL GAS
PRICES
DECREASED IN
ALL
SECTORS

In 2009, natural gas prices decreased in all sectors. On average, the price decreased 18.6 percent.

1970-2009 DOLLARS PER MILLION BTU

Year	Current Dollars					2009 Dollars				
	Residential	Commercial	Industrial	Utility	Average	Residential	Commercial	Industrial	Utility	Average
1970 ^r	1.22	0.82	0.54	0.42	0.79	5.51	3.70	2.44	1.90	3.57
1975 ^r	1.71	1.29	1.03	0.82	1.30	5.59	4.22	3.37	2.68	4.25
1980 ^r	3.81	3.43	3.12	2.94	3.43	8.76	7.89	7.17	6.76	7.89
1985 ^r	6.41	5.14	4.44	4.11	5.37	11.43	9.16	7.92	7.33	9.57
1990 ^r	5.70	4.72	3.37	2.93	4.55	8.67	7.18	5.12	4.45	6.92
1995 ^r	5.76	4.45	2.93	2.21	4.30	7.75	5.99	3.94	2.98	5.79
2000 ^r	7.48	6.26	5.42	4.44	6.27	9.26	7.75	6.71	5.50	7.76
2001 ^r	8.69	7.49	7.41	4.73	7.71	10.52	9.07	8.97	5.73	9.34
2002 ^r	7.29	6.06	5.18	3.60	6.07	8.69	7.22	6.17	4.29	7.23
2003 ^r	9.18	7.90	7.16	5.87	8.00	10.71	9.22	8.35	6.85	9.33
2004 ^r	10.08	8.64	7.86	6.43	8.76	11.43	9.80	8.92	7.29	9.94
2005 ^r	11.77	10.24	9.78	8.68	10.37	12.92	11.24	10.74	9.53	11.38
2006 ^r	12.04	10.16	9.36	7.27	10.19	12.80	10.80	9.95	7.73	10.83
2007 ^r	11.86	10.22	9.49	7.43	10.17	12.26	10.56	9.81	7.68	10.51
2008 ^r	12.63	11.03	10.42	9.09	11.22	12.78	11.16	10.54	9.20	11.35
2009^p	10.74	9.07	8.01	4.73	9.13	10.74	9.07	8.01	4.73	9.13

^p Preliminary estimates.

^r Revised.

Source: Natural Gas pricing pages of this publication.

Wisconsin Natural Gas Prices, by Public Service Commission of Wisconsin Sector

AVERAGE
PRICE OF
NATURAL GAS
18.0%

The prices of utility gas for all customer classes decreased in 2009. The average price of natural gas in 2009 decreased by 18.0 percent from 2008. Prices for commercial and industrial gas do not include the price of transport gas but represent the cost of gas purchased directly from the utility.

1970-2009 DOLLARS PER MILLION BTU

Year	Residential		Commercial and Industrial			Average
	General	Space Heating	Firm	Interruptible	Space Heating	
1970 ^r	1.55	1.18	0.73	0.49	0.92	0.81
1975 ^r	2.13	1.68	1.16	1.00	1.40	1.31
1980 ^r	4.34	3.77	3.22	3.07	3.49	3.44
1985 ^r	7.53	6.36	4.98	4.23	5.28	5.36
1990 ^r	6.78	5.67	4.28	3.00	4.49	4.85
1995 ^r	7.01	5.77	4.14	2.47	4.63	4.72
1996 ^r	7.00	5.95	4.26	3.30	4.75	5.08
1997 ^r	7.47	6.39	4.68	3.63	5.17	5.56
1998 ^r	7.48	6.08	4.16	3.15	4.74	5.25
1999 ^r	7.61	6.10	4.93	2.84	4.71	5.33
2000 ^r	8.86	7.48	7.32	4.63	6.05	6.78
2001 ^r	10.01	8.63	7.11	5.17	7.27	7.86
2002 ^r	8.79	7.29	6.19	3.91	5.92	6.50
2003 ^r	10.09	9.14	8.00	5.59	7.75	8.37
2004 ^r	11.20	10.03	8.80	6.94	8.56	9.27
2005 ^r	13.34	11.70	11.24	8.92	10.18	10.83
2006 ^r	13.71	11.95	10.44	8.17	10.09	10.97
2007 ^r	13.57	11.79	9.64	7.96	10.12	10.86
2008 ^r	14.35	12.57	10.69	9.27	10.95	11.76
2009^p	11.94	10.55	7.90	5.87	8.78	9.64

^p Preliminary estimates.

^r Revised.

Source: Public Service Commission of Wisconsin, Accounts and Finance Division, *Statistics of Wisconsin Public Utilities*, Bulletin #8 (1971-1993), and from form PSC-AF 2 (1994-2009).

Wisconsin Electricity Prices, by Economic Sector

1970-2009 CENTS PER kWh

Year	Public Service Commission of Wisconsin Sectors				Energy Information Administration ^c			
	Residential	Commercial & Industrial	Rural ^a	Average ^b	Residential	Commercial	Industrial	Average ^b
1970	2.13	1.69	2.41	1.89	2.19	2.39	1.35	1.91
1975	3.22	2.60	3.42	2.85	3.14	3.23	2.10	2.80
1980	4.80	3.91	4.80	4.24	4.91	4.94	3.23	4.31
1985	6.70	5.15	6.38	5.67	6.73	6.32	4.38	5.75
1990	6.55	4.68	6.29	5.27	6.65	5.82	3.99	5.38
1995	6.91	4.55	6.61	5.27	6.97	5.78	3.78	5.36
1996	6.81	4.43	6.40	5.15	6.88	5.68	3.66	5.25
1997	6.81	4.40	6.27	5.11	6.88	5.60	3.72	5.22
1998	7.16	4.61	6.42	5.35	7.17	5.87	3.86	5.44
1999	7.31	4.69	6.56	5.46	7.31	5.88	3.89	5.53
2000	7.55	4.83	6.84	5.65	7.53	6.03	4.04	5.71
2001	7.93	5.18	7.23	6.01	7.90	6.34	4.36	6.08
2002	8.19	5.34	7.59	6.26	8.18	6.54	4.43	6.28
2003	8.73	5.63	8.27	6.60	8.67	6.97	4.71	6.64
2004	9.11	5.84	8.73	6.81	9.07	7.24	4.93	6.88
2005	9.72	6.36	9.23	7.38	9.66	7.67	5.39	7.48
2006	10.57	7.01	10.22	8.08	10.51	8.37	5.85	8.13
2007	10.90	7.30	10.56	8.38	10.87	8.71	6.16	8.48
2008 ^r	11.56	7.67	10.90	8.84	11.51	9.28	6.51	9.00
2009^p	11.92	8.03	11.04	9.24	11.91	9.50	6.70	9.35

^a Rural, as listed by utilities.

^b Utilities' average revenue per kWh.

^c Historically, these data were from the Edison Electric Institute which began using U.S. Department of Energy electricity prices from the Energy Information Administration (EIA) in 1996.

^p Preliminary estimates.

^r Denotes year where numbers have been revised based on cited data sources.

Source: Public Service Commission of Wisconsin, Accounts and Finance Division, *Statistics of Wisconsin Public Utilities*, Bulletin #8 (1971-1994); Edison Electric Institute, *Statistical Yearbook* (1971-1996); U.S. Department of Energy, Energy Information Administration, *Electric Sales and Revenue* 1993-2000 [DOE/EIA-0540 (2000)] (November 2001), and *Electric Power Monthly*, Table 5.6.B, [DOE/EIA-0226 (2010/03)] (March 2010).

www.eia.doe.gov/cneaf/electricity/epm/epm_sum.html

IN 2009
ELECTRICITY
INCREASED IN
ALL
SECTORS

Electricity prices increased across all sectors in 2009.

The Public Service Commission of Wisconsin and the federal Department of Energy, Energy Information Administration (EIA) both report electricity prices for Wisconsin economic sectors. Because of differences in sector definitions, accounting methods and inclusion of cooperative utilities, their prices do not match.

Average Utility Electricity and Natural Gas Prices, by Economic Sector, for Selected Midwestern States

WISCONSIN'S
AVERAGE
ELECTRICITY PRICE
WAS
5.5%
LESS THAN THE
NATIONAL
AVERAGE
BUT
2nd
HIGHEST
IN THE MIDWEST

In 2009, Wisconsin's average electricity price was 5.5 percent less than the national average but the second highest in the Midwest. Wisconsin's commercial and industrial electricity prices were lower than the national averages for the same sectors by 7.0 and 2.0 percent respectively.

Wisconsin and Michigan lead the Midwest with the highest City Gate natural gas prices which are 11.9 and 3.6 percent above the national average.

2009 ELECTRICITY (CENTS PER kWh)

State	Average	Residential	Commercial	Industrial
Wisconsin	9.35	11.91	9.50	6.70
Illinois	9.13	11.25	8.31	7.53
Indiana	7.48	9.29	8.16	5.72
Iowa	7.29	9.87	7.45	5.17
Michigan	9.68	11.82	9.61	7.17
Minnesota	8.13	9.98	7.87	6.28
Ohio	8.97	10.61	9.59	6.69
U.S. Average	9.89	11.55	10.21	6.84

2009 NATURAL GAS (DOLLARS PER 1,000 CUBIC FEET)

State	City Gate ^a	Residential	Commercial	Industrial
Wisconsin	6.70	10.89	9.20	8.12
Illinois	5.71	9.03	8.71	7.29
Indiana	5.59	10.49	6.67	6.20
Iowa	5.63	9.81	7.84	6.00
Michigan	7.24	11.26	9.39	9.64
Minnesota	5.68	8.94	7.93	5.71
Ohio	6.60	NA	10.63	9.88
U.S. Average	6.47	11.98	9.75	5.27

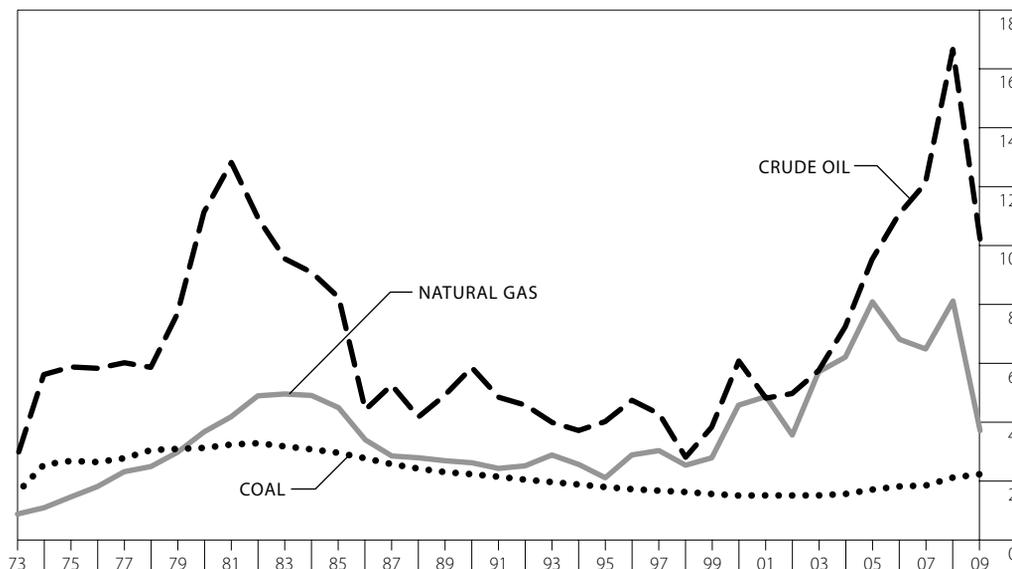
^a City Gate is the point where a pipeline or distribution company delivers natural gas to the natural gas utility serving the city and the surrounding area.

NA – Not available.

Source: U.S. Department of Energy, EIA, *Electric Power Monthly*, Table 5.6.B [DOE/EIA-0226 (2010/03)] (March 2010) www.eia.doe.gov/cneaf/electricity/epm/epm_sum.html and *Natural Gas Monthly*, Tables 17, 18, 19 and 20 [DOE/EIA-0130 (2010/03)] (March 2010) http://www.eia.doe.gov/pub/oil_gas/natural_gas/data_publications/natural_gas_monthly/historical/2010/2010_02/ngm_2010_02.html

U.S. Energy Prices

1973-2009 DOLLARS PER MILLION BTU (2009 DOLLARS)



1973-2009 DOLLARS PER MILLION BTU

Year	Current Dollars				2009 Dollars		
	Crude Oil Refiners Cost ^a \$/Barrel	Crude Oil Refiners Cost \$/MMBtu	Natural Gas Wellhead ^b \$/MMBtu	Coal Utility Cost ^c \$/MMBtu	Crude Oil Refiners Cost \$/MMBtu	Natural Gas Wellhead \$/MMBtu	Coal Utility Cost \$/MMBtu
1973	4.15	0.72	0.22	0.41	2.79	0.86	1.58
1975	10.38	1.79	0.44	0.81	5.85	1.44	2.66
1980	28.07	4.84	1.59	1.35	11.13	3.66	3.11
1985	26.75	4.61	2.51	1.65	8.22	4.47	2.94
1990	22.22	3.83	1.71	1.46	5.82	2.60	2.21
1995	17.23	2.97	1.55	1.32	4.00	2.09	1.77
2000	28.26	4.87	3.68	1.20	6.03	4.56	1.49
2005	50.24	8.66	7.33	1.54	9.51	8.05	1.69
2006	60.24	10.39	6.39	1.69	11.04	6.79	1.80
2007 ^r	67.94	11.71	6.25	1.77	12.11	6.46	1.83
2008 ^r	94.74	16.33	7.96	2.07	16.53	8.05	2.09
2009 ^p	59.27	10.22	3.71	2.21	10.22	3.71	2.21

^a Refiners cost of crude oil is the composite price for domestic and imported crude oil. Most of this crude oil is purchased under contract as opposed to the spot market.

^b U.S. DOE natural gas price information is reported in dollars per 1,000 cubic feet. This table assumes: (1) 5.8 MMBtu per one barrel of crude oil, and (2) 1,000 cubic feet = 1 MMBtu.

^c Includes cost of delivery to utilities.

^p Preliminary estimates.

^r Revised.

Source: U.S. Department of Energy, Energy Information Administration, *Monthly Energy Review* Tables 9.1, 9.10 and 9.11 [DOE/EIA-0035(2010/03)] (March 2010); www.eia.doe.gov/emeu/mer

REAL COST IN 2009 DOLLARS

CRUDE OIL

38.2%

NATURAL GAS

53.9%

In 2009, the real (2009 dollars) cost of oil and gas decreased—38.2 percent for crude oil and 53.9 percent for natural gas.

REAL COST IN 2009 DOLLARS

COAL

5.5%

The cost of coal increased by 5.5 percent.

COST OF CRUDE OIL

69.4%

SINCE 2000

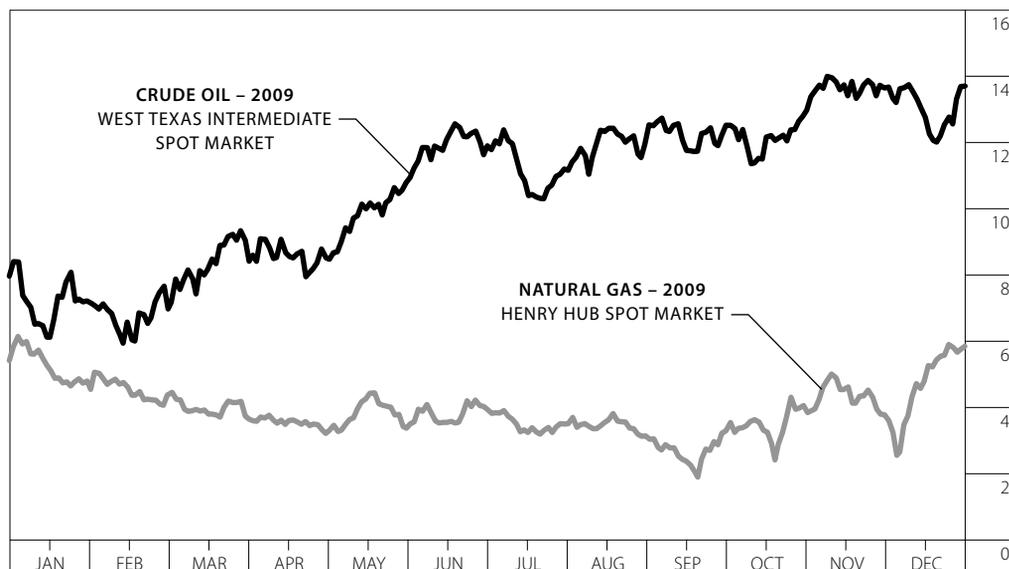
Since 2000, the cost of crude oil has increased by 69.4 percent.

U.S. Spot Market Prices of Crude Oil & Natural Gas

WEST TEXAS INTERMEDIATE
38.1%
 HENRY HUB
55.5%

In 2009, the average West Texas Intermediate crude oil spot market price decreased 38.1 percent, while the Henry Hub^b spot market price of natural gas decreased 55.5 percent.

2009 DOLLARS PER MILLION BTU (2009 DOLLARS)^a



2006-2009 DOLLARS PER MILLION BTU

Month	Crude Oil West Texas Intermediate				Natural Gas Henry Hub			
	2006	2007	2008	2009	2006	2007	2008	2009
Jan.	11.29	9.39	16.03	7.19	8.66	6.54	7.99	5.24
Feb.	10.63	10.22	16.44	6.74	7.53	8.03	8.54	4.51
Mar.	10.81	10.41	18.18	8.27	6.87	7.11	9.42	3.96
Apr.	11.97	11.04	19.41	8.56	7.06	7.60	10.18	3.49
May	12.21	10.93	21.62	10.18	6.17	7.64	11.27	3.83
Jun.	12.23	11.61	23.09	12.01	6.20	7.35	12.69	3.80
Jul.	12.83	12.77	23.01	11.06	6.15	6.22	11.09	3.38
Aug.	12.59	12.47	20.12	12.25	7.12	6.23	8.26	3.14
Sep.	11.00	13.77	17.91	11.97	4.90	6.07	7.63	2.99
Oct.	10.16	14.76	13.22	13.05	5.87	6.73	6.74	4.01
Nov.	10.19	16.30	9.90	13.48	7.43	7.11	6.68	3.70
Dec.	10.68	15.74	7.14	12.82	6.73	7.14	5.86	5.30
Average \$/MMBtu	11.38	12.45	17.17	10.63	6.72	6.98	8.86	3.95
Average \$/Barrel	66.02	72.21	99.60	61.66				

^a Graph is plotted with daily 2009 data.

^b Henry Hub is a natural gas pipeline hub in Louisiana.

Source: Oil Daily, electronically received data (2006-2008); WTI information also from http://tonto.eia.doe.gov/dnav/pet/pet_pri_spt_s1_d.htm (2008); Henry Hub data also from http://www.neo.ne.gov/statshhtml/124_20081203.htm (2008); Bloomberg.com Energy Prices (2008-2009); U.S. Department of Energy, Energy Information Administration, *Residual Fuel Oil Prices by Sales Type, PADD II*, http://tonto.eia.doe.gov/dnav/pet/pet_pri_resid_dcu_nus_m.htm.

National Indices of Price Inflation

1970-2009 ANNUAL RATE OF INFLATION

Year	Gross Domestic Product ^{a,r}		Producer Price Index ^b		Personal Consumption Expenditures ^{c,f}		Consumer Price Index ^d	
	Index	% Change	Index	% Change	Index	% Change	Index	% Change
1970	24.32	5.3%	36.9	3.7%	23.66	4.7%	38.8	5.7%
1975	33.56	9.4%	58.4	9.2%	32.16	8.4%	53.8	9.1%
1980	47.75	9.1%	89.8	14.1%	46.62	10.7%	82.4	13.5%
1985	61.58	3.0%	103.2	-0.5%	59.85	3.3%	107.6	3.6%
1990	72.20	3.9%	116.3	3.7%	72.15	4.6%	130.7	5.4%
1995	81.54	2.1%	124.7	3.6%	82.04	2.2%	152.4	2.8%
1996	83.09	1.9%	127.7	2.4%	83.83	2.2%	156.9	3.0%
1997	84.56	1.8%	127.6	-0.1%	85.39	1.9%	160.5	2.3%
1998	85.51	1.1%	124.4	-2.5%	86.21	1.0%	163.0	1.6%
1999	86.77	1.5%	125.5	0.9%	87.60	1.6%	166.6	2.2%
2000	88.65	2.2%	132.7	5.7%	89.78	2.5%	172.2	3.4%
2001	90.65	2.3%	134.2	1.1%	91.49	1.9%	177.1	2.8%
2002	92.12	1.6%	131.1	-2.3%	92.74	1.4%	179.9	1.6%
2003	94.10	2.2%	138.1	5.3%	94.62	2.0%	184.0	2.3%
2004	96.77	2.8%	146.7	6.2%	97.10	2.6%	188.9	2.7%
2005 ^r	100.00	3.3%	157.4	7.3%	100.00	3.0%	195.3	3.4%
2006 ^r	103.26	3.3%	164.7	4.6%	102.75	2.7%	201.6	3.2%
2007 ^r	106.21	2.9%	172.6	4.8%	105.50	2.7%	207.3	2.8%
2008 ^r	108.48	2.1%	189.6	9.8%	109.03	3.3%	215.3	3.9%
2009^p	109.77	1.2%	173.0	-8.8%	109.25	0.2%	214.5	-0.4%

a Gross Domestic Product Implicit Price Deflator, 2005 = 100, used in other tables to deflate residential, commercial, industrial, motor fuel and electric utility prices.

b All commodities, 1982 = 100, BLS series ID: WPU00000000.

c Implicit Price Deflator, 2005 = 100.

d All items, all urban consumers, 1982-1984 = 100, BLS series ID: CUUR0000SA0.

p Preliminary estimates.

r Revised.

Source: U.S. Department of Commerce, Bureau of Economic Analysis, *Economic Indicators* (March 2010) <http://www.bea.gov/national/nipaweb/TableView.asp>, *Survey of Current Business* (March 2010), and Bureau of Labor Statistics, (March 2010) <http://data.bls.gov/cgi-bin/surveymost?cu>.

PRODUCER
PRICE INDEX
8.8%

Price inflation indices are a measure of how much prices have changed from year to year. Each index is the ratio of prices in a given year to the base year. Each different index is normalized to 100 in different years. See footnotes for specific years. The percentage figure is the percent change from the previous year.

In 2009, the Producer Price Index decreased by 8.8 percent after jumping in 2008 by 9.8 percent over 2007.

CHAPTER 7

Wisconsin Expenditures for Energy

Where Learning is Natural

Established in 1994, the Aldo Leopold Nature Center specializes in connecting children, their families and teachers with nature. The mission of the center is based on the philosophy of famous Wisconsin Conservationist Aldo Leopold "...teach the student to see the land, understand what he sees, and enjoy what he understands."

Over the years the Aldo Leopold Nature Center has grown to operate year-round and has nearly tripled the number of visitors to more than 31,000 in 2009. With the growing use of the Center, it became apparent the facility needed to grow, too. With contributions from many partners and a \$500,000 Recovery Act grant to develop clean energy education, the dream to expand environmental education in Wisconsin grew.



In June of 2010, the center broke ground on an addition to double the environmental teaching capacity to 60,000 students per year and increase usable space by 11,161 square feet. Once completed in 2011, the addition will combine the best of 'high touch' nature education with 'high-tech' and represent a new approach for guiding students to discover, understand and explore complex energy and environmental issues. The high-tech education center is expected to draw in visitors from across the state and the Midwest.

Investing in our Children and Trees for Tomorrow

An organization that, at its foundation, literally grew one tree at a time is now sowing a different type of seedling in the region's youth. Trees for Tomorrow, an independent, nonprofit natural resource specialty school, uses both classroom education and hands-on field studies to teach children and adults the value of resource conservation and management.

Founded in 1944, Trees for Tomorrow was initially focused on the reforestation of Wisconsin's north woods, which had been severely depleted by logging and other practices. By the 1960s, the reforestation of the area was essentially complete, and the organization's focus shifted to conservation education. The school promotes the message that proper management and responsible use of natural resources are essential, as such resources are limited.

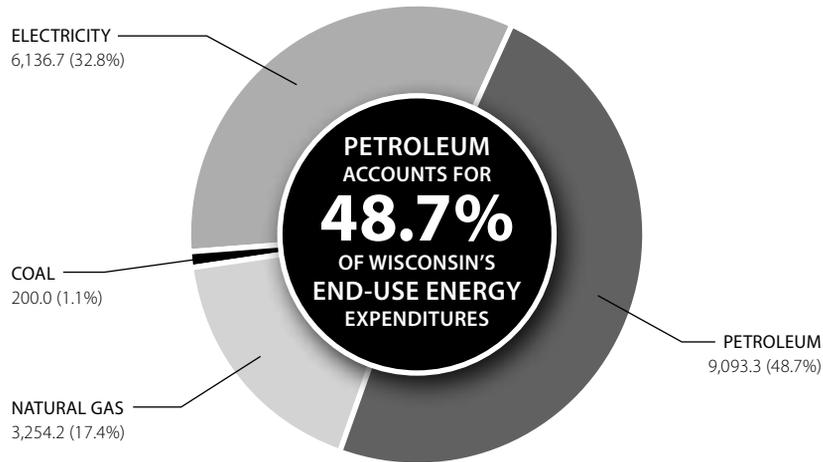


Trees for Tomorrow works mainly with elementary, middle and high school students while also offering adult education courses. During the school year, students from Wisconsin, northern Illinois and Michigan's Upper Peninsula travel to the campus in Eagle River for three-day workshops covering topics such as tree identification, water chemistry, wildlife tracking and many others. Roughly 5,000 students visit Trees for Tomorrow every year.

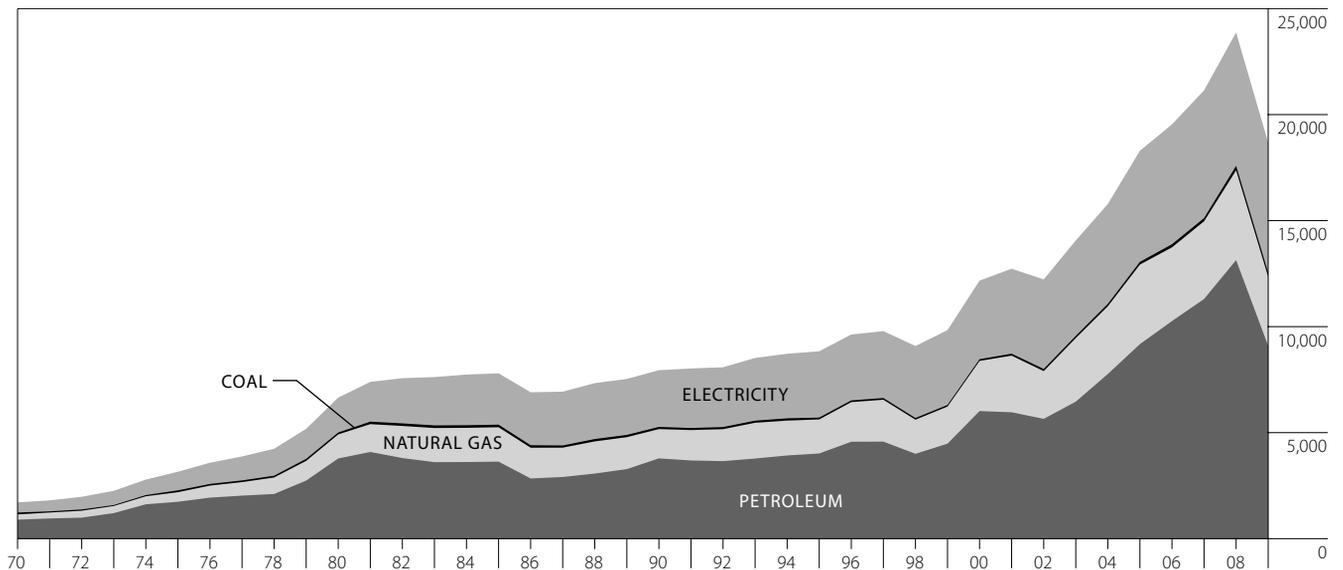
In 2010, Trees for Tomorrow received a \$50,000 Recovery Act grant to develop a clean energy outreach and education program on sustainable forestry and woody biomass. The program is teaching our youth how proper management of a renewable resource will help our state and our nation continue to move in the direction of clean energy and energy efficiency.

Wisconsin End-Use Energy Expenditures, by Type of Fuel

2009 MILLIONS OF DOLLARS AND PERCENT OF TOTAL



1970-2009 MILLIONS OF DOLLARS



Source: Wisconsin Office of Energy Independence.

Wisconsin End-Use Energy Expenditures, by Type of Fuel

WISCONSIN'S
**OVERALL
ENERGY BILL**
21.7%

In 2009, Wisconsin's overall energy bill dropped by 21.7 percent—from \$23.87 billion in 2008 to \$18.68 billion. This decrease of \$5.19 billion brings Wisconsin's energy expenditures close to 2005 levels.

Expenditures decreased for all fuels—petroleum by \$4.0 billion (30.8 percent), natural gas by \$982.5 million (23.2 percent), coal by \$6.7 million (3.3 percent), and electricity \$155.2 million (2.5 percent). Since 2000, Wisconsin's total energy expenditures increased by \$6.5 billion (53.5 percent).

The tables in this chapter show annual expenditures for the major energy resources used by Wisconsin's residential, commercial, industrial, agricultural and transportation sectors since 1970. Because consistent and reliable historic prices of wood, waste fuels and biogas are not available, expenditures for these fuels are excluded from the tables.

1970-2009 MILLIONS OF DOLLARS AND PERCENT OF TOTAL

Year	Petroleum		Natural Gas		Coal		Electricity		Total
1970 ^r	895.1	52.3%	247.5	14.5%	90.1	5.3%	477.6	27.9%	1,710.3
1975 ^r	1,738.7	55.1%	451.5	14.3%	86.2	2.7%	879.3	27.9%	3,155.7
1980 ^r	3,780.7	56.8%	1,135.8	17.1%	89.0	1.3%	1,648.0	24.8%	6,653.4
1985 ^r	3,633.5	46.6%	1,621.7	20.8%	121.6	1.6%	2,420.9	31.0%	7,797.7
1990 ^r	3,786.0	47.7%	1,381.8	17.4%	102.9	1.3%	2,674.5	33.7%	7,945.2
1995 ^r	4,017.0	45.5%	1,606.6	18.2%	85.6	1.0%	3,127.5	35.4%	8,836.7
1996 ^r	4,570.6	47.5%	1,868.6	19.4%	81.3	0.8%	3,108.1	32.3%	9,628.6
1997 ^r	4,577.2	46.8%	1,975.1	20.2%	80.3	0.8%	3,155.2	32.2%	9,787.9
1998 ^r	4,002.1	44.1%	1,608.7	17.7%	78.3	0.9%	3,395.6	37.4%	9,084.7
1999 ^r	4,479.0	45.5%	1,752.0	17.8%	74.3	0.8%	3,530.2	35.9%	9,835.5
2000 ^r	6,017.5	49.5%	2,365.6	19.4%	80.1	0.7%	3,705.5	30.5%	12,168.7
2001 ^r	5,961.8	46.8%	2,671.1	21.0%	90.9	0.7%	4,007.5	31.5%	12,731.3
2002 ^r	5,649.3	46.2%	2,252.6	18.4%	101.5	0.8%	4,222.1	34.5%	12,225.5
2003 ^r	6,460.9	45.9%	3,001.2	21.3%	98.7	0.7%	4,502.4	32.0%	14,063.3
2004 ^r	7,765.6	49.2%	3,196.2	20.3%	109.2	0.7%	4,712.4	29.9%	15,783.5
2005 ^r	9,174.4	50.1%	3,752.1	20.5%	128.3	0.7%	5,241.7	28.6%	18,296.4
2006 ^r	10,262.7	52.5%	3,476.1	17.8%	146.2	0.7%	5,654.9	28.9%	19,539.9
2007 ^r	11,301.3	53.4%	3,666.1	17.3%	151.7	0.7%	6,025.1	28.5%	21,144.2
2008 ^r	13,138.2	55.0%	4,236.7	17.7%	206.8	0.9%	6,291.9	26.4%	23,873.6
2009 ^p	9,093.3	48.7%	3,254.2	17.4%	200.0	1.1%	6,136.7	32.8%	18,684.3

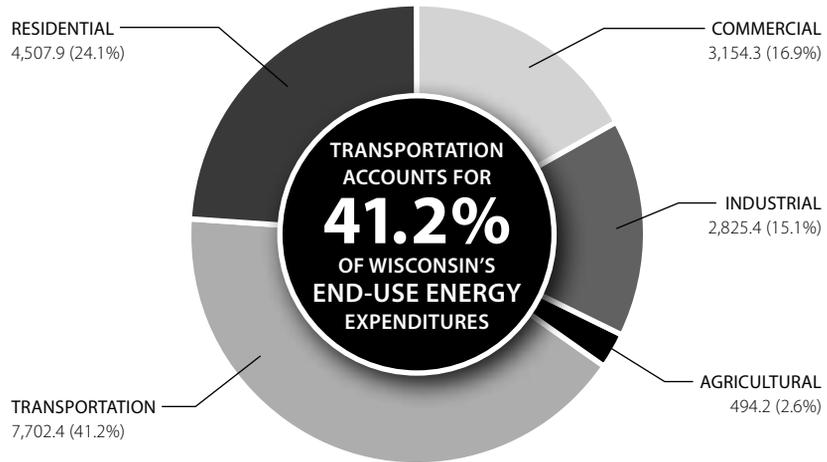
^p Preliminary estimates.

^r Revised due to revisions in price and consumption data.

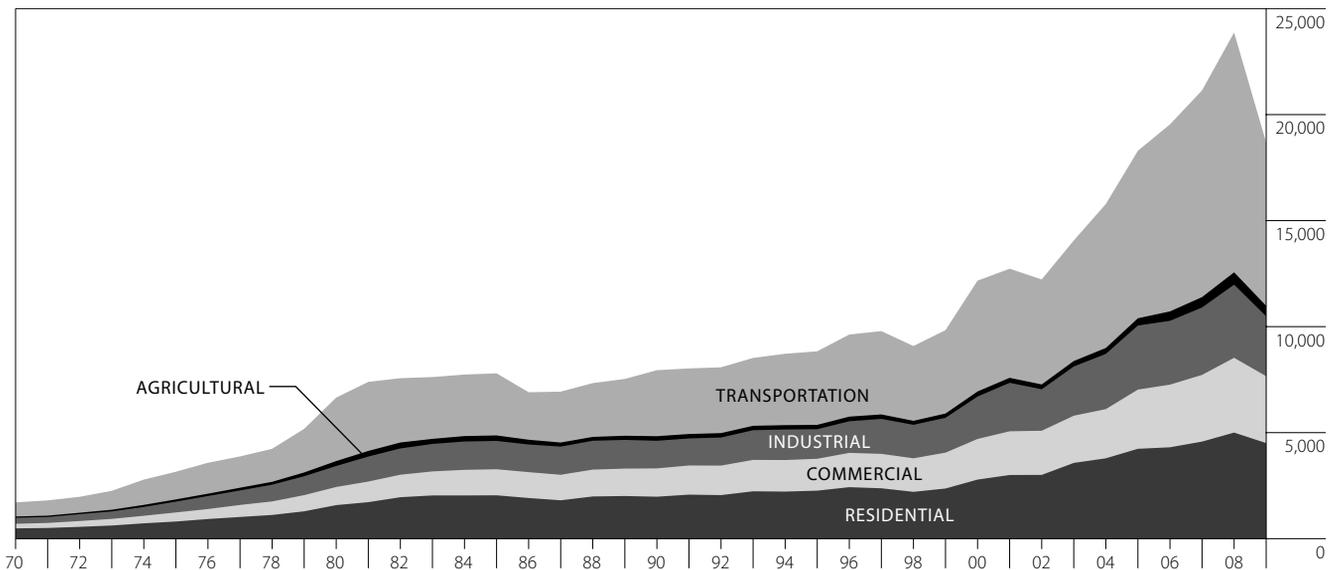
Source: Compiled from tables in this publication for Wisconsin petroleum, natural gas, coal and electricity use and prices, by economic sector.

Wisconsin End-Use Energy Expenditures, by Economic Sector

2009 MILLIONS OF DOLLARS AND PERCENT OF TOTAL



1970-2009 MILLIONS OF DOLLARS



Source: Wisconsin Office of Energy Independence.

Wisconsin End-Use Energy Expenditures, by Economic Sector

WISCONSIN'S
ENERGY
EXPENDITURES
DECREASED
IN ALL
SECTORS

In 2009, energy expenditures decreased in all sectors, with total expenditures decreasing \$5.19 billion or 21.7 percent.

Expenditures in the residential sector decreased by \$494.8 million (9.9 percent), in the commercial sector by \$374.1 million (10.6 percent), in the industrial sector by \$622.8 million (18.1 percent), in the agricultural sector by \$88.0 million (15.1 percent), and the transportation sector saw a drop of \$3.6 billion (31.9 percent).

1970-2009 MILLIONS OF DOLLARS AND PERCENT OF TOTAL

Year	Residential		Commercial		Industrial		Agricultural		Transportation		Total
1970 ^r	483.5	28.3%	217.9	12.7%	285.2	16.7%	58.7	3.4%	665.0	38.9%	1,710.3
1975 ^r	808.2	25.6%	428.4	13.6%	509.4	16.1%	104.9	3.3%	1,304.9	41.3%	3,155.7
1980 ^r	1,581.5	23.8%	855.2	12.9%	990.3	14.9%	232.4	3.5%	2,994.1	45.0%	6,653.4
1985 ^r	2,044.2	26.2%	1,229.1	15.8%	1,337.1	17.1%	258.8	3.3%	2,928.5	37.6%	7,797.7
1990 ^r	1,978.2	24.9%	1,335.8	16.8%	1,302.8	16.4%	215.8	2.7%	3,112.6	39.2%	7,945.2
1995 ^r	2,263.5	25.6%	1,504.5	17.0%	1,396.1	15.8%	202.7	2.3%	3,469.8	39.3%	8,836.7
1996 ^r	2,428.3	25.2%	1,617.6	16.8%	1,490.6	15.5%	218.6	2.3%	3,873.6	40.2%	9,628.6
1997 ^r	2,375.4	24.3%	1,624.5	16.6%	1,649.7	16.9%	209.3	2.1%	3,929.0	40.1%	9,787.9
1998 ^r	2,207.4	24.3%	1,582.8	17.4%	1,580.1	17.4%	187.2	2.1%	3,527.2	38.8%	9,084.7
1999 ^r	2,365.1	24.0%	1,691.8	17.2%	1,644.5	16.7%	200.0	2.0%	3,934.2	40.0%	9,835.5
2000 ^r	2,785.5	22.9%	1,916.4	15.7%	2,002.3	16.5%	237.2	1.9%	5,227.3	43.0%	12,168.7
2001 ^r	3,002.1	23.6%	2,062.1	16.2%	2,286.5	18.0%	234.9	1.8%	5,145.7	40.4%	12,731.3
2002 ^r	3,006.3	24.6%	2,083.3	17.0%	1,956.8	16.0%	227.1	1.9%	4,952.1	40.5%	12,225.5
2003 ^r	3,571.4	25.4%	2,227.5	15.8%	2,321.2	16.5%	258.3	1.8%	5,684.8	40.4%	14,063.3
2004 ^r	3,789.0	24.0%	2,319.9	14.7%	2,606.1	16.5%	277.7	1.8%	6,790.8	43.0%	15,783.5
2005 ^r	4,238.2	23.2%	2,793.3	15.3%	3,020.4	16.5%	342.7	1.9%	7,901.8	43.2%	18,296.4
2006 ^r	4,309.2	22.1%	2,955.1	15.1%	3,009.5	15.4%	444.6	2.3%	8,821.5	45.1%	19,539.9
2007 ^r	4,577.8	21.7%	3,145.2	14.9%	3,180.6	15.0%	489.2	2.3%	9,751.4	46.1%	21,144.2
2008 ^r	5,002.7	21.0%	3,528.4	14.8%	3,448.2	14.4%	582.3	2.4%	11,311.9	47.4%	23,873.6
2009^p	4,507.9	24.1%	3,154.3	16.9%	2,825.4	15.1%	494.2	2.6%	7,702.4	41.2%	18,684.3

^p Preliminary estimates.

^r Revised due to revisions in price and consumption data.

Source: Compiled from tables in this publication for Wisconsin residential, commercial, industrial, agricultural and transportation energy use and prices, by type of fuel.

Wisconsin Resource Use Energy Expenditures, Estimated Dollars Leaving Wisconsin

Of all petroleum energy expenditures, 85 percent are estimated to leave the state because petroleum refining operations are not located in Wisconsin, with the exception of Murphy Oil in Superior. The 15 percent estimated to stay in the state is due to Wisconsin-based gasoline and diesel blenders and retailers, LP and heating oil businesses, and utility revenues. Natural Gas production occurs out-of-state and natural gas pipelines are owned by out-of-state companies. The 15 percent estimated to stay in Wisconsin is attributed to in-state natural gas distribution businesses, LP businesses, and utility revenues.

Ninety-five percent of all expenditures on coal leave Wisconsin because this is an out-of-state resource. The five percent of expenditures estimated to stay in-state are attributed to utility revenues. All of the expenditures on imported electricity are necessarily attributed to out-of-state expenditures because this electricity is purchased from generation sources not based in Wisconsin.

In 2009, \$12.5 billion left the state, comprising 66.9 percent of Wisconsin's \$18.68 billion in end-use energy expenditures.

Like the other tables in this chapter, these dollar amounts do not include specific expenditures on renewable energy. The exception is where imported electricity is generation by renewable sources.

1970-2009 MILLIONS OF DOLLARS

Year	Petroleum		Natural Gas		Coal		Imported Electricity		Total Expenditure Leaving State
	Expenditures	Expenditure Leaving State	Expenditures	Expenditure Leaving State	Expenditures	Expenditure Leaving State	Expenditures	Expenditure Leaving State	
1970	900.3	765.2	260.6	221.5	177.1	168.2	-47.7	-47.7	1,107.3
1975	1,754.4	1,491.3	467.8	397.6	273.5	259.8	-50.5	-50.5	2,098.2
1980	3,804.6	3,233.9	1,177.2	1,000.7	476.9	453.1	-24.6	-24.6	4,663.0
1985	3,641.1	3,094.9	1,627.5	1,383.3	693.4	658.8	-9.2	-9.2	5,127.9
1990	3,791.2	3,222.6	1,388.8	1,180.5	585.4	556.1	417.4	417.4	5,376.5
1995	4,020.1	3,417.0	1,628.9	1,384.6	555.8	528.0	583.4	583.4	5,913.0
1996	4,575.0	3,888.7	1,890.9	1,607.2	546.4	519.1	372.4	372.4	6,387.4
1997	4,584.2	3,896.6	2,038.1	1,732.4	583.9	554.7	602.1	602.1	6,785.8
1998	4,008.3	3,407.1	1,672.6	1,421.7	558.6	530.7	518.5	518.5	5,878.0
1999	4,487.3	3,814.2	1,816.4	1,543.9	543.1	516.0	489.0	489.0	6,363.1
2000	6,027.4	5,123.3	2,460.7	2,091.6	560.9	532.8	495.9	495.9	8,243.6
2001	5,970.1	5,074.6	2,778.0	2,361.3	586.1	556.8	654.2	654.2	8,646.9
2002	5,660.5	4,811.4	2,327.1	1,978.0	604.3	574.1	557.9	557.9	7,921.5
2003	6,468.9	5,498.5	3,143.9	2,672.3	637.3	605.4	510.7	510.7	9,286.9
2004	7,776.8	6,610.3	3,333.8	2,833.8	672.2	638.6	572.1	572.1	10,654.8
2005	9,196.8	7,817.3	4,267.7	3,627.5	735.3	698.5	825.1	825.1	12,968.4
2006	10,283.6	8,741.0	3,799.6	3,229.6	828.4	787.0	581.6	581.6	13,339.3
2007	11,332.3	9,632.5	4,074.1	3,463.0	928.9	882.5	889.4	889.4	14,867.4
2008	13,160.4	11,186.4	4,616.6	3,924.1	1,162.4	1,104.3	831.6	831.6	17,046.4
2009^p	9,101.5	7,736.3	3,459.5	2,940.6	1,091.6	1,037.0	790.1	790.1	12,503.9

^p Preliminary estimates.

Source: Compiled from tables in this publication for Wisconsin petroleum, natural gas, coal and electricity use and prices, by economic sector.

Wisconsin Expenditures for Residential Energy, by Type of Fuel

WISCONSIN'S
OVERALL
RESIDENTIAL
ENERGY
EXPENDITURES
9.9%

In 2009, overall residential energy expenditures decreased by 9.9 percent (\$494.8 million) from 2008. Expenditures for all fuel types decreased, with the exception of electricity which saw a 0.5 percent increase.

1970-2009 MILLIONS OF DOLLARS AND PERCENT OF TOTAL

Year	Petroleum		Natural Gas		Coal		Electricity		Total ^a
1970 ^r	142.6	29.5%	133.5	27.6%	15.5	3.2%	191.9	39.7%	483.5
1975 ^r	250.5	31.0%	203.8	25.2%	11.8	1.5%	342.0	42.3%	808.2
1980 ^r	483.8	30.6%	474.3	30.0%	9.0	0.6%	614.4	38.8%	1,581.5
1985 ^r	393.7	19.3%	754.5	36.9%	3.8	0.2%	892.2	43.6%	2,044.2
1990 ^r	342.9	17.3%	653.8	33.0%	1.3	0.1%	980.2	49.6%	1,978.2
1995 ^r	282.7	12.5%	792.0	35.0%	1.1	0.0%	1,187.7	52.5%	2,263.5
1996 ^r	357.9	14.7%	892.8	36.8%	1.0	0.0%	1,176.5	48.4%	2,428.3
1997 ^r	336.1	14.1%	873.2	36.8%	1.0	0.0%	1,165.1	49.0%	2,375.4
1998 ^r	237.6	10.8%	712.6	32.3%	0.9	0.0%	1,256.3	56.9%	2,207.4
1999 ^r	265.3	11.2%	787.5	33.3%	0.8	0.0%	1,311.6	55.5%	2,365.1
2000 ^r	394.1	14.1%	1,020.3	36.6%	0.7	0.0%	1,370.4	49.2%	2,785.5
2001 ^r	402.8	13.4%	1,098.4	36.6%	0.7	0.0%	1,500.2	50.0%	3,002.1
2002 ^r	359.0	11.9%	1,008.2	33.5%	0.7	0.0%	1,638.5	54.5%	3,006.3
2003 ^r	404.9	11.3%	1,313.7	36.8%	0.6	0.0%	1,852.3	51.9%	3,571.4
2004 ^r	505.0	13.3%	1,367.9	36.1%	0.6	0.0%	1,915.6	50.6%	3,789.0
2005 ^r	607.6	14.3%	1,564.2	36.9%	0.6	0.0%	2,065.8	48.7%	4,238.2
2006 ^r	650.6	15.1%	1,467.7	34.1%	0.5	0.0%	2,190.5	50.8%	4,309.2
2007 ^r	668.0	14.6%	1,577.3	34.5%	0.4	0.0%	2,332.0	50.9%	4,577.8
2008 ^r	787.4	15.7%	1,799.8	36.0%	0.0	0.0%	2,415.5	48.3%	5,002.7
2009^p	630.7	14.0%	1,448.8	32.1%	0.0	0.0%	2,428.4	53.9%	4,507.9

^a Does not include renewable energy, except those renewable fuels used in electricity production.

^p Preliminary estimates.

^r Revised due to revisions in price and consumption data.

Source: Compiled from tables in this publication for Wisconsin residential energy use and prices.

Wisconsin Expenditures for Commercial Energy, by Type of Fuel

1970-2009 MILLIONS OF DOLLARS AND PERCENT OF TOTAL

Year	Petroleum		Natural Gas		Coal		Electricity		Total ^a
1970 ^r	34.7	15.9%	34.6	15.9%	11.5	5.3%	137.1	62.9%	217.9
1975 ^r	70.8	16.5%	73.5	17.2%	11.0	2.6%	273.0	63.7%	428.4
1980 ^r	82.4	9.6%	210.6	24.6%	6.8	0.8%	555.4	64.9%	855.2
1985 ^r	104.5	8.5%	307.4	25.0%	9.3	0.8%	807.9	65.7%	1,229.1
1990 ^r	92.8	6.9%	314.8	23.6%	8.2	0.6%	920.0	68.9%	1,335.8
1995 ^r	73.7	4.9%	381.8	25.4%	6.2	0.4%	1,042.8	69.3%	1,504.5
1996 ^r	95.6	5.9%	458.4	28.3%	7.8	0.5%	1,055.8	65.3%	1,617.6
1997 ^r	85.0	5.2%	474.5	29.2%	7.7	0.5%	1,057.3	65.1%	1,624.5
1998 ^r	57.7	3.6%	382.2	24.1%	7.9	0.5%	1,134.9	71.7%	1,582.8
1999 ^r	66.5	3.9%	395.3	23.4%	8.0	0.5%	1,221.9	72.2%	1,691.8
2000 ^r	103.6	5.4%	513.9	26.8%	8.0	0.4%	1,290.8	67.4%	1,916.4
2001 ^r	104.1	5.1%	579.0	28.1%	8.6	0.4%	1,370.3	66.5%	2,062.1
2002 ^r	91.3	4.4%	525.4	25.2%	8.8	0.4%	1,457.8	70.0%	2,083.3
2003 ^r	125.2	5.6%	695.2	31.2%	9.2	0.4%	1,397.9	62.8%	2,227.5
2004 ^r	150.1	6.5%	715.4	30.8%	10.0	0.4%	1,444.5	62.3%	2,319.9
2005 ^r	202.2	7.2%	894.0	32.0%	12.2	0.4%	1,684.9	60.3%	2,793.3
2006 ^r	192.8	6.5%	888.0	30.0%	13.6	0.5%	1,860.7	63.0%	2,955.1
2007 ^r	204.2	6.5%	923.3	29.4%	11.6	0.4%	2,006.1	63.8%	3,145.2
2008 ^r	299.6	8.5%	1,087.6	30.8%	8.9	0.3%	2,132.4	60.4%	3,528.4
2009 ^p	209.6	6.6%	842.6	26.7%	6.8	0.2%	2,095.2	66.4%	3,154.3

^a Does not include renewable energy, except those renewable fuels used in electricity production.

^p Preliminary estimates.

^r Revised due to revisions in price and consumption data.

Source: Compiled from tables in this publication for Wisconsin commercial energy use and prices.

WISCONSIN
EXPENDITURES
FOR
COMMERCIAL
ENERGY

10.6%

Commercial energy expenditures decreased 10.6 percent (\$374.1 million) in 2009. Commercial energy expenditures are dominated (66.4 percent) by electricity used for lighting, cooling, ventilation and office equipment.

Wisconsin Expenditures for Industrial Energy, by Type of Fuel

WISCONSIN
EXPENDITURES
FOR
INDUSTRIAL
ENERGY
18.1%

In 2009, industrial energy expenditures decreased 18.1 percent (\$622.8 million). Industrial energy use is dominated by electricity (52.2 percent) and natural gas (34.1 percent). Expenditures for all fuels decreased: petroleum, 34.4 percent; electricity, 8.1 percent; natural gas, 28.6 percent; and coal, 2.4 percent.

1970-2009 MILLIONS OF DOLLARS AND PERCENT OF TOTAL

Year	Petroleum		Natural Gas		Coal		Electricity		Total ^a
1970 ^r	18.7	6.5%	79.4	27.8%	63.1	22.1%	124.0	43.5%	285.2
1975 ^r	46.7	9.2%	174.2	34.2%	63.4	12.4%	225.1	44.2%	509.4
1980 ^r	64.1	6.5%	450.8	45.5%	73.2	7.4%	402.1	40.6%	990.3
1985 ^r	58.2	4.4%	559.9	41.9%	108.5	8.1%	610.6	45.7%	1,337.1
1990 ^r	117.6	9.0%	413.2	31.7%	93.5	7.2%	678.5	52.1%	1,302.8
1995 ^r	80.3	5.8%	432.8	31.0%	78.3	5.6%	804.8	57.6%	1,396.1
1996 ^r	114.9	7.7%	517.4	34.7%	72.5	4.9%	785.8	52.7%	1,490.6
1997 ^r	106.0	6.4%	627.4	38.0%	71.7	4.3%	844.6	51.2%	1,649.7
1998 ^r	84.3	5.3%	513.9	32.5%	69.5	4.4%	912.5	57.7%	1,580.1
1999 ^r	104.7	6.4%	569.2	34.6%	65.5	4.0%	905.0	55.0%	1,644.5
2000 ^r	149.0	7.4%	831.4	41.5%	71.3	3.6%	950.5	47.5%	2,002.3
2001 ^r	172.6	7.5%	993.7	43.5%	81.6	3.6%	1,038.7	45.4%	2,286.5
2002 ^r	121.0	6.2%	719.0	36.7%	92.0	4.7%	1,024.8	52.4%	1,956.8
2003 ^r	98.9	4.3%	992.4	42.8%	88.9	3.8%	1,141.0	49.2%	2,321.2
2004 ^r	150.8	5.8%	1,113.0	42.7%	98.6	3.8%	1,243.7	47.7%	2,606.1
2005 ^r	243.2	8.1%	1,293.9	42.8%	115.5	3.8%	1,367.8	45.3%	3,020.4
2006 ^r	285.0	9.5%	1,120.4	37.2%	132.0	4.4%	1,472.0	48.9%	3,009.5
2007 ^r	308.6	9.7%	1,165.5	36.6%	139.7	4.4%	1,566.9	49.3%	3,180.6
2008 ^r	294.8	8.5%	1,349.4	39.1%	197.9	5.7%	1,606.1	46.6%	3,448.2
2009^p	193.5	6.8%	962.8	34.1%	193.2	6.8%	1,475.9	52.2%	2,825.4

^a Does not include renewable energy, except those renewable fuels used in electricity production.

^p Preliminary estimates.

^r Revised due to revisions in price and consumption data.

Source: Compiled from tables in this publication for Wisconsin industrial energy use and prices.

Wisconsin Expenditures for Agricultural Energy, by Type of Fuel

1970-2009 MILLIONS OF DOLLARS AND PERCENT OF TOTAL

Year	Motor Gasoline	Diesel Fuel ^a	LPG	Other Fuel ^b	Total Petroleum	Electricity	Total ^c
1970	19.1	9.8	5.2		34.1 58.1%	24.6 41.9%	58.7
1975	30.9	24.1	10.8		65.8 62.7%	39.1 37.3%	104.9
1980	38.7	94.8	22.9		156.4 67.3%	76.0 32.7%	232.4
1985	22.4	98.3	27.8		148.5 57.4%	110.3 42.6%	258.8
1990	9.6	88.1	22.4		120.1 55.6%	95.7 44.4%	215.8
1995	6.6	80.8	23.1		110.5 54.5%	92.2 45.5%	202.7
1996	6.5	87.4	34.7		128.6 58.8%	90.0 41.2%	218.6
1997	6.1	83.6	31.4		121.1 57.9%	88.2 42.1%	209.3
1998	5.4	71.3	18.6		95.3 50.9%	91.9 49.1%	187.2
1999	5.9	81.1	21.2		108.3 54.1%	91.7 45.9%	200.0
2000	7.1	108.8	27.5		143.4 60.5%	93.8 39.5%	237.2
2001	7.0	100.5	29.1		136.6 58.2%	98.3 41.8%	234.9
2002	6.4	94.7	24.9		126.0 55.5%	101.0 44.5%	227.1
2003	7.5	111.2	28.4		147.1 57.0%	111.2 43.0%	258.3
2004	9.0	126.5	33.4		169.0 60.9%	108.7 39.1%	277.7
2005	63.3	115.2	37.8	3.2	219.5 64.1%	123.2 35.9%	342.7
2006	60.1	199.5	48.5	4.8	312.9 70.4%	131.7 29.6%	444.6
2007	75.7	241.6	47.0	4.8	369.0 75.4%	120.1 24.6%	489.2
2008 ^r	70.4	294.6	73.6	5.8	444.4 76.3%	137.9 23.7%	582.3
2009^p	60.4	217.0	69.4	10.4	357.1 72.3%	137.1 27.7%	494.2

^a Includes fuel oil and kerosene through 2004.

^b This fuel is primarily distillate and kerosene, but may include small amounts of coal and wood.

^c Does not include renewable energy, except those renewable fuels used in electricity production.

^p Preliminary estimates.

^r Revised due to revisions in price and consumption data.

Source: Compiled from tables in this publication for Wisconsin agricultural energy use and prices.

WISCONSIN'S
AGRICULTURAL
ENERGY BILL

15.1%

Wisconsin's agricultural energy bill is 15.1 percent less than 2008, a decrease of \$88.0 million.

Wisconsin Expenditures for Transportation Energy, by Type of Fuel

WISCONSIN'S
TRANSPORTATION
ENERGY BILL
31.9%

Wisconsin's transportation energy bill decreased 31.9 percent (\$3.6 billion dollars) in 2009. Vehicle gasoline accounts for 76.8 percent of all transportation expenditures, costing motorists \$5.9 billion.

1970-2009 MILLIONS OF DOLLARS AND PERCENT OF TOTAL

Year	Vehicle Gasoline ^a		Diesel Fuel		Aviation Gasoline		Jet Fuel		Middle Distillate		Total
1970	626.2	94.3%	23.0	3.5%	2.4	0.4%	5.9	0.9%	6.3	0.9%	664.3
1975	1,187.1	91.7%	74.3	5.7%	4.5	0.3%	21.2	1.6%	13.8	1.1%	1,302.7
1980	2,531.3	84.7%	335.7	11.2%	8.4	0.3%	72.7	2.4%	37.8	1.3%	2,988.9
1985	2,369.2	81.0%	469.6	16.1%	5.5	0.2%	52.0	1.8%	23.7	0.8%	2,923.7
1990	2,429.1	78.2%	571.2	18.4%	6.1	0.2%	71.5	2.3%	25.0	0.8%	3,106.0
1995	2,661.8	76.8%	724.3	20.9%	6.5	0.2%	50.9	1.5%	22.7	0.7%	3,466.2
1996	2,974.7	76.8%	798.0	20.6%	7.1	0.2%	62.5	1.6%	29.2	0.8%	3,871.5
1997	3,006.2	76.5%	830.7	21.1%	7.2	0.2%	60.3	1.5%	24.6	0.6%	3,929.0
1998	2,692.2	76.3%	761.4	21.6%	6.0	0.2%	47.6	1.3%	19.6	0.6%	3,526.7
1999	2,993.5	76.1%	852.0	21.7%	7.4	0.2%	55.6	1.4%	25.7	0.7%	3,934.2
2000	3,994.0	76.4%	1,101.5	21.1%	8.7	0.2%	85.3	1.6%	37.8	0.7%	5,227.3
2001	3,973.1	77.2%	1,054.6	20.5%	8.4	0.2%	73.8	1.4%	35.7	0.7%	5,145.7
2002	3,844.1	77.6%	997.7	20.1%	6.6	0.1%	72.2	1.5%	31.5	0.6%	4,952.1
2003	4,447.9	78.2%	1,113.0	19.6%	6.6	0.1%	83.8	1.5%	33.6	0.6%	5,684.8
2004	5,228.9	77.0%	1,388.3	20.4%	7.8	0.1%	121.4	1.8%	44.4	0.7%	6,790.8
2005	5,946.7	75.3%	1,684.0	21.3%	9.7	0.1%	193.6	2.5%	67.8	0.9%	7,901.8
2006	6,550.7	74.3%	1,964.7	22.3%	9.8	0.1%	213.2	2.4%	83.1	0.9%	8,821.5
2007	7,347.7	75.4%	2,083.3	21.4%	9.6	0.1%	207.0	2.1%	103.8	1.1%	9,751.4
2008 ^r	8,191.6	72.4%	2,667.5	23.6%	10.5	0.1%	332.8	2.9%	109.5	1.0%	11,311.9
2009^p	5,911.7	76.8%	1,528.8	19.8%	6.7	0.1%	200.1	2.6%	55.2	0.7%	7,702.4

^a Includes ethanol.

^p Preliminary estimates.

^r Revised due to revisions in price and consumption data.

Source: Compiled from tables in this publication for Wisconsin transportation energy use and prices.

CHAPTER 8

Miscellaneous

UW-Oshkosh Home to Nation's First Dry Fermentation Anaerobic Digester



The University of Wisconsin-Oshkosh (UWO) is home to the first dry fermentation anaerobic digester in the United States. The digester could provide up to 5 percent of UWO's electricity and heat. The project is a collaborative effort between the UWO Foundation and Germany's BIOFerm Energy Systems.

Anaerobic digestion accelerates the natural breakdown of organic waste by removing oxygen from the biochemical process to produce quality methane gas. The BIOFerm anaerobic digester converts organic waste normally sent to a landfill into a renewable energy source. The UWO digester will use food, agricultural, and yard waste to produce the gas, and will require no pre-treatment of material prior to entering the digester. In addition, BIOFerm's digester design eliminates waste water by collecting and redistributing the water within the digester to speed the breakdown of the organic waste.

The dry fermentation digester is also able to digest non-recyclable items such as paper products that have touched food (i.e. pizza boxes or hamburger and french fry wrappers) and convert it to energy. This is especially relevant for a university campus where feeding several thousand students a day can really add up.

With financial assistance from several sources including more than \$232,000 from Wisconsin's Focus on Energy program and \$500,000 from the federal Department of Energy, the UWO digester will be the largest renewable energy project in terms of power generation within the UW system and the City of Oshkosh. This project will vastly increase UWO's renewable energy portfolio, joining the solar hot water and renewable electricity already in use on campus.



Energy Efficient Rebates are a Success in Wisconsin

Within four months, \$5.1 million in federally-funded rebates for energy efficient appliances was refunded to Wisconsinites. More than 45,000 customers took advantage of the funding allocated for residents to transition to efficient ENERGY STAR® appliances for their homes or apartments.

Funded by the American Recovery and Reinvestment Act, Wisconsin's Focus on Energy administered the program and included incentives on products including boilers, central air conditioners, clothes washers, dishwashers, refrigerators and freezers, furnaces, water heaters and solar hot water systems.



Because older appliances consume a huge amount of electricity, there is enormous potential for consumers to experience significant long-term savings by making energy-efficiency improvements. In fact, by upgrading a 10-year-old clothes washer to an energy-efficient model, a household can potentially save \$135 a year in energy costs.

United States Energy Use and Gross Domestic Product

ENERGY USE
PER DOLLAR
OF GDP

45.6%
SINCE 1980

Until the early 1970s, energy use kept pace with the growth in the nation's economy. Economic growth during the 1970s and early 1980s was accompanied by slower growth in energy use due to increases in efficiency and a shift away from energy intensive industries.

Efficiency, in terms of decreasing energy required to produce a dollar of Gross Domestic Product, continues to increase slowly.

The ratio between electric sales and Gross Domestic Product has fallen 1.8 percent since 2008, and 23.3 percent since 1980. Energy use per dollar of Gross Domestic Product declined 2.5 percent since 2008 and 45.6 percent since 1980.

The federal Bureau of Economic Analysis (BEA) periodically adjusts the base year for economic data. These data represent the most recent revision of BEA data to 2005 as the base year.

1970-2009

Year	Resident Population (Thousands) ^{a,r}	Gross Domestic Product (Bil. of 2005\$)	Resource Energy Consumption (Quad. Btu) ^c	Electric Sales to Ultimate Customers (Bil. of kWh) ^d	Resource Energy Per GDP (Thous. Btu/2005\$)	Electric Sales Per GDP (kWh/2005\$)
1970	205,052	4,269.9	68.00	1,391.4	15.93	0.3259
1975	215,973	4,879.5	72.00	1,747.1	14.76	0.3580
1980	227,225	5,839.0	78.12	2,094.4	13.38	0.3587
1985	237,924	6,849.3	76.49	2,324.0	11.17	0.3393
1990 ^r	249,623	8,033.9	84.65	2,712.6	10.54	0.3376
1995 ^r	266,278	9,093.7	91.17	3,013.3	10.03	0.3314
1996 ^r	269,394	9,433.9	94.18	3,101.1	9.98	0.3287
1997 ^r	272,647	9,854.3	94.77	3,145.6	9.62	0.3192
1998 ^r	275,854	10,283.5	95.18	3,264.2	9.26	0.3174
1999 ^r	279,040	10,779.8	96.81	3,312.1	8.98	0.3072
2000 ^r	282,172	11,226.0	98.97	3,421.4	8.82	0.3048
2001 ^r	285,082	11,347.2	96.32	3,394.5	8.49	0.2991
2002 ^r	287,804	11,553.0	97.85	3,465.5	8.47	0.3000
2003 ^r	290,326	11,840.7	98.13	3,493.7	8.29	0.2951
2004 ^r	293,046	12,263.8	100.31	3,547.5	8.18	0.2893
2005 ^r	295,753	12,638.4	100.45	3,661.0	7.95	0.2897
2006 ^r	298,593	12,976.2	99.79	3,670.0	7.69	0.2828
2007 ^r	301,580	13,254.1	101.53	3,765.0	7.66	0.2841
2008 ^r	304,375	13,312.2	99.40	3,733.0	7.47	0.2804
2009^p	307,007	12,987.4	94.58	3,575.0	7.28	0.2753

^a As of July 1.

^c Quadrillions of Btu.

^d Beginning in 1975, the DOE data source has been used.

^r Revised.

Source: U.S. Department of Energy, Energy Information Administration, *Monthly Energy Review* (May 2010), [http://www.eia.doe.gov/mer/Tables/1.3_and_7.1_\(1970-2009\)](http://www.eia.doe.gov/mer/Tables/1.3_and_7.1_(1970-2009)); Wisconsin Department of Administration Demographic Services resident, national population estimates as of July 1 (1970-2009); Bureau of Economic Analysis, Regional Economic Accounts, <http://www.bea.gov/bea/regional/> (1970-2009).

Wisconsin Population, Households, Gross State Product and Personal Income

Data in this table are provided as a reference point for making per capita comparisons. To explain recent increases in residential energy use, personal income per capita and per household are shown in current and constant 2009 dollars.

1970-2009

Year	GDP Deflator	Population ^{c,r} (Thousands)	No. of Households ^{a,c,r} (Thousands)	Gross State Product (Million 2009 Dollars)	Personal Income ^{b,r} (Current Dollars)			Personal Income ^{b,r} (2009 Dollars)		
					Total (Million Dollars)	Dollars Per Capita	Dollars Per Household	Total (Million Dollars)	Dollars Per Capita	Dollars Per Household
1970	24.32	4,417.8	1,328.8	91,548	17,621	3,989	13,261	79,547	18,006	59,864
1975	33.56	4,565.8	1,486.8	102,971	27,830	6,095	18,718	91,020	19,935	61,218
1980	47.75	4,705.6	1,652.3	122,762	47,519	10,098	28,760	109,240	23,215	66,115
1985	61.58	4,744.7	1,720.4	133,001	65,132	13,727	37,860	116,111	24,472	67,492
1990	72.20	4,891.8	1,822.1	152,512	88,213	18,033	48,412	134,115	27,416	73,604
1995	81.54	5,134.1	1,946.3	180,529	116,074	22,608	59,638	156,267	30,437	80,289
1996	83.09	5,182.0	1,971.6	187,276	122,953	23,727	62,362	162,436	31,346	82,388
1997	84.56	5,233.9	1,998.4	196,740	130,478	24,929	65,291	169,386	32,363	84,761
1998	85.51	5,280.0	2,024.5	206,266	141,019	26,708	69,656	181,027	34,285	89,418
1999	86.77	5,323.7	2,053.9	213,815	147,462	27,699	71,796	186,552	35,042	90,828
2000 ^r	88.65	5,374.3	2,092.5	217,613	156,603	29,139	74,840	193,919	36,083	92,673
2001 ^r	90.65	5,408.8	2,126.6	220,311	162,792	30,098	76,550	197,129	36,446	92,697
2002 ^r	92.12	5,446.8	2,157.1	224,743	167,742	30,796	77,763	199,887	36,698	92,665
2003 ^r	94.10	5,476.8	2,183.3	228,527	173,295	31,642	79,373	202,153	36,911	92,590
2004 ^r	96.77	5,511.4	2,212.1	233,577	180,338	32,721	81,523	204,563	37,116	92,474
2005 ^r	100.00	5,541.4	2,238.3	235,809	186,595	33,673	83,365	204,826	36,963	91,509
2006 ^r	103.26	5,571.7	2,257.1	239,104	198,598	35,644	87,988	211,125	37,892	93,538
2007 ^r	106.21	5,601.6	2,272.3	241,223	207,201	36,990	91,186	214,140	38,228	94,239
2008 ^r	108.48	5,627.6	2,288.0	243,283	212,553	37,770	92,899	215,077	38,218	94,002
2009^p	109.77	5,654.8	2,302.5	235,500	208,220	36,822	90,432	208,220	36,822	90,432

a Household numbers for intercensal years estimated on basis of Public Service Commission of Wisconsin reports of electric utility residential customers. Starting in 2000, estimates are from the Department of Administration, Wisconsin Demographic Services Center.

b Personal Income data are revised back to 1970 based on federal BEA adjustments (2010).

c Population and Households revised for 2000-2009.

p Preliminary estimates.

r Revised.

Source: U.S. Department of Commerce, Bureau of Census, *2000 Census of Population and Housing*, CPH-1-51 (August 2001) Final Official Population Estimates and Census Counts for Wisconsin Counties: 1970-2008; Department of Administration, Wisconsin Demographic Services Center (1970-2009); U.S. Department of Commerce, Bureau of Economic Analysis, Regional Economic Accounts, <http://www.bea.gov/bea/regional/> (1970-2009).

HOUSEHOLD
INCOME
IN 2009 DOLLARS
1.1%
ANNUALLY
SINCE 1990

Wisconsin's population and number of households continue to grow. The number of households has grown faster than the population, as the number of persons per household has declined.

After growing at an annual rate of 2.3 percent over the 10-year period from 1990 to 2000, the 2009 per household income (in constant 2009 dollars) actually declined for the first time since 1970.

Household income growth, in constant 2009 dollars, has been about 1.1 percent annually over the 19-year period since 1990. Gross State Product in 2009 dollars decreased by 3.2 percent in 2009 compared to 2008.

Wisconsin Employment, by Type

WISCONSIN
LABOR FORCE
0.9%

In 2009, Wisconsin's
working age labor force
increased 0.9 percent.

WISCONSIN
EMPLOYMENT
3.9%

Employment in the state
decreased 3.9 percent
(113,266 jobs).

Employment in all
sectors decreased. In
the goods producing
sector, by 12.1 percent,
in the services producing
sector by 2.5 percent,
and a 4.5 percent in
the nonfarm sector.
Most Wisconsin jobs are
classified as services
producing.

1970-2009 THOUSANDS

Year	Working Age 18-64	Total Employment ^a	Percent Working Age Employed	Total NonFarm ^{c,f}	Goods Producing ^{c,d}	Services Producing ^{c,e}
1970	2,362.6	1,530.5	64.8%		Data Not Available ^b	
1975	2,572.5	1,677.0	65.2%		Data Not Available ^b	
1980	2,783.7	1,938.1	69.6%		Data Not Available ^b	
1985	2,858.3	1,983.1	69.4%		Data Not Available ^b	
1990	2,949.3	2,486.1	84.3%	2,291.5	614.8	1,676.7
1995	3,122.9	2,773.6	88.8%	2,558.6	672.5	1,886.1
1996	3,157.5	2,600.6	82.4%	2,600.6	567.6	1,921.4
1997	3,194.8	2,655.8	83.1%	2,655.8	579.2	1,960.9
1998	3,228.6	2,718.0	84.2%	2,718.0	593.2	2,004.6
1999	3,261.0	2,784.0	85.4%	2,784.0	594.8	2,063.5
2000	3,292.4	2,894.9	87.9%	2,833.8	723.0	2,110.8
2001	3,336.3	2,897.9	86.9%	2,813.9	689.5	2,124.3
2002	3,379.4	2,860.9	84.7%	2,782.4	656.2	2,126.1
2003	3,417.8	2,862.6	83.8%	2,143.4	631.9	2,143.4
2004	3,455.2	2,867.1	83.0%	2,807.1	633.3	2,173.8
2005 ^r	3,513.2	2,890.1	82.3%	2,842.1	636.4	2,205.7
2006 ^r	3,547.5	2,929.5	82.6%	2,866.4	637.2	2,229.3
2007 ^r	3,574.6	2,947.0	82.4%	2,884.4	630.9	2,253.5
2008 ^r	3,598.0	2,933.0	81.5%	2,878.1	614.7	2,263.5
2009^p	3,631.5	2,819.7	77.6%	2,748.2	540.6	2,207.7

a Nonfarm wage and salary employment.

b Industry employment data prior to 1990 are not available due to a change in coding from the Standard Industrial Classification (SIC) system to the North American Industrial Classification System (NAICS).

c These data categories represent numbers of jobs, not numbers of individuals.

d Goods Producing is a compilation of the Mining, Natural Resources, and Construction industries.

e Services Producing is a compilation of all non-farm jobs that do not produce goods.

f Total Non-Farm job is a compilation of many non-farm job categories, which includes Goods Producing and Services Producing.

p Preliminary.

r Revised.

Source: Wisconsin Department of Administration, Demographic Services Center, *Final Population Projections for Wisconsin by Sex and Single Year of Age, 2000–2015* (January 2004) (2000–2009); *State Age-Sex Population Projections by Single Years, 2005–2020* (June 2010) (revised 2005–2009), www.doa.state.wi.us/subcategory.asp?linksubcatid=105&linkcatid=11&linkid=64&locid=9; Wisconsin Department of Workforce Development, Labor Market Information Section, Current Employment Statistics (CES) <http://worknet.wisconsin.gov/worknet/daces.aspx?menuselection=da> (1990-2009).

Wisconsin Occupied Dwelling Units, by Type of Fuel for Space Heating

1970, 1980, 1990, 2000, 2005 AND 2008 NUMBER OF UNITS AND PERCENT OF TOTAL

Fuel	1970		1980		1990		2000		2005		2008	
Natural Gas	654,851	49.3%	945,092	57.2%	1,111,733	61.0%	1,384,230	66.4%	1,453,768	65.5%	1,492,976	66.4%
Fuel Oil ^a	521,256	39.2%	425,622	25.8%	265,600	14.6%	158,499	7.6%	129,925	5.9%	98,225	4.4%
LP Gas	85,549	6.4%	130,476	7.9%	152,823	8.4%	228,408	11.0%	250,739	11.3%	248,871	11.1%
Electricity	24,763	1.9%	101,489	6.1%	168,615	9.3%	236,755	11.4%	288,829	13.0%	285,056	12.7%
Wood	6,795	0.5%	42,783	2.6%	107,239	5.9%	56,862	2.7%	72,452	3.3%	96,898	4.3%
Coal or Coke	29,708	2.2%	2,591	0.2%	787	0.0%	330	0.0%	583	0.0%	335	0.0%
Solar Energy	NA		NA		NA		NA		456	0.0%	277	0.0%
Other	5,334	0.4%	3,578	0.2%	11,294	0.6%	13,839	0.7%	16,850	0.8%	19,376	0.9%
None	548	0.0%	630	0.0%	4,027	0.2%	5,621	0.3%	5,969	0.3%	7,616	0.3%
Total^b	1,328,804		1,652,261		1,822,118		2,084,544		2,219,571		2,249,630	

^a Includes kerosene.

^b Number of households data may not match due to different data sources.

Source: U.S. Department of Commerce, Bureau of the Census, *Census of Housing* (1970, 1980, 1990 and 2000) and American Community Survey (2005, 2007, 2008).

Wisconsin Occupied Dwelling Units, by Type of Fuel for Water Heating

1970, 1980, 1990, 2000, 2005 AND 2009 NUMBER OF UNITS AND PERCENT OF TOTAL

Fuel	1970		1980		1990 ^c		2000 ^c		2005 ^c		2009 ^c	
Natural Gas	668,219	50.3%	877,135	53.1%	1,036,118	56.9%	1,244,544	59.7%	1,374,571	61.9%	1,429,130	63.5%
Fuel Oil ^a	36,913	2.8%	36,048	2.2%	29,000	1.6%	21,000	1.0%	15,500	0.7%	8,000	0.4%
LP Gas	93,955	7.1%	125,741	7.6%	142,000	7.8%	138,000	6.6%	133,000	6.0%	125,000	5.6%
Electricity	491,803	37.0%	599,827	36.3%	603,000	33.1%	671,000	32.2%	687,500	31.0%	680,000	30.2%
Other ^d	5,865	0.4%	4,755	0.3%	7,000	0.4%	6,000	0.3%	5,500	0.2%	5,000	0.2%
None	32,049	2.4%	8,755	0.5%	5,000	0.3%	4,000	0.2%	3,500	0.2%	2,500	0.1%
Total^b	1,328,804		1,652,261		1,822,118		2,084,544		2,219,571		2,249,630	

^a Includes kerosene.

^b Number of households data may not match due to different data sources.

^c Estimate by Wisconsin Office of Energy Independence.

^d The 'Other' category includes Coal/Coke and Wood fuel sources. Data are available for these fuels for 1970: Coal/Coke (3,612 units; 0.3 percent of total Occupied Dwelling Units) and Wood (864 units; 0.1 percent of total Occupied Dwelling Units).

Source: U.S. Department of Commerce, Bureau of the Census, *Census of Housing* (1970, 1980, 1990 and 2000).

Wisconsin Motor Vehicle Registrations, by Type of Vehicle

TOTAL VEHICLE
REGISTRATIONS
0.54%

In 2009, total vehicle registrations increased by 0.54 percent; auto registrations decreased by 1.7 percent. The truck category includes vans, sports utility vehicles and light trucks.

These data are provided as a factor to help compare the use of motor vehicle fuels across the years.

1970-2009

Year	Autos	Trucks	Buses	Motorcycles	Trailers	Total ^{a,b}
1970	1,762,681	317,096	8,178	53,642	64,065	2,210,492
1975	2,023,427	426,756	11,422	96,629	81,378	2,644,681
1980	2,248,951	665,012	13,375	169,329	93,288	3,215,302
1985	2,310,024	771,264	10,325	176,037	101,030	3,406,196
1990	2,456,175	1,053,280	14,518	149,281	152,712	3,825,966
1995	2,419,389	1,399,236	14,940	161,773	240,841	4,281,803
1996	2,398,351	1,464,366	15,413	136,794	205,177	4,260,959
1997	2,370,453	1,537,241	12,497	161,509	213,415	4,339,088
1998	2,402,019	1,668,241	17,061	151,391	231,934	4,513,250
1999	2,396,072	1,735,326	14,546	171,839	242,849	4,605,088
2000	2,405,408	1,822,078	15,587	160,927	256,890	4,703,294
2001	2,413,001	1,922,916	16,259	192,312	269,931	4,860,457
2002	2,404,081	2,012,847	17,061	183,890	285,471	4,948,282
2003	2,401,816	2,103,643	17,555	215,231	303,852	5,091,716
2004	2,387,459	2,176,903	14,099	207,592	334,898	5,170,728
2005	2,384,717	2,280,170	12,418	278,055	365,435	5,320,795
2006	2,427,905	2,354,954	13,222	266,195	396,374	5,458,650
2007	2,427,882	2,404,895	14,110	324,833	419,816	5,591,536
2008	2,391,300	2,400,680	10,736	307,808	411,871	5,522,395
2009	2,350,931	2,429,921	13,176	355,487	402,766	5,552,281

^a As of June 30.

^b Total includes motor homes, mopeds and municipal vehicles; it does not equal sum of registration types shown before 2005. From 2005 on, motor homes, mopeds and municipal vehicles are included in trucks, motorcycles and autos, respectively.

Source: Wisconsin Department of Transportation (June 2010).

Wisconsin New Single and Two Family Building Permits

1990-2009^a

	1990		2000		2005		2008 ^r		2009	
Type										
Single Family	10,663	94.9%	17,548	93.5%	20,380	94.0%	8,644	96.0%	6,910	96.3%
Two Family	578	5.1%	1,219	6.5%	1,306	6.0%	360	4.0%	269	3.7%
Heating Equipment										
Forced Air	10,299	91.6%	16,972	95.6%	19,256	88.1%	7,718	70.8%	5,846	66.9%
Radiant Electric	225	2.0%	343	1.9%	515	2.4%	254	2.3%	236	2.7%
Heat Pump	15	0.1%	50	0.3%	199	0.9%	275	2.5%	272	3.1%
Boiler	113	1.0%	385	2.2%	1,017	4.7%	653	6.0%	516	5.9%
Not Specified	589	5.2%	10	0.1%	871	4.0%	2,003	18.4%	1,872	21.4%
AC Equipped										
Yes	2,699	24.0%	10,820	57.7%	14,208	65.5%	5,733	63.7%	4,010	55.8%
No	8,542	76.0%	7,947	42.3%	7,499	34.5%	3,272	36.3%	3,175	44.2%
Space Heating Source										
Natural Gas	8,518	75.8%	11,640	61.9%	13,061	60.2%	4,986	55.4%	3,750	52.2%
LP Gas	1,395	12.4%	3,733	19.8%	4,703	21.7%	2,293	25.5%	1,790	24.9%
Oil	109	1.0%	49	0.3%	33	0.2%	6	0.1%	12	0.2%
Electric	240	2.1%	175	0.9%	265	1.2%	337	3.7%	274	3.8%
Solid	51	0.5%	51	0.3%	83	0.4%	150	1.7%	149	2.1%
Solar	0	0.0%	51	0.3%	83	0.4%	47	0.5%	30	0.4%
Not Specified	928	8.3%	3,117	16.6%	3,477	16.0%	1,186	13.2%	1,180	16.4%
Water Heating Source										
Natural Gas	8,326	74.1%	11,690	62.3%	12,348	56.9%	4,744	52.7%	3,466	48.2%
LP Gas	1,082	9.6%	2,746	14.6%	3,484	16.1%	1,477	16.4%	1,243	17.3%
Oil	22	0.2%	12	0.1%	12	0.1%	1	0.0%	3	0.0%
Electric	667	5.9%	1,495	8.0%	2,058	9.5%	1,535	17.0%	1,359	18.9%
Solid	12	0.1%	27	0.1%	58	0.3%	49	0.5%	34	0.5%
Solar	0	0.0%	1	0.0%	36	0.2%	26	0.3%	10	0.1%
Not Specified	1,132	10.1%	2,796	14.9%	3,709	17.1%	1,173	13.0%	1,070	14.9%
Living Area (Sq. Ft)										
1-1,000	394	3.6%	654	3.7%	591	2.8%	443	5.1%	430	6.3%
1,001-1,800	4,784	44.0%	7,681	43.4%	7,764	37.2%	3,501	40.6%	3,004	44.0%
1,801-2,400	3,153	29.0%	4,874	27.5%	6,091	29.2%	2,134	24.8%	1,655	24.2%
2,401-Greater	2,550	23.4%	4,496	25.4%	6,444	30.8%	2,535	29.4%	1,738	25.5%
Total	10,881		17,705		20,890		8,613		6,827	
Average (Sq. Ft)	1,980		1,945		2,148		2,072		1,961	

SINGLE FAMILY
PERMITS
20.1%
FROM
2008 TO 2009

From 2008 to 2009,
there was a 20.1 percent
decrease in construction
for single family
building permits,

TWO-FAMILY
PERMITS
25.3%
FROM
2008 TO 2009

and a 25.3 percent
decrease for two-family
building permits.

There was a
36.2 percent decrease
for solar space heating,
and a 61.5 percent
decrease in solar for
water heating. Natural
gas and propane remain
the most commonly
used fuels for space and
water heating.

^a These statistics are incomplete before January 1, 2005, as not all municipalities who issue building permits reported this information.

^r Revised.

Source: Wisconsin Department of Commerce, Division of Safety and Buildings <http://www.commerce.state.wi.us/SB/SB-StatsUDCStatisticsList.html>;
Amerifax Data Corporation, <http://www.home2000.com/adc/welcome.htm> (1970-2009).

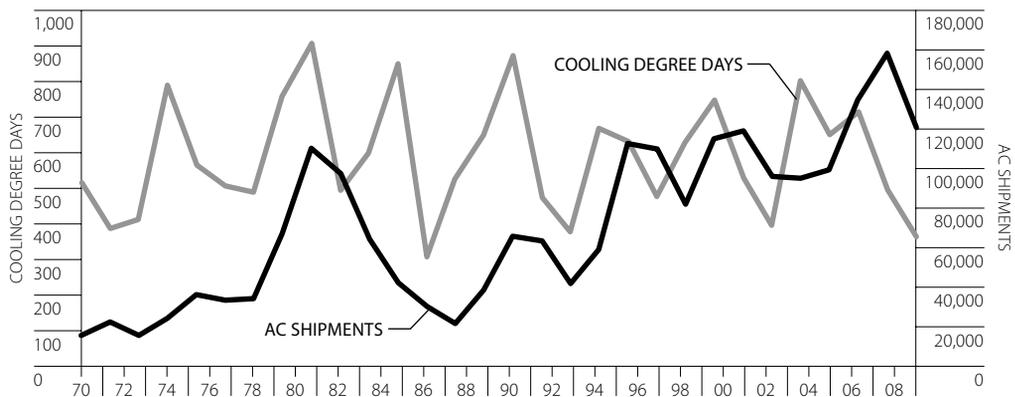
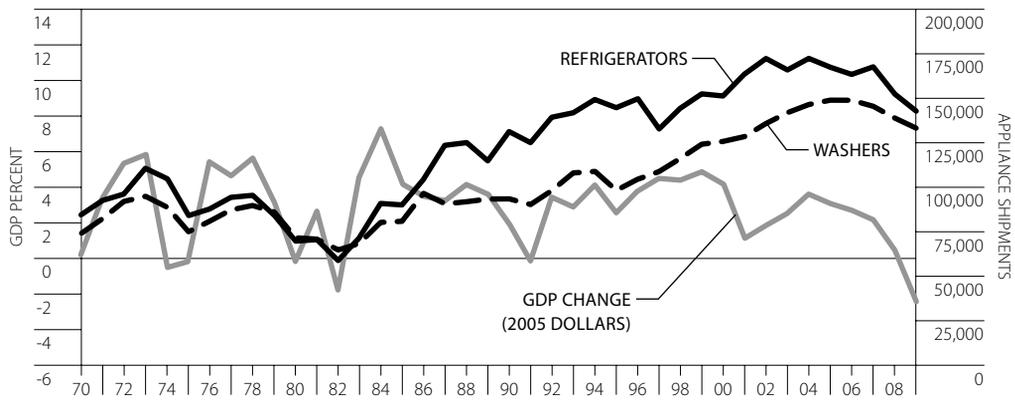
Wisconsin Appliance Shipments, by Type, Cooling Degree Days and Gross National Product

The first graph plots shipments of refrigerators and washing machines against the annual percent change in the U.S. Gross Domestic Product (GDP) in constant 2005 U.S. dollars. This graph illustrates the relationship between large appliance purchases, the national economy and energy consumption.

1970-2009

Year	Cooling Degree Days	Percent Change in GDP	Refrigerators	Room Air Conditioners	Washers
1970		0.19%	84,180	62,715	73,666
1975		-0.21%	83,658	31,297	74,547
1980	515	-0.27%	69,380	15,290	71,230
1985	505	4.14%	89,700	33,100	80,500
1990	598	1.88%	130,800	64,100	93,100
1995	866	2.51%	144,300	65,400	97,800
2000	473	4.14%	150,900	109,600	125,400
2005	797	3.05%	167,062	94,773	148,563
2006	648	2.67%	163,019	99,097	148,519
2007	712	2.14%	167,234	134,569	145,139
2008	495	0.44%	152,087	157,601	138,575
2009	363	-2.44%	142,502	120,597	132,900

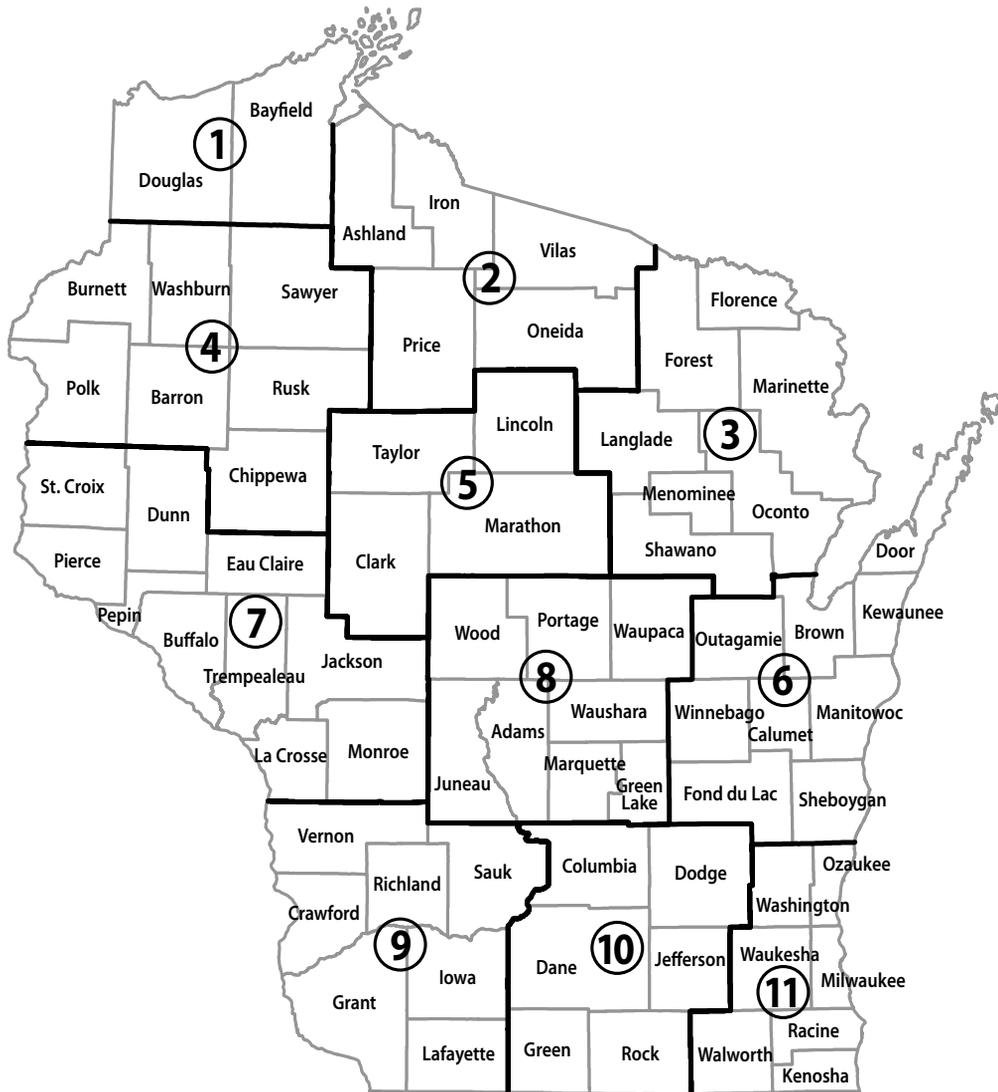
The second graph plots appliance shipments of room air conditioners (RACs) against Wisconsin's Cooling Degree Days (CDDs)^a to demonstrate the relationship between appliance purchases, energy consumption and the weather.



^a Additional information about degree days can be found at the end of this chapter.

Source: Association of Home Appliance Manufacturers, *Distributor Sales by State—2009*; Association of Home Appliance Manufacturers, *Trends in Energy Efficiency—2009*. Compiled from tables in this chapter on Cooling Degree Days and the Gross Domestic Product.

Wisconsin Degree Day Zones



The energy needed to heat and cool homes and other buildings strongly depends on the outdoor temperature. The next few pages provide a set of tables listing typical and historic degree day figures throughout Wisconsin in eleven degree day zones—shown in the map on the left.

Heating and cooling degree days are relative measures of outdoor air temperature, and are defined as deviations of the mean daily temperature below or above a base temperature of 65 degrees Fahrenheit. Data for this section are collected through a partnership with the Wisconsin State Climatology Office.

Heating and cooling degree days are provided as population-weighted averages for the state, to provide a point of reference for comparing the severity of winters and summers to statewide energy use.

Source: Wisconsin Office of Energy Independence.

Wisconsin Normal Heating Degree Days, by Zone and Month

Heating degree days are relative measurements of outdoor air temperature and are defined as deviations of the mean daily temperature below a base temperature (65 degrees Fahrenheit, by convention). For example, a weather station recording a mean daily temperature of 40 degrees Fahrenheit would report 25 heating degree days. The normal heating degree days for each zone and month are the 30-year averages, from 1971 through 2000.

Month	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	Zone 6	Zone 7	Zone 8	Zone 9	Zone 10	Zone 11	State ^a
January	1,715	1,688	1,612	1,678	1,654	1,537	1,647	1,635	1,568	1,490	1,384	1,507
February	1,374	1,371	1,321	1,317	1,329	1,270	1,301	1,311	1,233	1,209	1,132	1,223
March	1,182	1,176	1,120	1,088	1,107	1,065	1,064	1,086	997	978	949	1,016
April	768	725	682	621	637	638	601	629	576	576	611	616
May	412	367	334	286	316	301	263	301	263	261	318	300
June	138	128	106	83	79	85	58	71	51	63	86	79
July	48	50	35	27	18	19	16	20	13	12	13	17
August	71	83	60	53	57	38	31	50	42	33	18	33
September	267	283	246	218	232	208	197	208	171	183	134	180
October	614	640	590	555	572	540	551	535	501	504	443	505
November	1,044	1,057	991	1,018	1,012	925	997	986	937	892	808	900
December	1,517	1,512	1,431	1,508	1,480	1,350	1,470	1,450	1,378	1,298	1,200	1,323
Total	9,150	9,080	8,528	8,452	8,493	7,976	8,196	8,282	7,730	7,499	7,096	7,699

^a Population-weighted statewide average, based on 2000 census.

Source: National Oceanic and Atmospheric Administration, "Monthly Normals of Temperature, Precipitation, and Heating and Cooling Degree Days, 1971-2000 Wisconsin" *Climatology of the United States No. 81 (by State)*, (December 2000).

Wisconsin Normal Cooling Degree Days, by Zone and Month

Cooling degree days are relative measurements of outdoor air temperature and are defined as deviations of the mean daily temperature above a base temperature (65 degrees Fahrenheit, by convention). For example, a weather station recording a mean daily temperature of 90 degrees Fahrenheit would report 25 cooling degree days. The normal cooling degree days for each zone and month are the 30-year averages, from 1971 through 2000.

Month	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	Zone 6	Zone 7	Zone 8	Zone 9	Zone 10	Zone 11	State ^a
April	0	0	1	1	1	3	1	1	1	6	5	3
May	10	25	25	38	29	24	44	36	35	33	27	30
June	31	52	73	85	88	95	111	92	108	123	114	105
July	116	117	147	164	166	177	214	164	200	214	222	199
August	83	83	105	121	125	126	155	120	163	154	180	151
September	10	11	23	20	16	36	28	27	35	48	63	44
October	0	0	1	0	0	2	1	1	1	4	5	3
Total	250	288	375	429	425	463	554	441	543	582	616	535

^a Population-weighted statewide average, based on 2000 census.

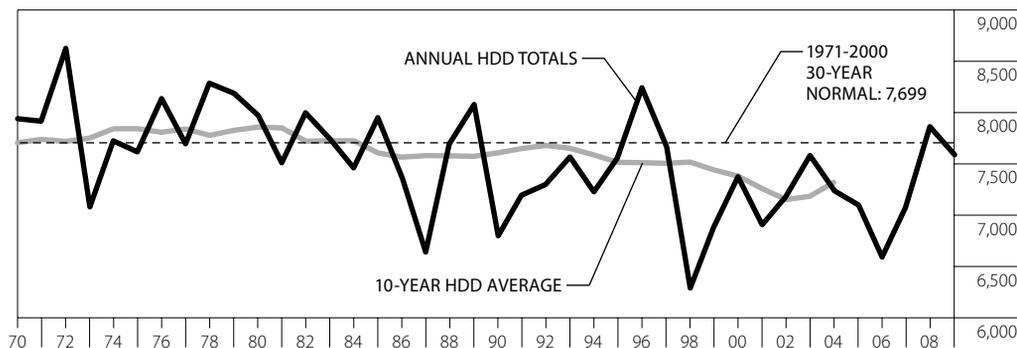
Source: National Oceanic and Atmospheric Administration, "Monthly Normals of Temperature, Precipitation, and Heating and Cooling Degree Days, 1971-2000 Wisconsin" *Climatology of the United States No. 81 (by State)*, (December 2000).

Wisconsin Population-Weighted Heating Degree Days

1970-2009

What significance does the number of HDDs have on energy use? Increased HDDs means that space heating is used more because the temperature is cooler. Fewer HDDs means that space heating is used less because the temperature is warmer. Fluctuations in HDDs can also influence such variables as price and volume of winter heating fuels (e.g., propane, heating oil, natural gas).

The 10-year average and 30-year normal^b are presented here as a point of reference for the variation in HDDs. The 10-year average is plotted in the middle of an 11-year period, averaging the five years previous to, and five years after, the plotted year. For example, the number plotted on the graph at 2003 is the average of 1998 through 2008. The 10-year average is not plotted for 2005 through 2009 because these averages cannot yet be calculated.



Month	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
Normal	1,507	1,223	1,016	616	300	79	17	33	180	505	900	1,323	7,699
1970	1,715	1,292	1,116	565	295	81	15	15	179	430	888	1,343	7,934
1975	1,375	1,246	1,212	790	221	74	23	17	258	412	713	1,268	7,609
1980	1,465	1,378	1,141	582	240	117	8	14	177	634	867	1,345	7,968
1985	1,614	1,296	883	474	189	107	7	32	194	486	993	1,660	7,935
1990	1,141	1,119	880	532	361	52	19	19	131	497	708	1,321	6,780
1995	1,344	1,197	890	682	254	38	8	1	213	455	1,097	1,375	7,554
2000	1,428	1,057	759	626	245	86	26	15	189	384	909	1,636	7,360
2005	1,436	1,043	1,073	491	331	20	9	12	75	425	811	1,369	7,095
2006	1,044	1,203	949	441	265	46	3	7	190	599	761	1,068	6,576
2007	1,282	1,398	853	615	201	35	11	13	130	319	879	1,337	7,073
2008	1,451	1,378	1,111	579	350	42	7	11	107	478	861	1,477	7,852
2009	1,689	1,160	977	607	264	106	34	50	96	607	671	1,323	7,584

2009 HDD
1.5%
 BELOW
 THE 30-YEAR
 NORMAL

Using population-weighted^a heating degree days (HDDs) as an index, the winter for 2009 was warmer than the winter of 2008, with 3.4 percent fewer HDDs. In 2009, the number of HDDs (7,584) was 1.5 percent below the 30-year normal (7,699).

The 10-year average is plotted using area-weighted HDDs. The state climatologist uses area to weight these data, where the rest of the HDD data in this publication is weighted by population to better illustrate the connection between degree days and energy consumption.

^a Population-weighted heating degree days are derived by multiplying the number of heating degree days in each degree day zone by the population in that degree day zone, adding the products, then dividing by the total state population (based on 2000 census data).

^b The 30-year normal runs from 1971 to 2000 and is developed by the National Oceanographic and Atmospheric Agency (NOAA).

Source: Wisconsin Office of Energy Independence, degree day data based on daily data from the University of Wisconsin-Madison, Wisconsin State Climatology Office (<http://www.aos.wisc.edu/~sco/>) (1970-2009).

2008 Wisconsin Heating Degree Days, by Zone and Month

Month	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	Zone 6	Zone 7	Zone 8	Zone 9	Zone 10	Zone 11	State ^a
January	1,589	1,570	1,533	1,648	1,607	1,481	1,621	1,494	1,585	1,468	1,313	1,451
February	1,503	1,548	1,488	1,541	1,554	1,415	1,518	1,445	1,494	1,392	1,240	1,378
March	1,297	1,343	1,257	1,243	1,283	1,155	1,200	1,182	1,155	1,089	1,000	1,111
April	787	758	667	716	679	559	641	589	568	514	554	579
May	504	441	396	380	373	337	345	351	293	317	359	350
June	166	91	66	75	53	31	28	48	19	16	49	42
July	45	14	9	9	4	3	4	4	2	2	11	7
August	78	44	31	26	25	10	18	12	17	8	2	11
September	212	186	167	185	162	140	137	115	122	97	58	107
October	614	613	571	558	554	513	530	529	545	487	396	478
November	1,010	1,018	969	976	932	904	950	906	857	844	780	861
December	1,685	1,680	1,618	1,702	1,649	1,542	1,648	1,584	1,531	1,480	1,311	1,477
Total	9,490	9,306	8,772	9,059	8,875	8,090	8,640	8,259	8,188	7,714	7,073	7,852

^a Population-weighted statewide average, based on 2000 census.

Source: Office of Energy Independence, degree day data based on daily data from the University of Wisconsin-Madison, State Climatology Office (<http://www.aos.wisc.edu/~sco/>)

2009 Wisconsin Heating Degree Days, by Zone and Month

Month	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	Zone 6	Zone 7	Zone 8	Zone 9	Zone 10	Zone 11	State ^a
January	1,884	1,893	1,833	1,974	1,821	1,773	1,844	1,783	1,794	1,681	1,517	1,689
February	1,314	1,342	1,279	1,331	1,238	1,215	1,276	1,211	1,162	1,153	1,051	1,160
March	1,166	1,190	1,120	1,122	1,084	1,049	1,053	1,043	926	918	890	977
April	754	718	677	634	621	636	589	650	583	569	589	607
May	424	377	347	311	265	302	255	262	259	210	249	264
June	214	163	144	142	109	116	114	104	71	63	108	106
July	109	85	63	71	44	33	33	64	61	34	15	34
August	124	93	81	79	53	59	47	54	59	42	37	50
September	138	130	133	97	106	126	97	102	120	94	72	96
October	757	752	701	751	711	634	700	674	697	597	512	607
November	783	790	748	793	734	690	736	716	713	677	598	671
December	1,516	1,512	1,454	1,577	1,434	1,375	1,468	1,361	1,405	1,318	1,187	1,323
Total	9,183	9,045	8,580	8,882	8,220	8,008	8,212	8,024	7,850	7,356	6,825	7,584

^a Population-weighted statewide average, based on 2000 census.

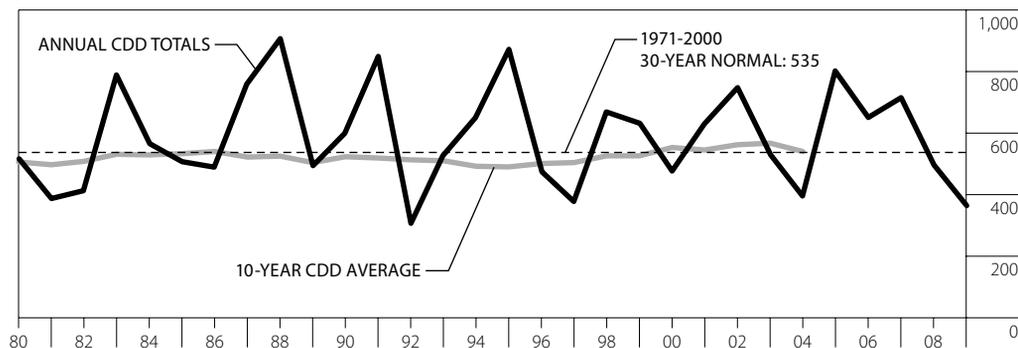
Source: Office of Energy Independence, degree day data based on daily data from the University of Wisconsin-Madison, State Climatology Office (<http://www.aos.wisc.edu/~sco/>)

Wisconsin Population-Weighted Cooling Degree Days

1980-2009

What significance does the number of CDDs have on energy use? Increased CDDs means that air conditioning may be used more because the temperature is warmer. Fewer CDDs means that air conditioning may be used less because the temperature is cooler. Fluctuations in CDDs can also influence such variables as peak electric demand and the wholesale price of electricity.

The 10-year average and 30-year normal^c are presented here as a point of reference for the variation in CDDs. The 10-year average is plotted in the middle of an 11-year period, averaging the five years previous to, and five years after, the plotted year. For example, the number plotted on the graph at 2003 is the average of 1998 through 2008. The 10-year average is not plotted for 2005 through 2009 because these averages cannot yet be calculated.



Month	April ^b	May	June	July	August	September	October ^b	Total
Normal	3	30	105	199	151	44	3	535
1980	9	34	71	218	156	27	0	515
1985	31	28	60	185	98	103	0	505
1990	32	3	120	176	164	99	4	598
1995	0	8	223	273	310	47	5	866
2000	0	37	88	136	154	53	5	473
2005	3	4	211	228	200	119	32	797
2006	1	52	94	301	169	26	4	647
2007	8	48	132	201	196	90	37	712
2008	0	1	93	195	150	52	4	495
2009	0	14	114	80	123	32	0	363

^a Population-weighted cooling degree days are derived by multiplying the number of cooling degree days in each degree day zone by the population in that degree day zone, adding the products, then dividing by the total state population (based on 2000 census data).

^b Includes March for the years 2001 and 2007. For 1990, the October column also includes November.

^c The 30-year normal runs from 1971 to 2000 and is developed by the National Oceanographic and Atmospheric Agency (NOAA).

Source: Office of Energy Independence, degree day data based on daily data from the University of Wisconsin-Madison, State Climatology Office (<http://www.aos.wisc.edu/~sco/>) (1970-2009).

**SUMMER
2009 CDD
26.7%
FEWER THAN
2008**

Using population-weighted^a cooling degree days (CDD) as an index, the summer of 2009 was cooler than the summer of 2008, with 26.7 percent fewer cooling degree days.

In 2009, the number of cooling degree days (363) was 32.1 percent below the 30-year normal (535).

The 10-year average is plotted using area-weighted CDDs. The state climatologist uses area to weight these data, where the rest of the CDD data in this publication is weighted by population to better illustrate the connection between degree days and energy consumption.

In 2009, the number of CDDs decreased because the summer was cool. 2008 and 2009 represent a slight departure from a trend since 2005 of hotter summers with more CDDs.

2008 Wisconsin Cooling Degree Days, by Zone and Month

Month	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	Zone 6	Zone 7	Zone 8	Zone 9	Zone 10	Zone 11	State ^a
January	0	0	0	0	0	0	0	0	0	0	0	0
February	0	0	0	0	0	0	0	0	0	0	0	0
March	0	0	0	0	0	0	0	0	0	0	0	0
April	0	0	0	0	0	0	0	0	0	0	0	0
May	0	0	0	0	0	0	0	5	7	2	0	1
June	25	39	77	41	40	104	52	79	99	111	109	93
July	92	110	156	173	138	188	186	169	179	220	214	195
August	70	66	107	119	90	138	129	113	89	144	195	150
September	38	29	33	39	32	33	47	47	36	57	69	52
October	0	0	2	3	5	3	4	5	1	4	6	4
November	0	0	0	0	0	0	0	0	0	0	0	0
December	0	0	0	0	0	0	0	0	0	0	0	0
Total	225	244	375	375	305	466	418	418	411	538	593	495

^a Population-weighted statewide average, based on 2000 census.

Source: Office of Energy Independence, degree day data based on daily data from the University of Wisconsin-Madison, State Climatology Office (<http://www.aos.wisc.edu/~sco/>)

2009 Wisconsin Cooling Degree Days, by Zone and Month

Month	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	Zone 6	Zone 7	Zone 8	Zone 9	Zone 10	Zone 11	State ^a
January	0	0	0	0	0	0	0	0	0	0	0	0
February	0	0	0	0	0	0	0	0	0	0	0	0
March	0	0	0	0	0	0	0	0	0	0	0	0
April	0	0	0	0	0	0	2	0	1	0	0	0
May	0	10	8	7	16	6	19	25	9	16	15	14
June	34	83	98	100	107	106	113	114	107	130	119	114
July	23	18	38	40	46	50	60	34	35	62	134	80
August	53	61	80	83	92	92	99	108	71	139	162	123
September	15	18	22	45	31	22	36	29	12	21	45	32
October	0	0	0	0	0	0	0	0	0	0	0	0
November	0	0	0	0	0	0	0	0	0	0	0	0
December	0	0	0	0	0	0	0	0	0	0	0	0
Total	125	190	246	275	292	276	329	310	235	368	475	363

^a Population-weighted statewide average, based on 2000 census.

Source: Office of Energy Independence, degree day data based on daily data from the University of Wisconsin-Madison, State Climatology Office (<http://www.aos.wisc.edu/~sco/>)

Energy Definitions

DEFINITIONS

Energy is the ability to do work. It is stored in various forms including chemical energy in biomass, coal and oil, nuclear energy in uranium, gravitational energy in water used in hydroelectric plants, the wind and the sun.

There are two common ways to account for energy use; **resource energy** consumption and **end-use** energy consumption. End-use refers to the energy content of electricity and other fuels at the point of use by customers. Resource energy includes all energy resources used to generate electricity, including the energy content of the coal, petroleum, nuclear and renewable fuels.

One **British thermal unit (Btu)** is the amount of energy in the form of heat which will raise the temperature of one pound of water one degree Fahrenheit.

One **calorie** is the amount of energy in the form of heat which will raise the temperature of one gram of water one degree Centigrade.

One **Btu** is equal to 252 calories.

One **watt** is a unit of power, or rate of energy delivery, of one joule per second, or equivalently, one ampere of electric current delivered across a potential of one volt. One kilowatt (kW) is 1,000 watts. Ten 100-watt light bulbs require 1,000 watts or 1 kW of power to stay lit at any point in time.

One **kilowatt-hour (kWh)** is one kilowatt of electric power delivered for one hour (or the equivalent). One kilowatt-hour is 1,000 watt-hours. Ten 100-watt light bulbs burning for one hour consume 1,000 watt-hours or 1 kWh.

Heating degree days are relative measurements of outdoor air temperature and are obtained by subtracting the mean daily temperature from an established base temperature of 65 degrees Fahrenheit.

Cooling degree days are relative measurements of outdoor air temperature and are obtained by subtracting an established base temperature of 65 degrees Fahrenheit from the mean daily temperature.

MEASUREMENT OF ENERGY SUPPLIES

Petroleum products are measured in either gallons or barrels. A barrel contains 42 gallons. Petroleum is refined from crude oil into various products such as kerosene, diesel fuel, home heating oil (No. 1 and No. 2 oils), and other heating oils (No. 3 - No. 6), gasoline and liquefied petroleum gas (propane). The energy content of a gallon of each product is listed in the conversion table.

Natural Gas is measured in either Mcf (1,000 cubic feet) or in therms. One Mcf contains approximately ten therms or one million Btu.

Coal is measured in tons. The three broad classifications of coal, in order of greatest energy content, are bituminous, sub-bituminous and lignite.

Wood is usually measured in either tons or cords. A cord is an amount of stacked wood measuring 8 feet x 4 feet x 4 feet. The weight of a cord of wood varies according to the type of wood and its moisture content, but is estimated at 1.5 to 2 tons. A face cord is the 8 feet x 4 feet face of a stacked cord but of shorter width. Common usage is three face cords to a full cord.

Conversion Factors

AVERAGE ENERGY CONTENT OF VARIOUS FUELS

1 kilowatt-hour of electricity	3,413 Btu
1 cubic foot of natural gas	1,008 to 1,034 Btu
1 therm of natural gas	100,000 Btu
1 gallon of liquefied petroleum gas (LPG)	95,475 Btu
1 gallon of crude oil	138,095 Btu
1 barrel of crude oil	5,800,000 Btu
1 gallon of kerosene or light distillate oil	135,000 Btu
1 gallon of middle distillate or diesel fuel oil	138,690 Btu
1 gallon of residual fuel oil	149,690 Btu
1 gallon of gasoline	125,000 Btu
1 gallon of ethanol	84,400 Btu
1 gallon of methanol	62,800 Btu
1 gallon of gasohol (10% ethanol, 90% gasoline)	120,900 Btu
1 pound of coal	8,100 to 13,000 Btu
1 ton of coal	16,200,000 to 26,000,000 Btu
1 ton of coke	26,000,000 Btu
1 ton of wood	9,000,000 to 17,000,000 Btu
1 standard cord of wood	18,000,000 to 24,000,000 Btu
1 face cord of wood	6,000,000 to 8,000,000 Btu
1 pound of low pressure steam (recoverable heat)	1,000 Btu

MEASUREMENT CONVERSIONS

1 short ton (ton) = 2,000 pounds = 6.65 barrels (crude oil)

1 metric ton (tonn) = 2,200 pounds

1 barrel (bbl) = 42 gallons = 5.615 cubic feet = 159.0 liters

1 Mcf = 1,000 cubic feet

1 therm = 10^5 Btu = 100,000 Btu

1 thousand Btu (KBtu) = 1,000 Btu

1 million Btu (MMBtu) = 1,000,000 Btu

1 quad = 10^{15} (quadrillion) Btu or 1,000,000,000 MMBtu

1 kilowatt-hour (kWh) = 1,000 watt-hours

1 megawatt-hour (MWh) = 1,000 kWh or 1,000,000 watt-hours

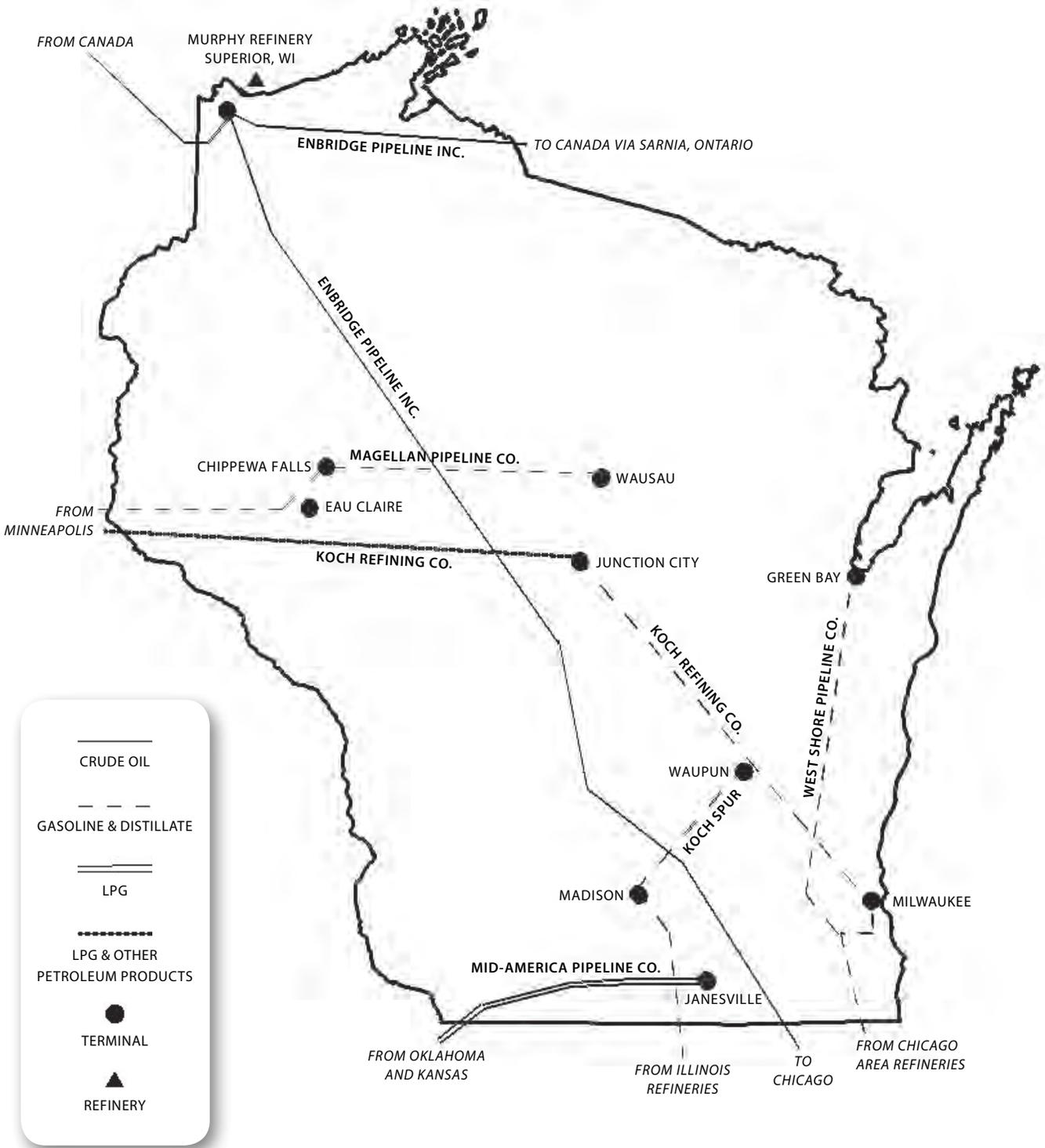
1 gigawatt-hour (GWh) = 1,000 MWh or 1,000,000,000 watt-hours

1 gallon = 4.524 pounds liquefied petroleum gas

1 standard cord of wood = 8 feet x 4 feet x 4 feet = 128 cubic feet = approx. 3,000-4,000 lbs.

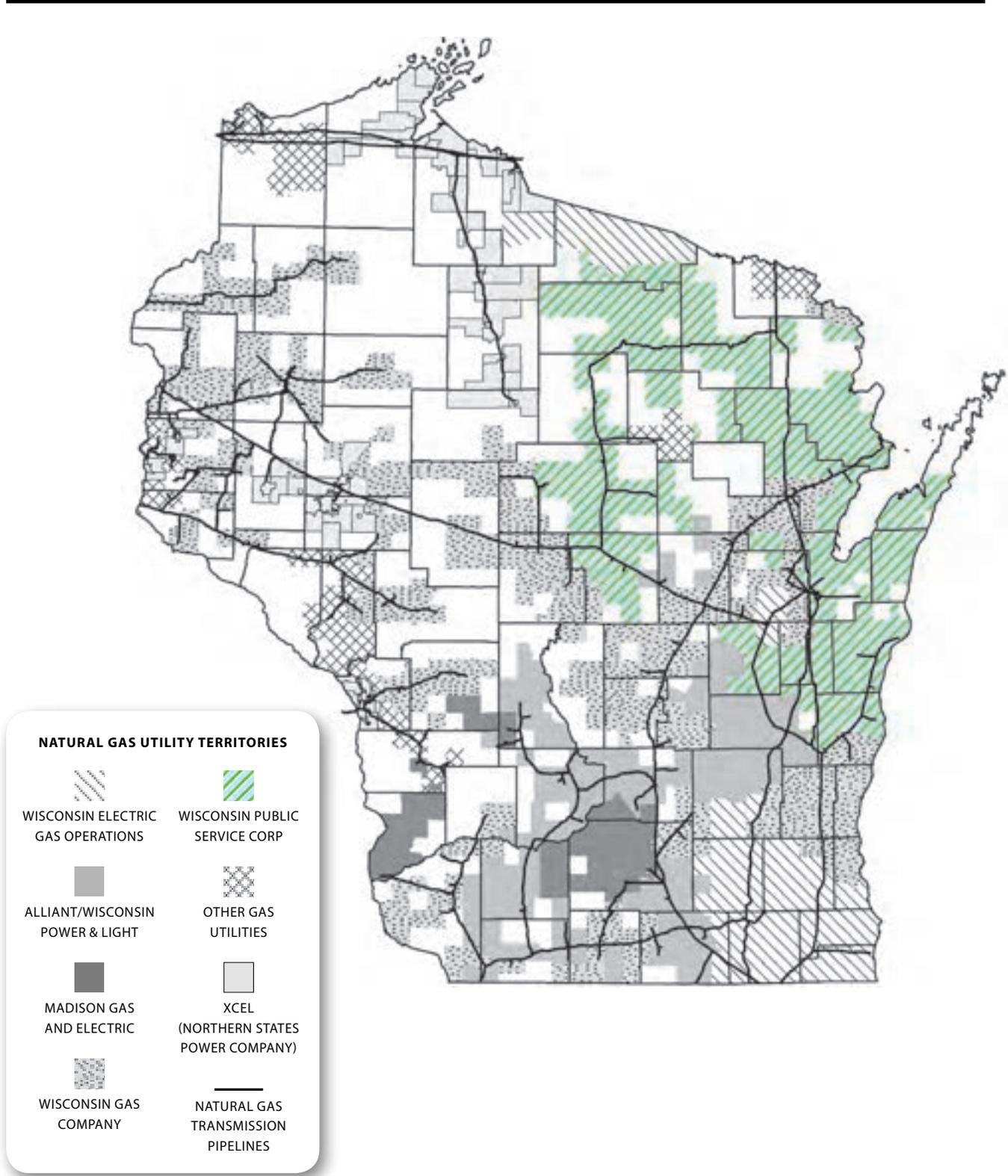
1 face cord of wood = 8 feet x 4 feet x 16 inches = 42.7 cubic feet = approx. 1,333 lbs.

Wisconsin Petroleum Pipelines



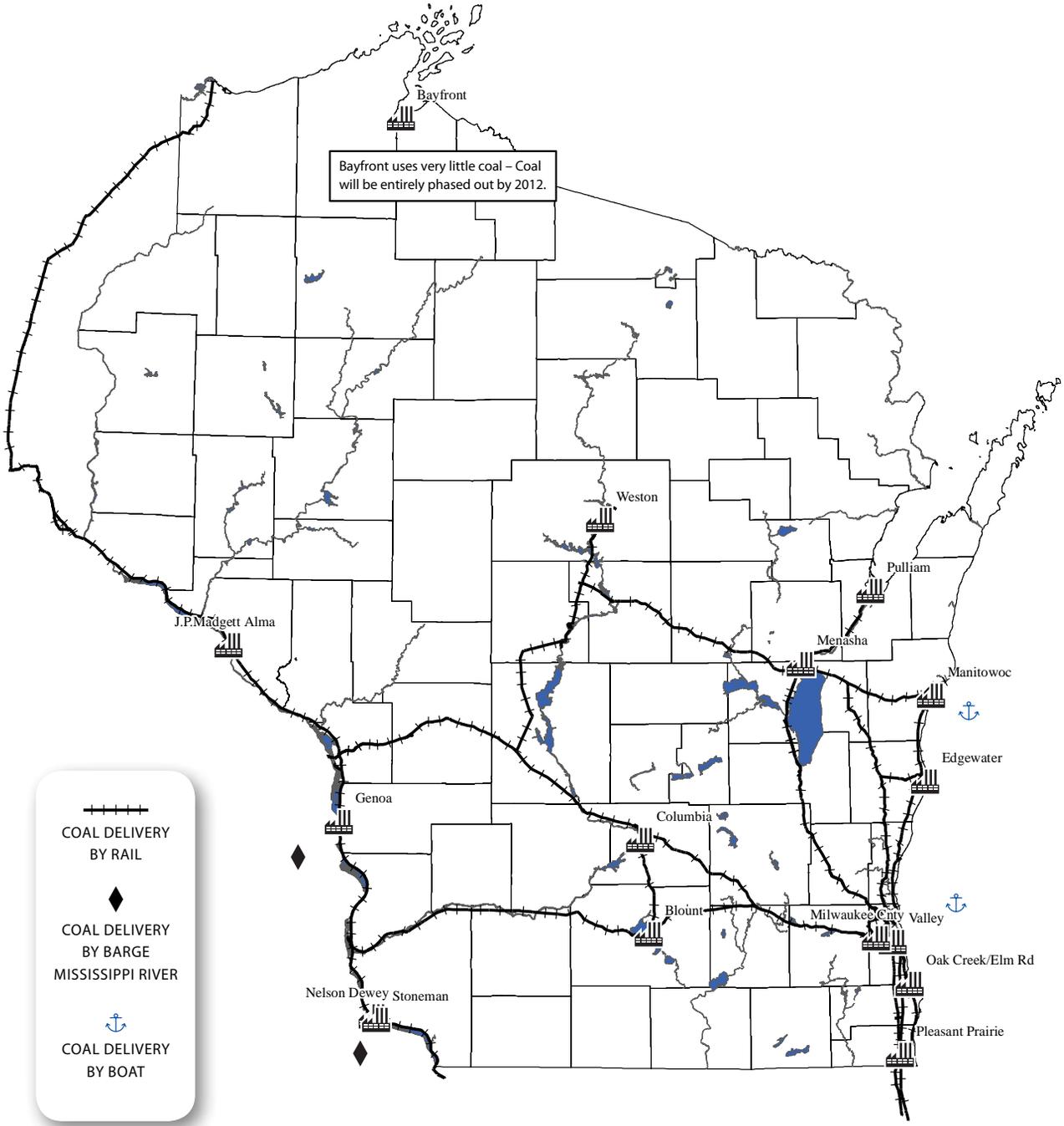
Source: Wisconsin Office of Energy Independence.

Wisconsin Natural Gas Company Territories and Major Pipelines



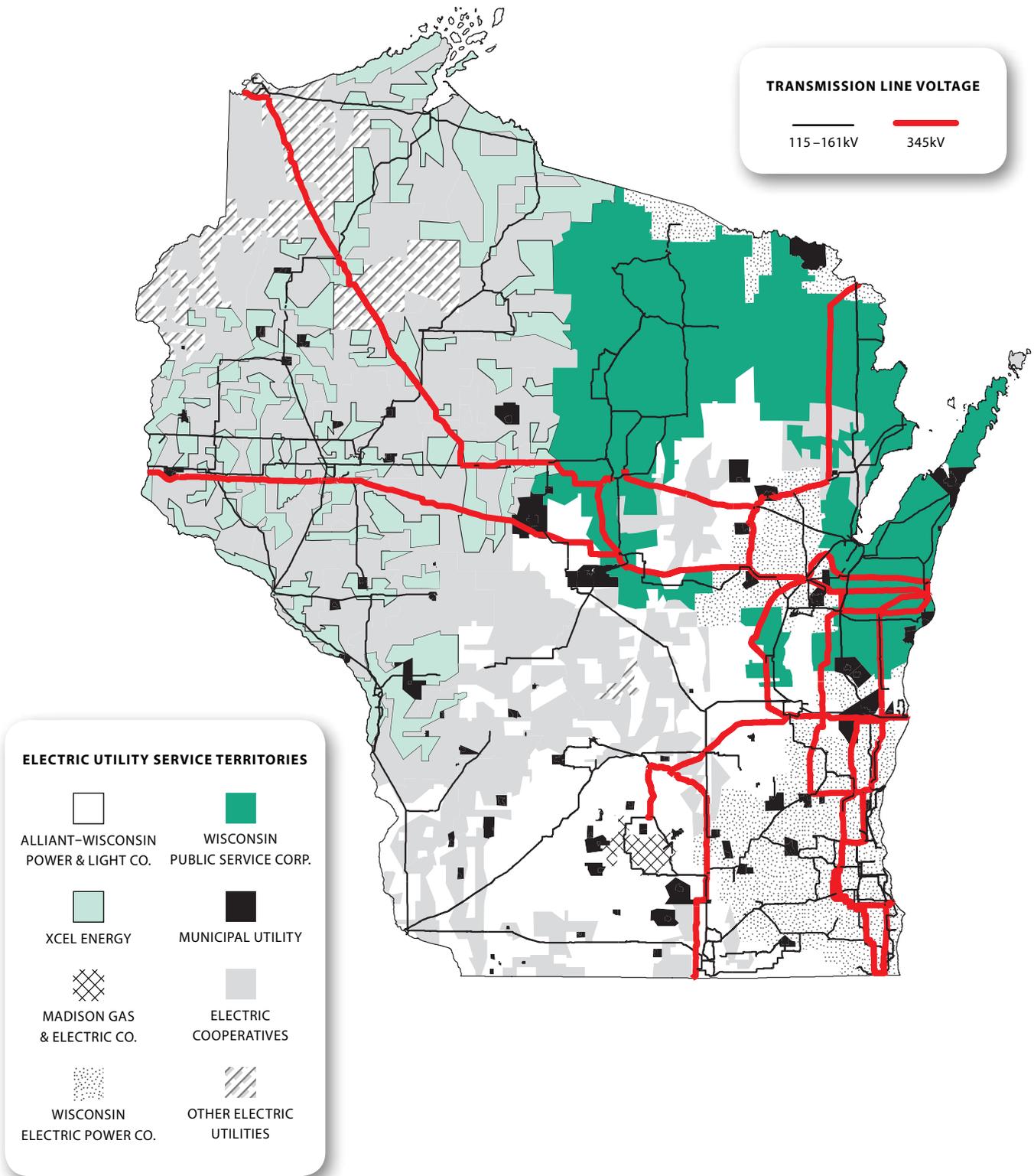
Source: Public Service Commission of Wisconsin.

Coal Transportation Routes in Wisconsin and Major Coal-Fired Power Plants, 2010



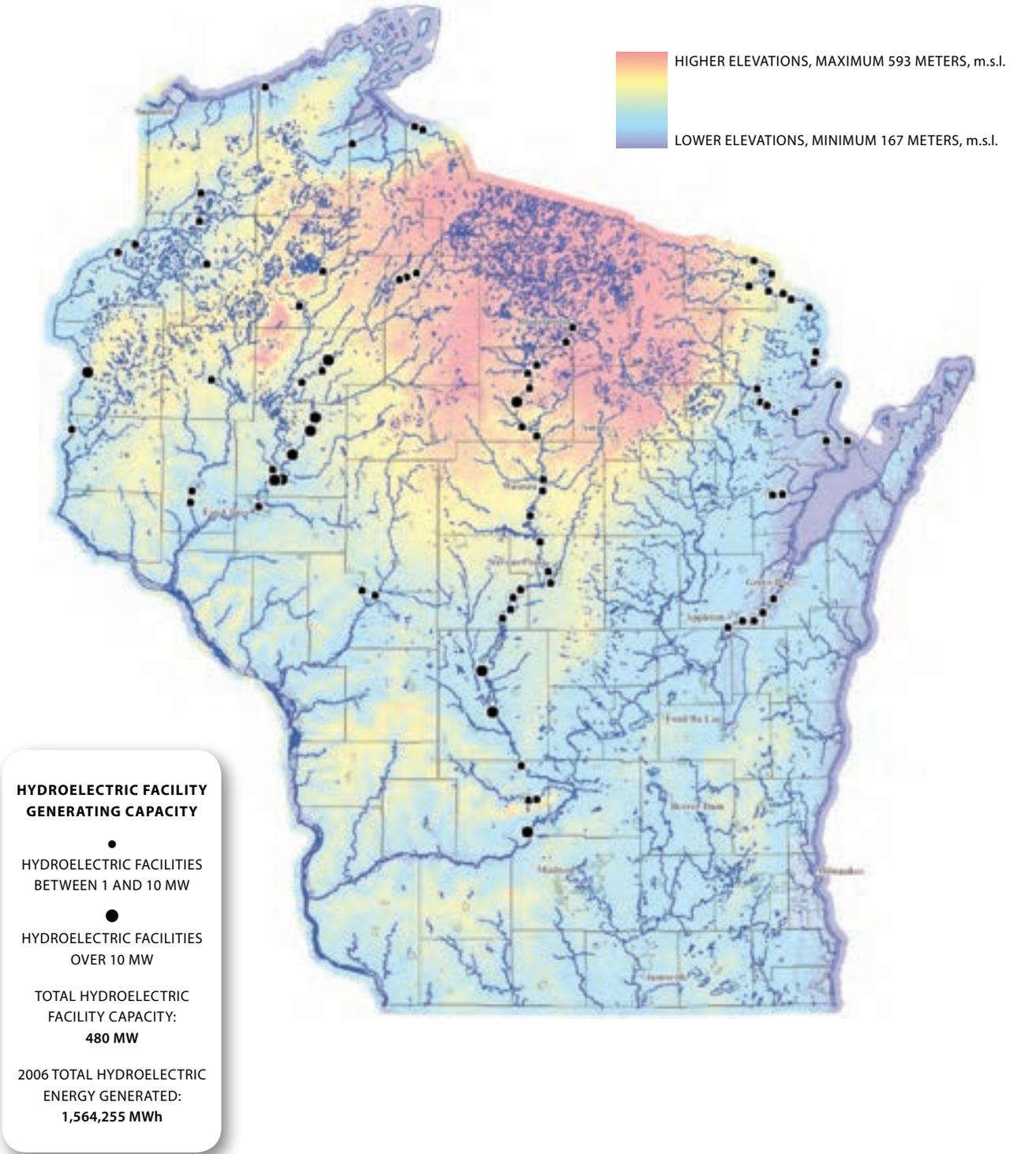
Source: Wisconsin Office of Energy Independence

Major Electric Lines and Service Territories



Source: Public Service Commission of Wisconsin—2010.

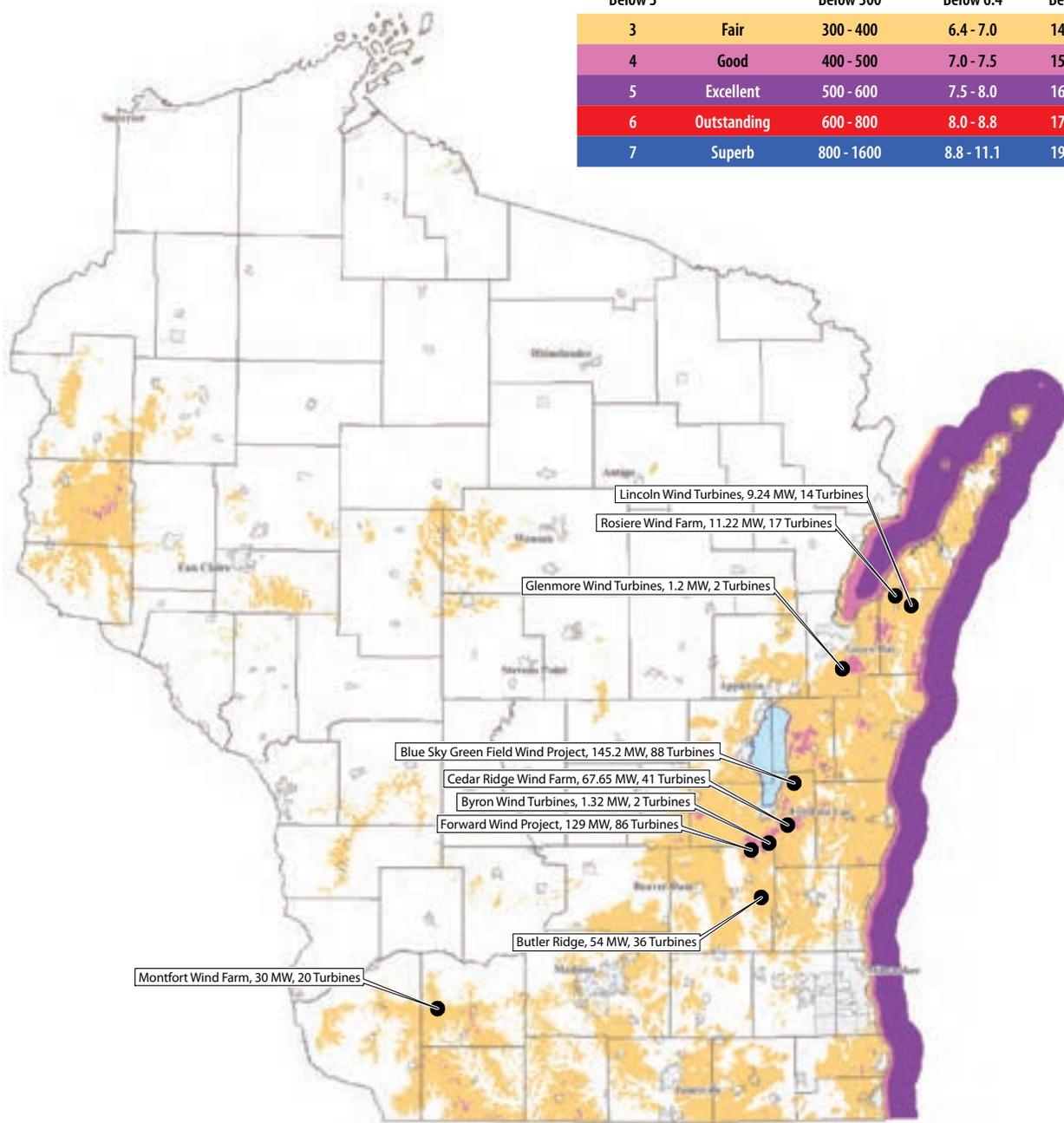
Hydroelectric Generation Sites in Wisconsin, 2010



Capacity and Energy Data Source: Commission of Wisconsin, Gas and Energy Division. Includes hydroelectric generation sites in Wisconsin owned by utilities, merchants, cooperatives, and other nonutilities.
Hydroelectric Facility GIS Data Source: Wisconsin Department of Administration, Division of Energy.

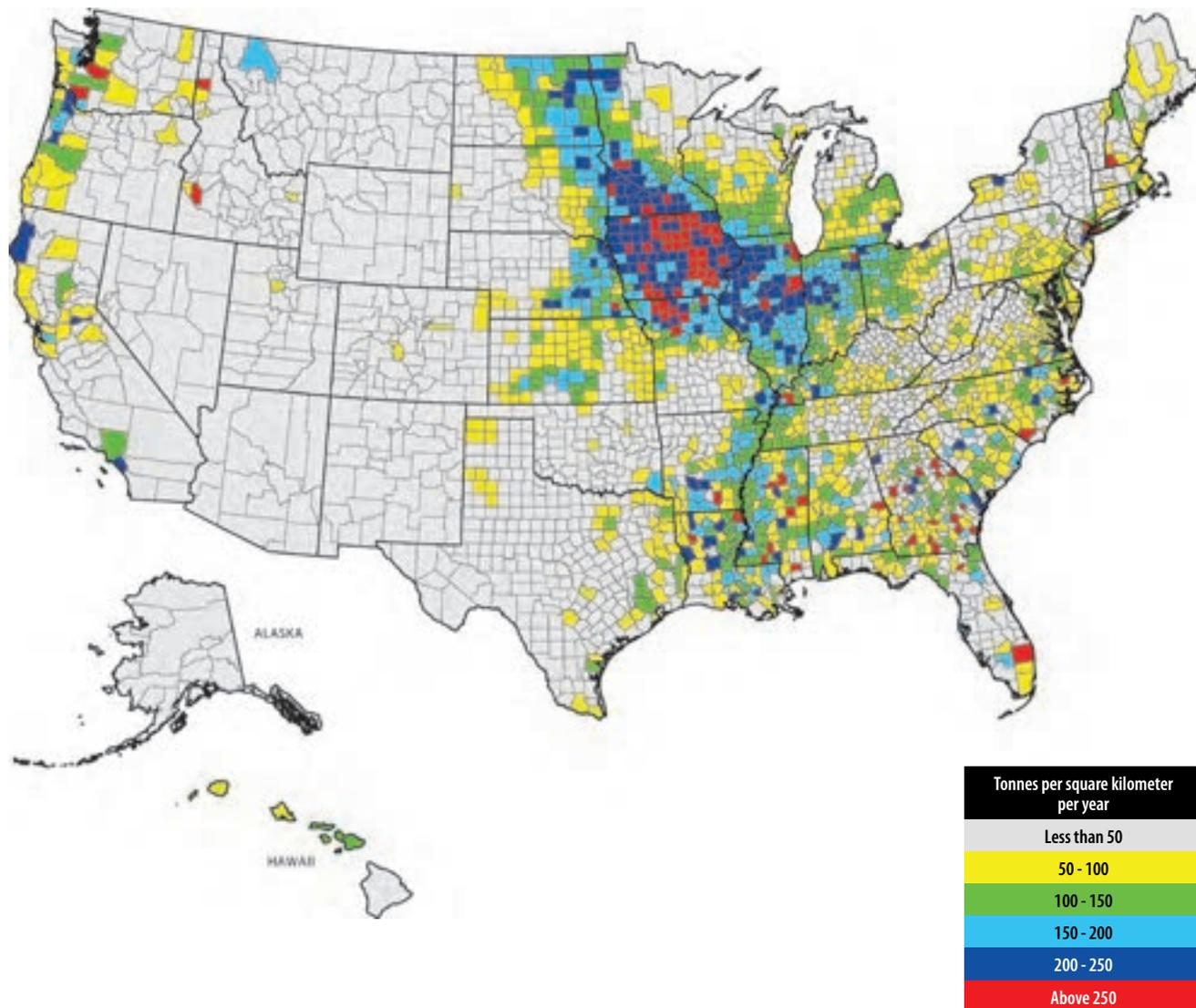
Estimated Wind Power Energy Potential (at 70 meters) and Existing Wind Development Locations, 2010

Wind Power Classification	Resource Potential	Wind Power Density at 70 m (watts/square meter)	Wind Speed at 70 m (m/s)	Wind Speed at 70 m (mph)
Below 3		Below 300	Below 6.4	Below 14.3
3	Fair	300 - 400	6.4 - 7.0	14.3 - 15.7
4	Good	400 - 500	7.0 - 7.5	15.7 - 16.8
5	Excellent	500 - 600	7.5 - 8.0	16.8 - 17.9
6	Outstanding	600 - 800	8.0 - 8.8	17.9 - 19.7
7	Superb	800 - 1600	8.8 - 11.1	19.7 - 24.8



Wind Data Source: AWS Truewind, 2008

Biomass Resources Available in the United States



Based on the map titled "Biomass Resources Available in the United States," distributed by the National Renewable Energy Laboratory (NREL), <http://www.nrel.gov/>.

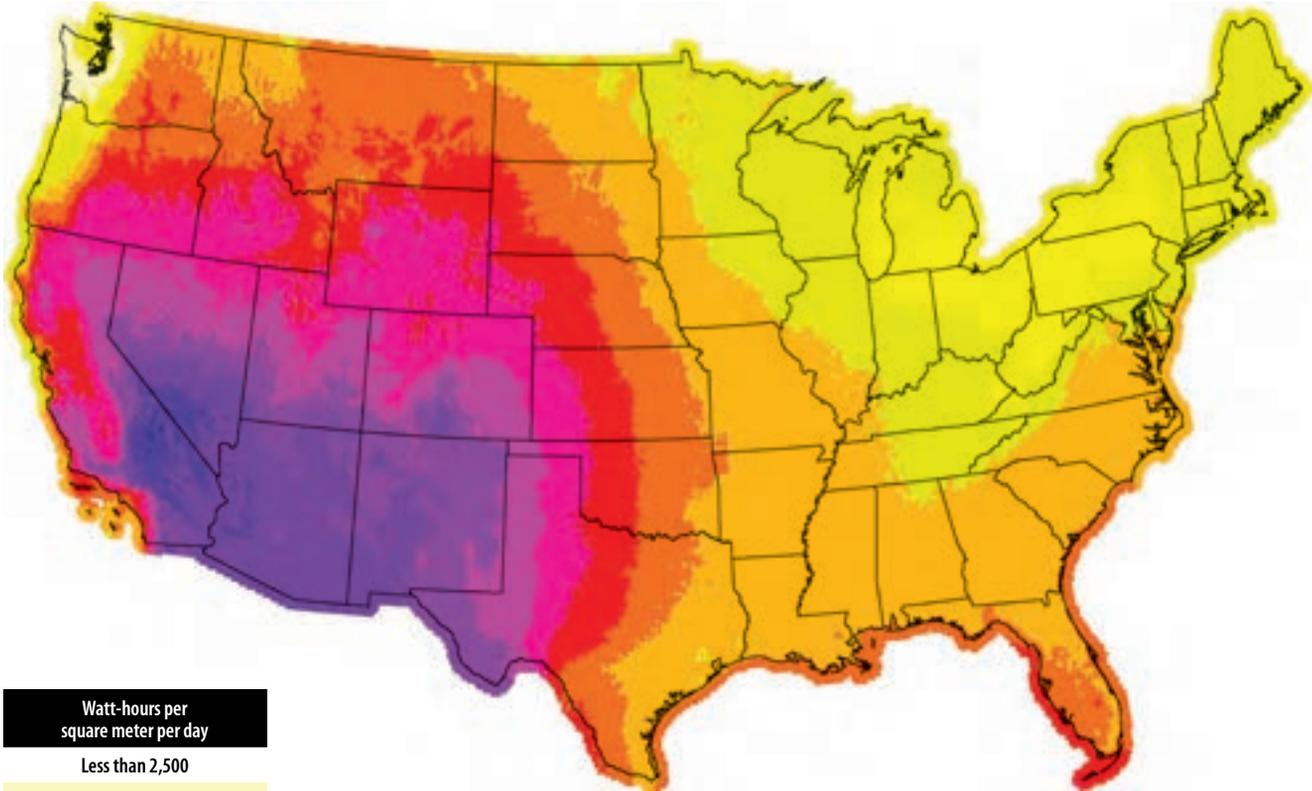
GIS Data Source: <http://www.nrel.gov/>.

GIS Data Metadata: None available.

Notes from the original NREL map: This study estimates the technical biomass resources currently available in the United States by county. It includes the following feedstock categories:

- Agricultural residues (crops and animal manure).
- Wood residues (forest, primary mill, secondary mill, and urban wood).
- Municipal discards (methane emissions from landfills and domestic wastewater treatment).
- Dedicated energy crops (on Conservation Reserve Program and Abandoned Mine Lands).

Estimated Solar Insolation for the United States, Two-Axis Tracker



Watt-hours per square meter per day
Less than 2,500
2,500 - 3,000
3,000 - 3,500
3,500 - 4,000
4,000 - 4,500
4,500 - 5,000
5,000 - 5,500
5,500 - 6,000
6,000 - 6,500
6,500 - 7,000
7,000 - 7,500
7,500 - 8,000
Above 8,000

GIS Data Source: <http://www.nrel.gov/>

Purpose: Provide information on the solar resource potential for the 48 contiguous states. The insolation values represent the average solar energy available to a concentrating collector on a 2-axis tracker, such as a dish or a power tower.