



2011 and 2012

Wisconsin Energy Statistics

Wisconsin State Energy Office

Acknowledgements

Wisconsin's State Energy Office 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 State Energy Office 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. Publicly-funded programs and private businesses that have contributed data toward this publication include Focus on Energy, landfill and wastewater treatment facilities, railroads, schools, and natural gas pipelines.

Holly Laux O'Higgins and Jim Mapp authored this publication. 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 refueled with E85 ethanol represents Wisconsin's largest home-grown contribution to renewable transportation fuels. Photo courtesy of the Wisconsin State Energy Office.

2011 and 2012 Wisconsin Energy Statistics

State Energy Office

101 E. Wilson Street, 6th Floor

PO Box 7868

Madison, WI 53707-7868



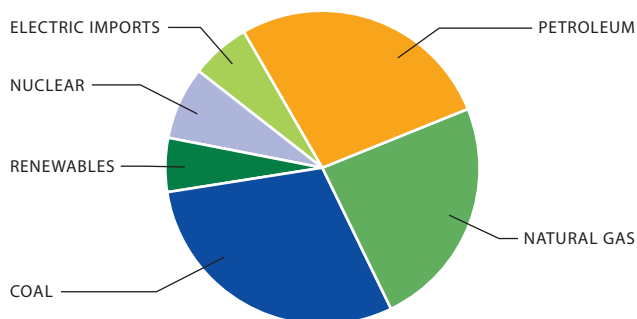
Wisconsin Resource Energy Consumption

Resource energy consumption decreased by 0.8 percent in 2011. 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: 1,647.6 TRILLION BTU

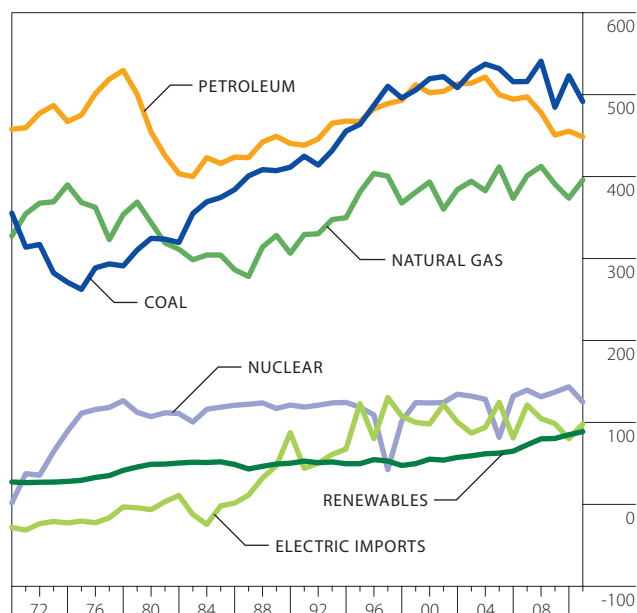
By Type of Fuel

2011 TRILLIONS OF BTU AND PERCENT OF TOTAL



Type of Fuel	2011 Trillions of Btu	2011 Percent of Total
Renewables	88.7	5.4%
Electric Imports	98.1	6.0%
Nuclear	124.8	7.6%
Natural Gas	395.8	24.0%
Petroleum	448.6	27.2%
Coal	491.5	29.8%

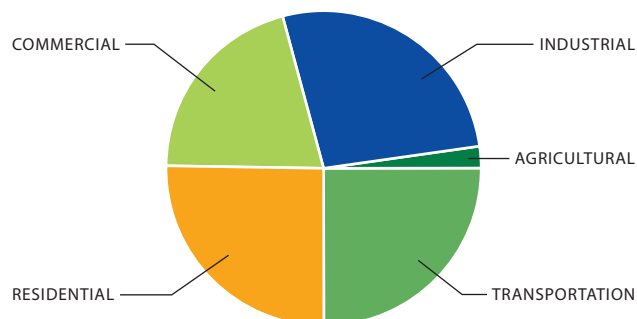
1970-2011 TRILLIONS OF BTU



Source: Wisconsin State Energy Office.

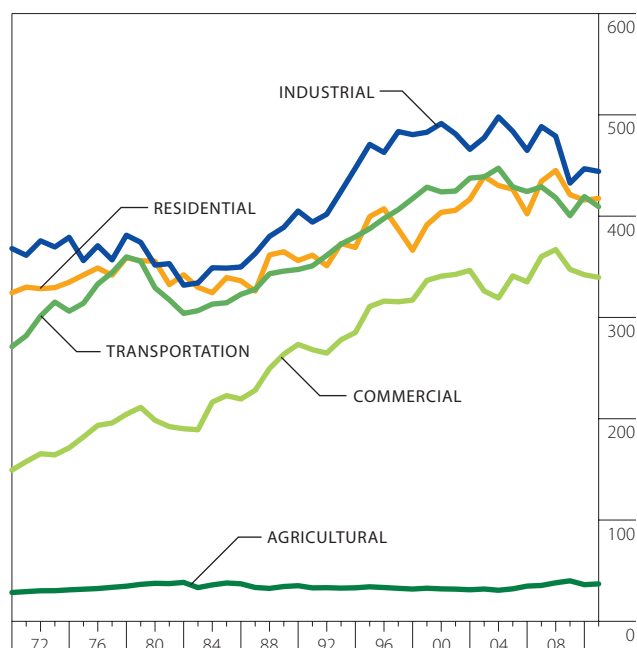
By Economic Sector

2011 TRILLIONS OF BTU AND PERCENT OF TOTAL



Economic Sector	2011 Trillions of Btu	2011 Percent of Total
Agricultural	37.0	2.2%
Commercial	339.6	20.6%
Transportation	409.4	24.8%
Residential	417.4	25.3%
Industrial	444.2	27.0%

1970-2011 TRILLIONS OF BTU



Source: Wisconsin State Energy Office.

Wisconsin End-Use Energy Consumption

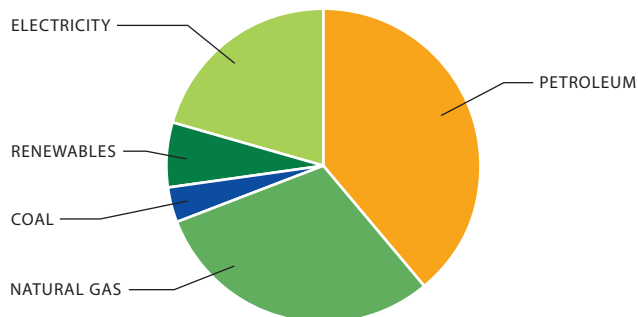
End-use energy increased by 1.0 percent overall in 2011.

End-use energy is a measure of the energy content of fuels at the point of consumption.

TOTAL END-USE ENERGY CONSUMPTION: 1,148.7 TRILLION BTU

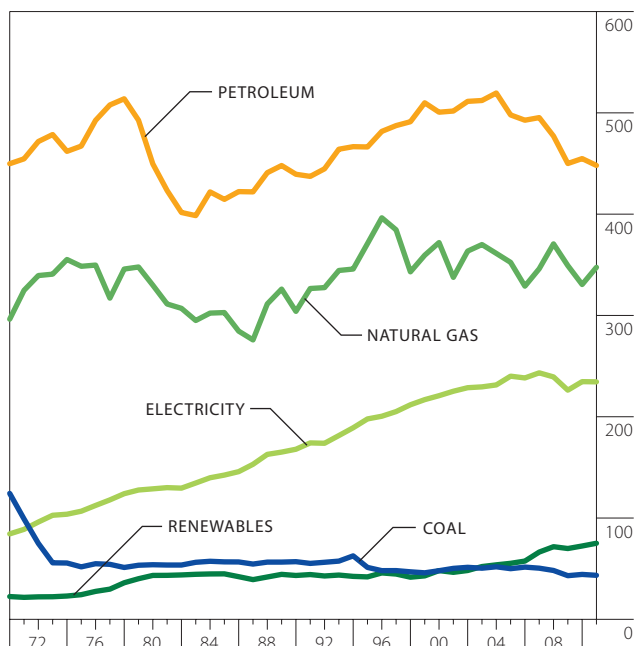
By Type of Fuel

2011 TRILLIONS OF BTU AND PERCENT OF TOTAL



Type of Fuel	2011 Trillions of Btu	2011 Percent of Total
Coal (non-utility)	43.5	3.8%
Renewables	75.1	6.5%
Electricity	234.5	20.4%
Natural Gas	347.5	30.3%
Petroleum	448.1	39.0%

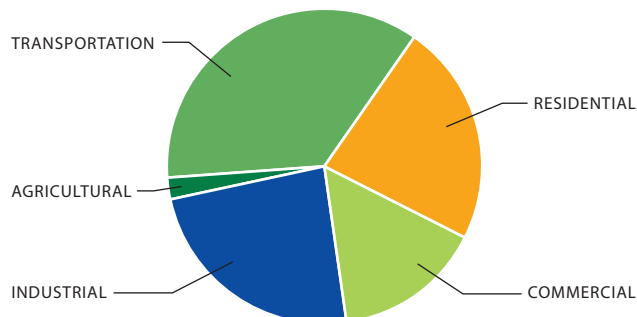
1970-2011 TRILLIONS OF BTU



Source: Wisconsin State Energy Office.

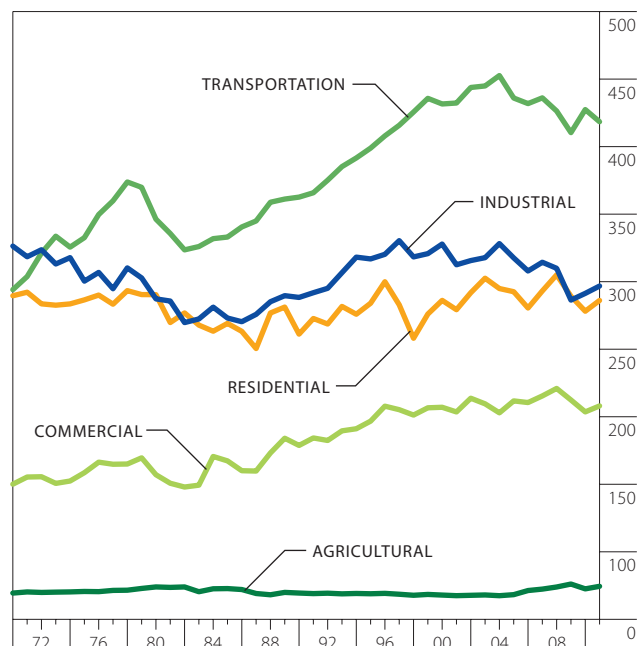
By Economic Sector

2011 TRILLIONS OF BTU AND PERCENT OF TOTAL



Economic Sector	2011 Trillions of Btu	2011 Percent of Total
Agricultural	27.2	2.4%
Commercial	175.6	15.3%
Residential	262.3	22.8%
Industrial	274.2	23.9%
Transportation	409.4	35.6%

1970-2011 TRILLIONS OF BTU



Source: Wisconsin State Energy Office.

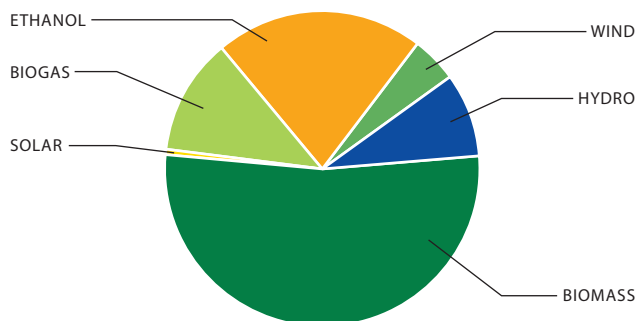
Wisconsin Renewable Energy Production

Overall renewable energy use in Wisconsin increased 4.4 percent in 2011.

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).

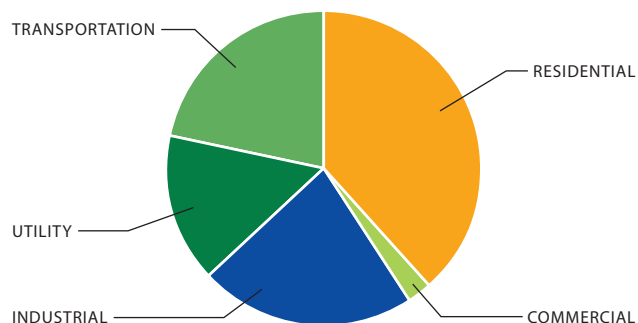
By Type of Fuel

2011 TRILLIONS OF BTU AND PERCENT OF TOTAL

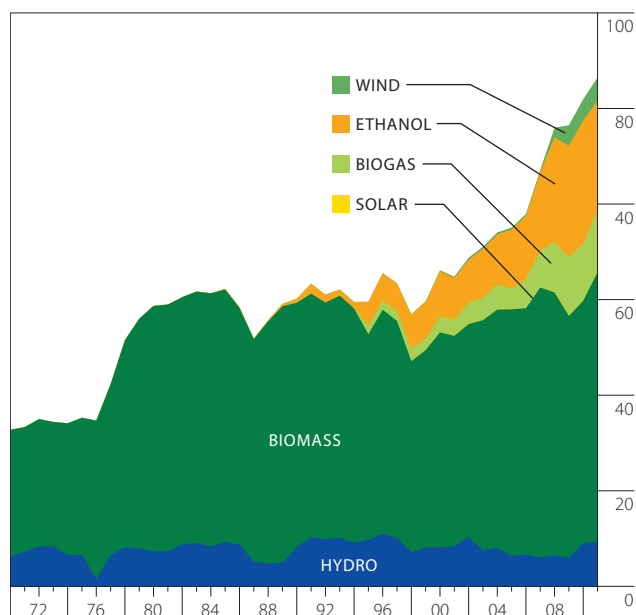


By Economic Sector

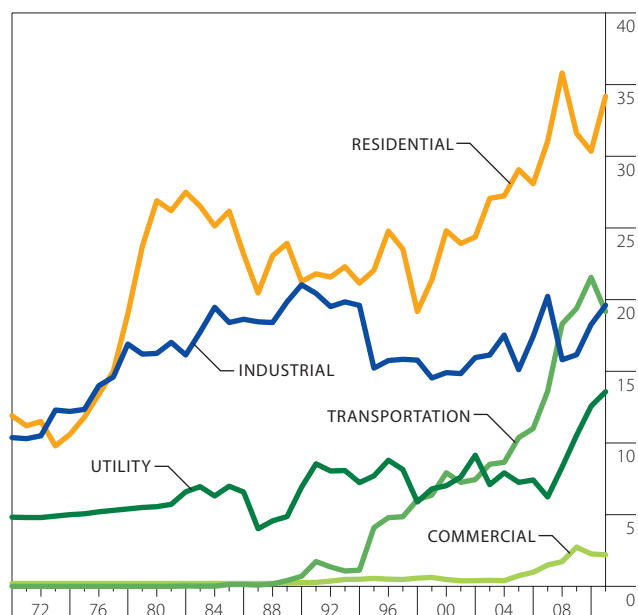
2011 TRILLIONS OF BTU AND PERCENT OF TOTAL



1970-2011 TRILLIONS OF BTU



1970-2011 TRILLIONS OF BTU



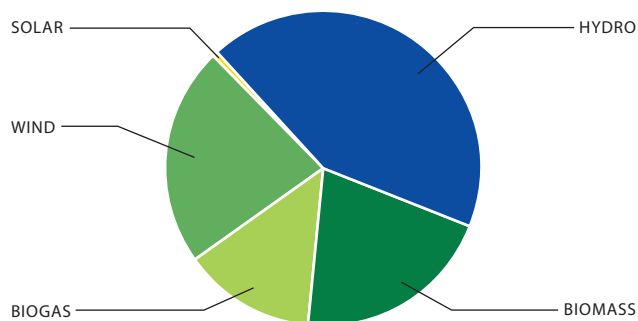
Source: Wisconsin State Energy Office.

Wisconsin Renewable Energy Use

In 2011, Wisconsin's electricity generated from renewable energy sources increased by 7.5 percent. Sales of renewable energy comprise 7.7 percent of total electric sales in Wisconsin, an increase of 7.6 percent over 2010. Wisconsin is 9th in the nation for biofuels production, thanks to its eight ethanol and four biodiesel production facilities.

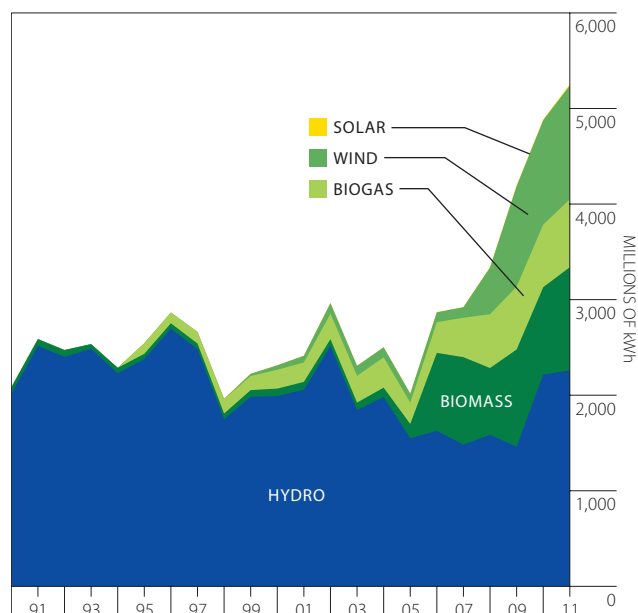
For Electricity Generation

2011 MILLIONS OF kWh AND PERCENT OF TOTAL



Type of Fuel	2011 Millions of kWh	2011 Percent of Total
Solar	13.2	0.3%
Biogas	710.0	13.5%
Biomass	1,080.3	20.6%
Wind	1,190.5	22.7%
Hydro	2,258.9	43.0%

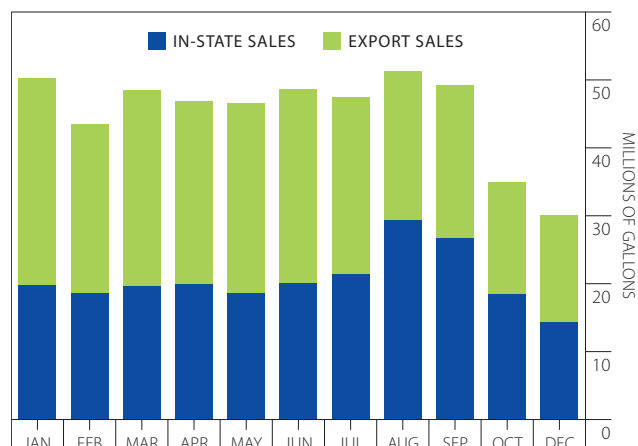
1990-2011 RENEWABLE ENERGY ELECTRICITY GENERATED AND PURCHASED



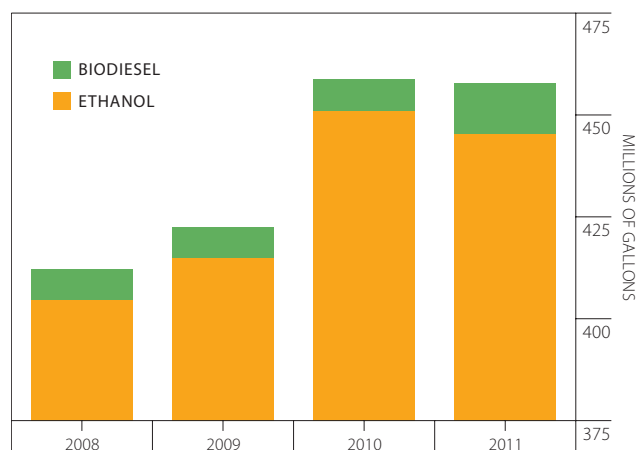
Source: Wisconsin State Energy Office.

For Transportation

2011 ETHANOL SALES BY WISCONSIN PRODUCERS^a



2008-2011 ETHANOL AND BIODIESEL PRODUCED IN WISCONSIN



Of the 227.0 million gallons of ethanol sold in Wisconsin, 77.2 percent was produced in-state. Wisconsin's biodiesel facilities produced 12.3 million gallons of biodiesel.

^a November is missing from this graph because in 2011, the Wisconsin Department of Revenue shifted its data collection method and reported no ethanol for that month.

Source: Wisconsin State Energy Office.

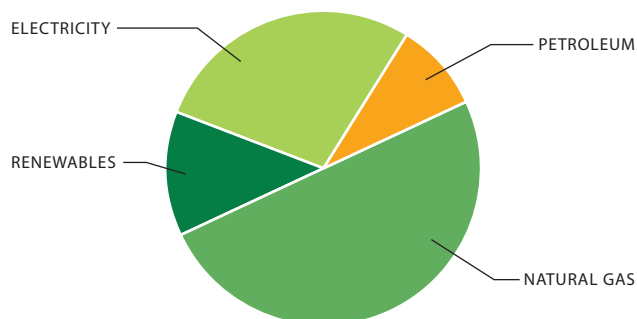
Wisconsin Residential Energy Use

Residential resource energy consumption increased 0.4 percent while end-use consumption increased 3.5 percent.

Natural gas comprises 49.9 percent of all energy use in the residential sector, most of which is used for space heating. A cold winter in 2011 led to a 4.4 percent increase in per customer natural gas use. Electricity use per customer decreased 0.4 percent.

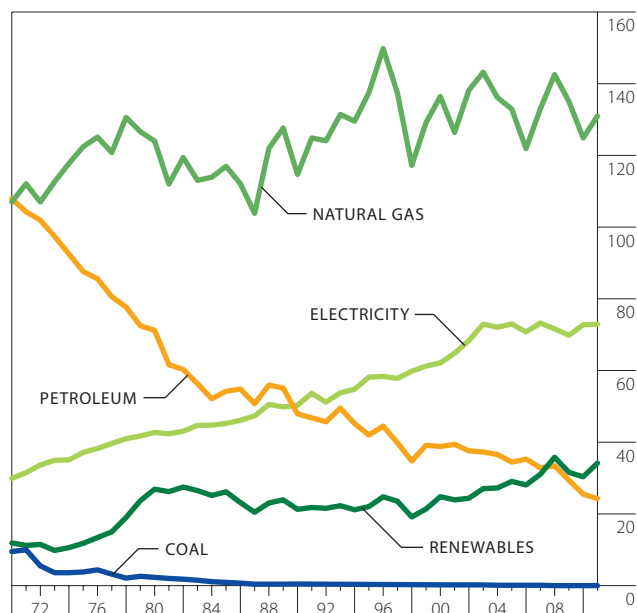
By Type of Fuel

2011 TRILLIONS OF BTU AND PERCENT OF TOTAL



Type of Fuel	2011 Trillions of Btu	2011 Percent of Total
Coal (non-utility)	0.0	0.0%
Petroleum	24.3	9.3%
Renewables ^a	34.2	13.0%
Electricity	72.9	27.8%
Natural Gas	131.0	49.9%

1970-2011 TRILLIONS OF BTU

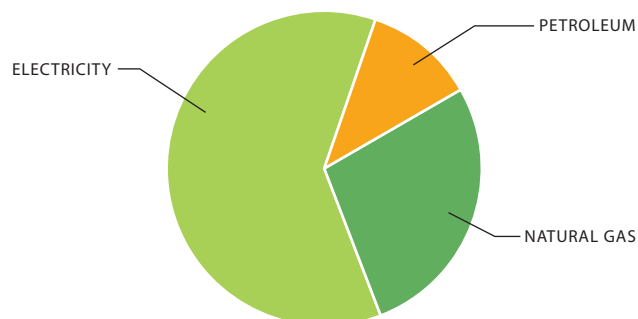


^a Renewables includes wood, solar, wind and biogas.

Source: Wisconsin State Energy Office.

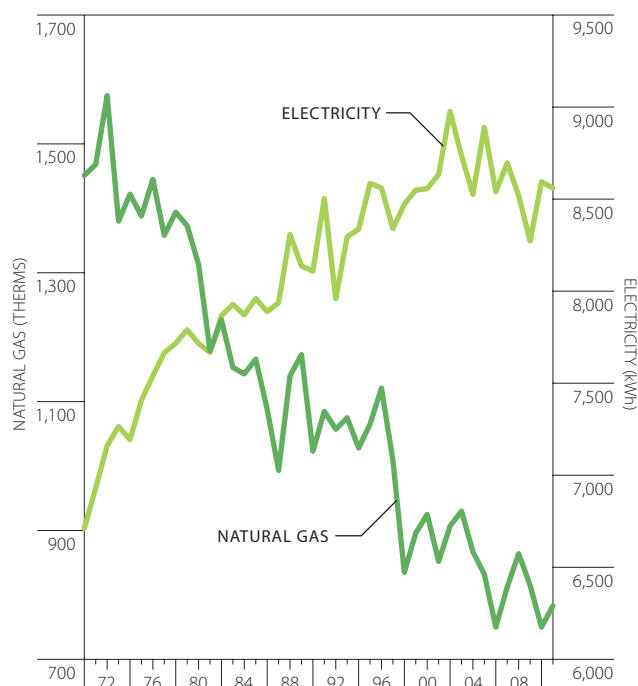
Expenditures and Per Customer Usage

2011 MILLIONS OF DOLLARS AND PERCENT OF TOTAL



Type of Fuel	2011 Millions of Dollars	2011 Percent of Total
Petroleum	531.5	11.6%
Natural Gas	1,264.1	27.6%
Electricity	2,789.1	60.8%

1970-2011 ELECTRICITY AND NATURAL GAS USE PER CUSTOMER



Source: Wisconsin State Energy Office.

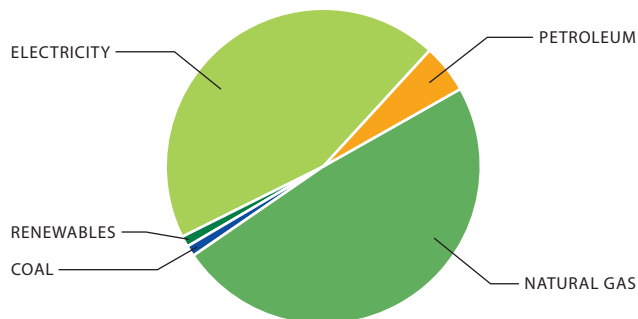
Wisconsin Commercial and Industrial Energy Use

Commercial sector end-use energy increased 2.9 percent, while industrial sector end-use increased 2.2 percent.

In the commercial and industrial sectors natural gas remains the major energy source, providing 48.8 percent of commercial sector energy and 46.8 percent in the industrial sector.

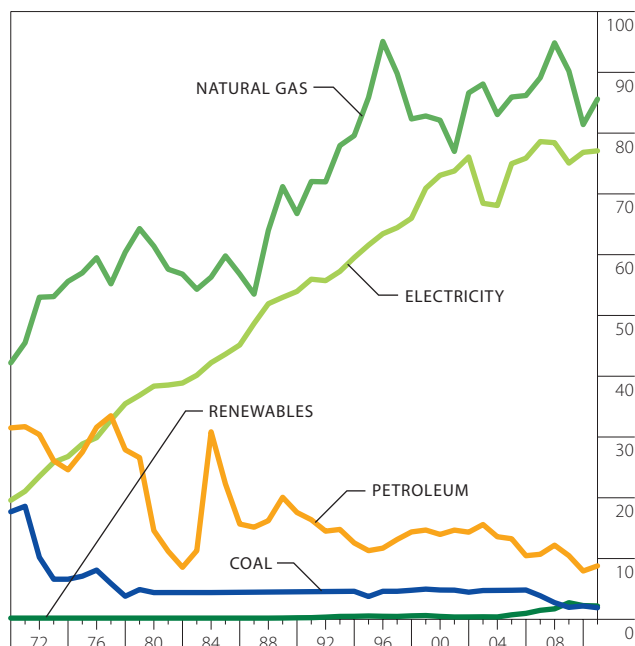
Commercial by Type of Fuel

2011 TRILLIONS OF BTU AND PERCENT OF TOTAL



Type of Fuel	2011 Trillions of Btu	2011 Percent of Total
Coal (non-utility)	1.9	1.1%
Renewables	2.2	1.3%
Petroleum	8.8	5.0%
Electricity	77.1	43.9%
Natural Gas	85.6	48.8%

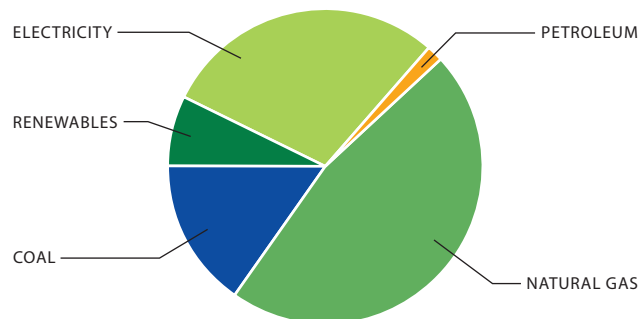
1970-2011 TRILLIONS OF BTU



Source: Wisconsin State Energy Office.

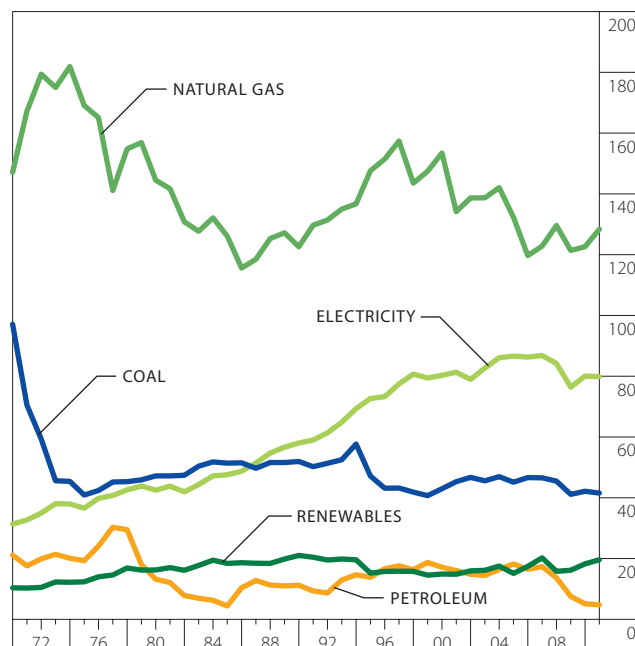
Industrial by Type of Fuel

2011 TRILLIONS OF BTU AND PERCENT OF TOTAL



Type of Fuel	2011 Trillions of Btu	2011 Percent of Total
Petroleum	4.8	1.7%
Renewables	19.6	7.2%
Coal (non-utility)	41.6	15.2%
Electricity	79.9	29.1%
Natural Gas	128.4	46.8%

1970-2011 TRILLIONS OF BTU



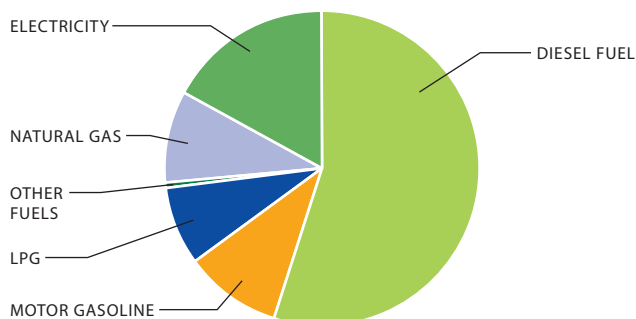
Source: Wisconsin State Energy Office.

Wisconsin Agricultural and Transportation Energy Use

Agricultural end-use petroleum consumption increased 8.8 percent in 2011, while electricity use decreased by 7.6 percent. Using 2011 dollars, the real, average statewide price of gasoline increased by \$0.678 a gallon (23.8 percent), to \$3.529 a gallon.

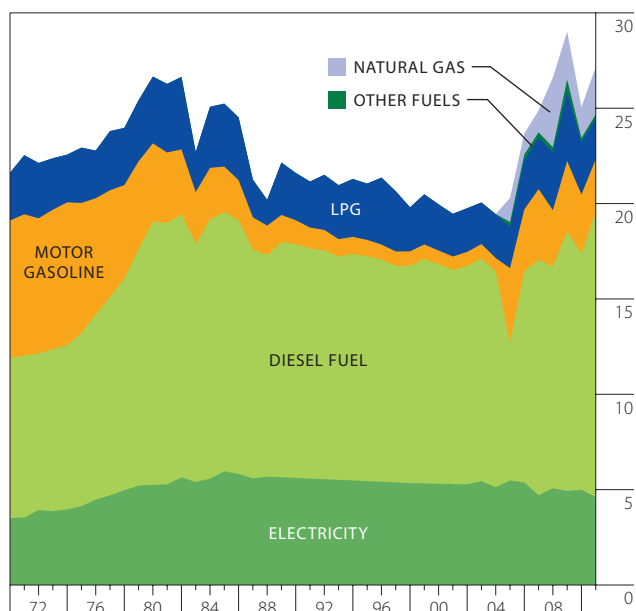
Agricultural by Type of Fuel

2011 TRILLIONS OF BTU AND PERCENT OF TOTAL



Type of Fuel	2011 Trillions of Btu	2011 Percent of Total
Other Fuels	0.2	0.7%
LPG	2.2	7.9%
Natural Gas	2.5	9.2%
Motor Gasoline	2.7	10.1%
Electricity	4.6	17.0%
Diesel Fuel	15.0	55.1%

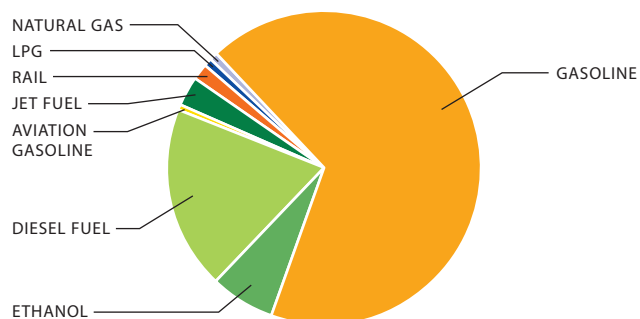
1970-2011 TRILLIONS OF BTU



Source: Wisconsin State Energy Office.

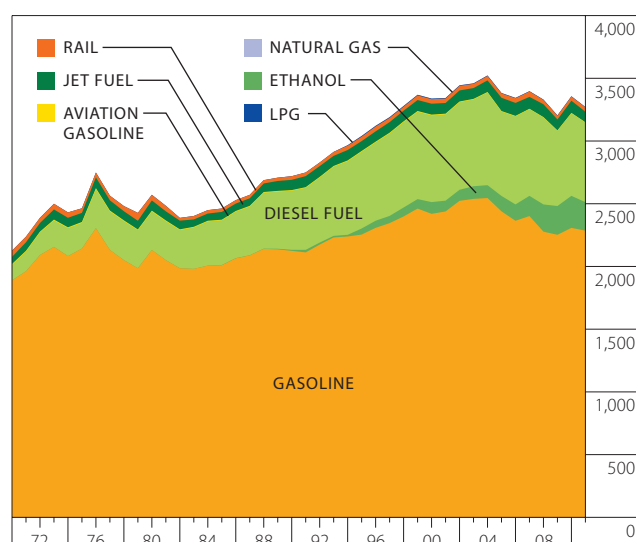
Transportation by Type of Fuel

2011 MILLIONS OF GALLONS AND PERCENT OF TOTAL



Type of Fuel	2011 Millions of Gallons	2011 Percent of Total
Natural Gas	0.5	0.02%
LPG	1.6	0.05%
Aviation Gasoline	2.4	0.1%
Rail	35.8	1.1%
Jet Fuel	83.7	2.6%
Ethanol	227.1	6.9%
Diesel Fuel	634.6	19.4%
Gasoline	2,285.5	69.9%

1970-2011 MILLIONS OF GALLONS



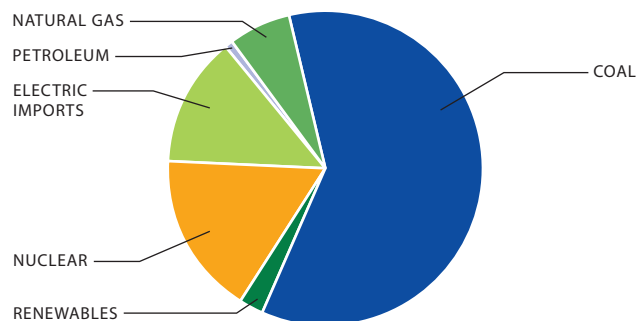
Source: Wisconsin State Energy Office.

Wisconsin Energy Use for Electricity Generation and Electric Utility Sales

Wisconsin's energy use for electric generation decreased by 3.3 percent in 2011, while total electricity sales decreased 0.1 percent despite slight increases in electricity sales in the residential and commercial sectors. Industrial and agricultural electricity sales decreased.

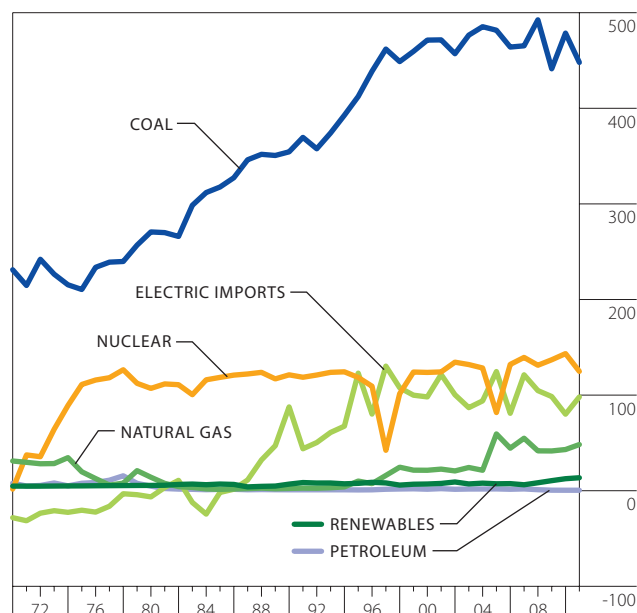
Energy Use for Electricity Generation by Type of Fuel

2011 TRILLIONS OF BTU AND PERCENT OF TOTAL



Type of Fuel	2011 Trillions of Btu	2011 Percent of Total
Petroleum	0.5	0.1%
Renewables	13.6	1.9%
Natural Gas	48.3	6.6%
Electric Imports	98.1	13.4%
Nuclear	124.8	17.0%
Coal	448.0	61.1%

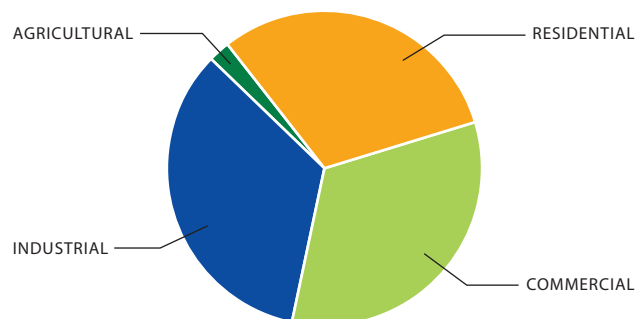
1970-2011 TRILLIONS OF BTU



Source: Wisconsin State Energy Office.

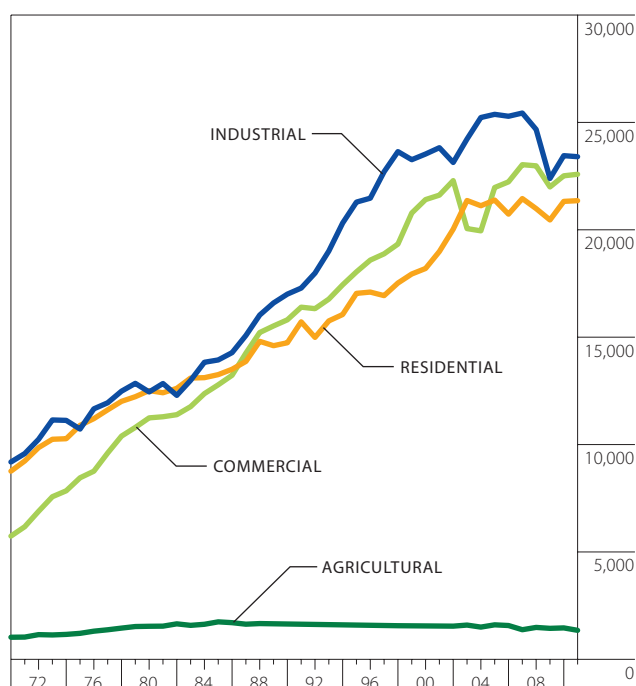
Electric Utility Sales by Economic Sector

2011 MILLIONS OF kWh AND PERCENT OF TOTAL



Economic Sector	2011 Millions of kWh	2011 Percent of Total
Agricultural	1,351	2.0%
Residential	21,356	31.1%
Commercial	22,585	32.9%
Industrial	23,403	34.1%

1970-2011 MILLIONS OF kWh



Source: Wisconsin State Energy Office.

Wisconsin End-Use Energy Expenditures

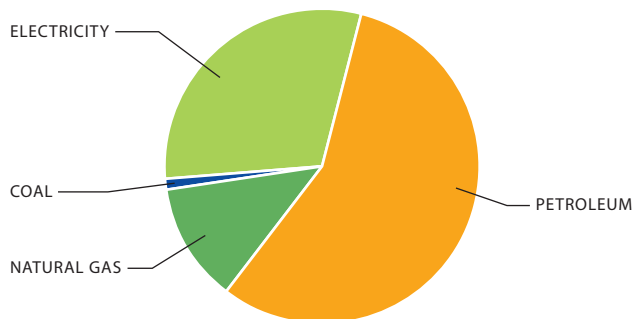
In 2011, Wisconsin's overall energy bill increased by \$2.8 billion (13.6 percent) from 2010.

Expenditures increased for all sectors and all fuels, except natural gas.

Since 2000, Wisconsin's total energy expenditures increased by \$11 billion (92.5 percent increase).

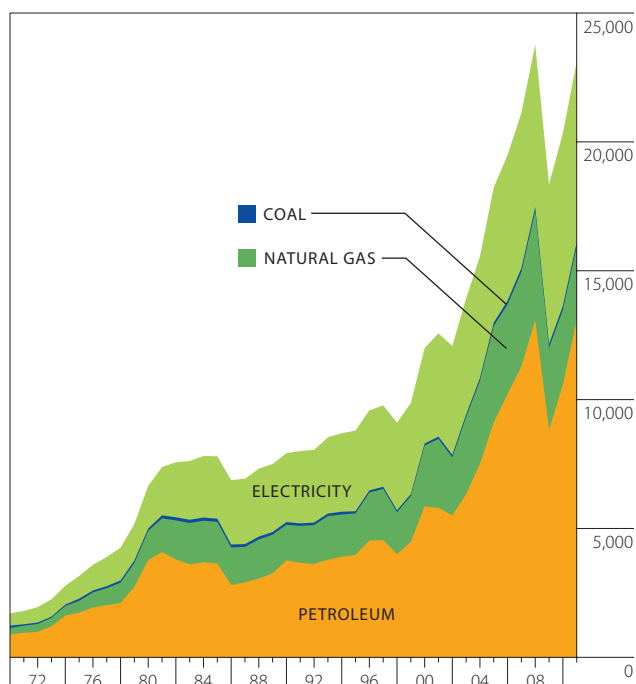
By Type of Fuel

2011 MILLIONS OF DOLLARS AND PERCENT OF TOTAL



Type of Fuel	2011 Millions of Dollars	2011 Percent of Total
Coal (non-utility)	159.9	0.7%
Natural Gas	2,855.0	12.4%
Electricity	7,003.8	30.3%
Petroleum	13,084.6	56.6%

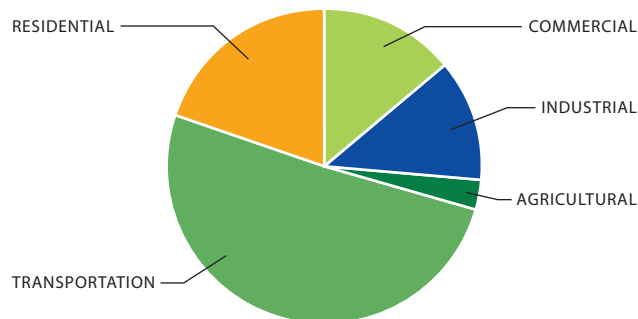
1970-2011 MILLIONS OF DOLLARS



Source: Wisconsin State Energy Office.

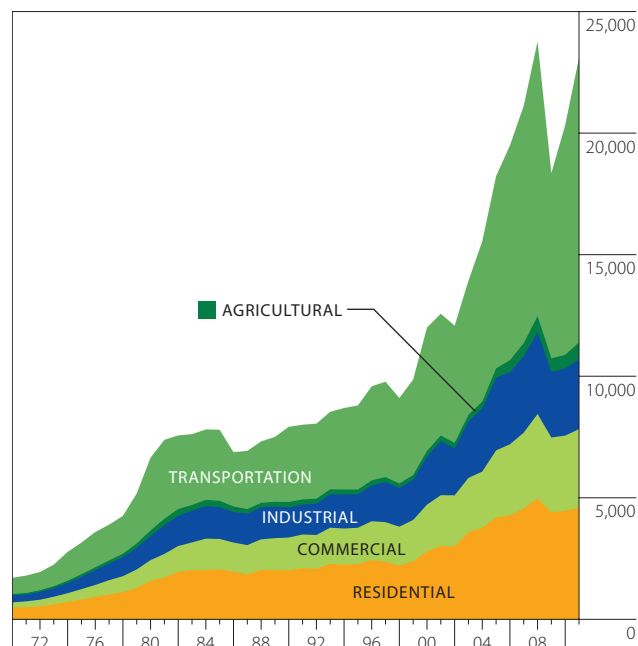
By Economic Sector

2011 MILLIONS OF DOLLARS AND PERCENT OF TOTAL



Economic Sector	2011 Millions of Dollars	2011 Percent of Total
Agricultural	705.7	3.1%
Industrial	2,863.1	12.4%
Commercial	3,241.2	14.0%
Residential	4,584.7	19.8%
Transportation	11,708.5	50.7%

1970-2011 MILLIONS OF DOLLARS



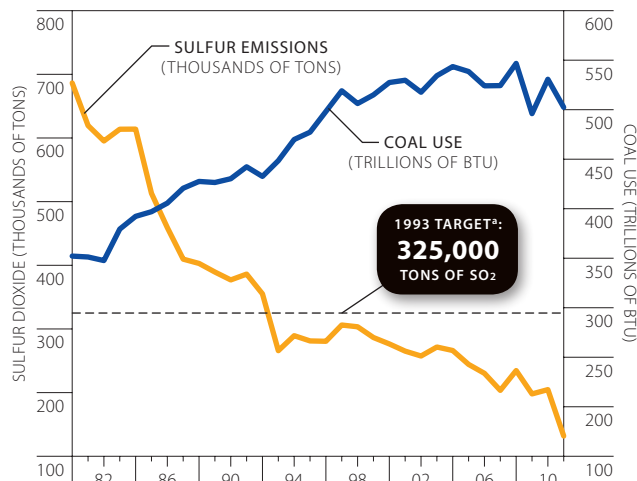
Source: Wisconsin State Energy Office.

Wisconsin Emissions

Future decreases in total emissions will depend on 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 US EPA rules. SO₂ and NO_x emissions are pollutants and are measured for air quality monitoring. CO₂ is a greenhouse gas which contributes to climate change.

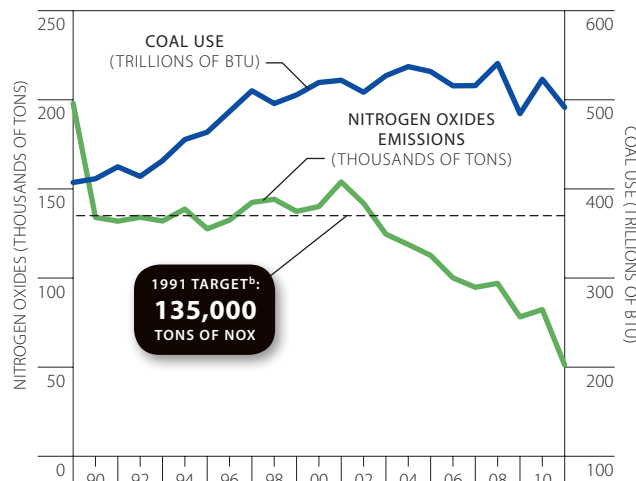
Sulfur Dioxide Emissions and Coal Use

1980-2011



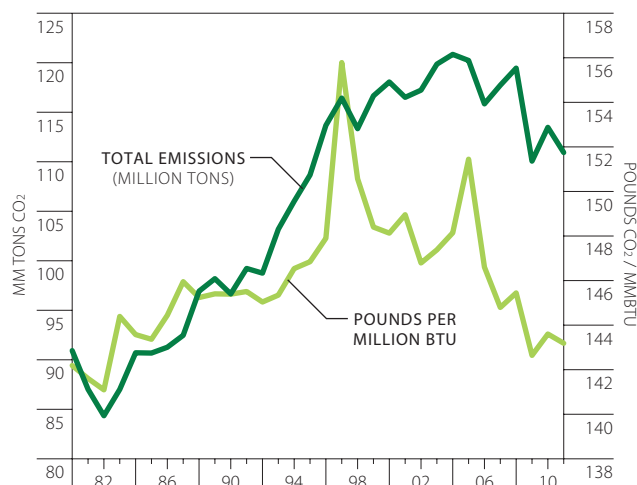
Nitrogen Oxides Emissions and Coal Use

1989-2011



Carbon Dioxide Emissions from Energy Use

1980-2011^c



Utility Sulfur Dioxide Emissions

decreased 17.4 percent from 2010 to 2011.

Wisconsin CO₂ Emissions from Energy

decreased 1.9 percent in 2011.

Since 1990 total CO₂ emissions have increased 14.8 percent.

Utility Nitrogen Oxides Emissions

decreased 9.6 percent from 2010 to 2011.

^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.

^c Does not include electric imports.

Source: Wisconsin State Energy Office.

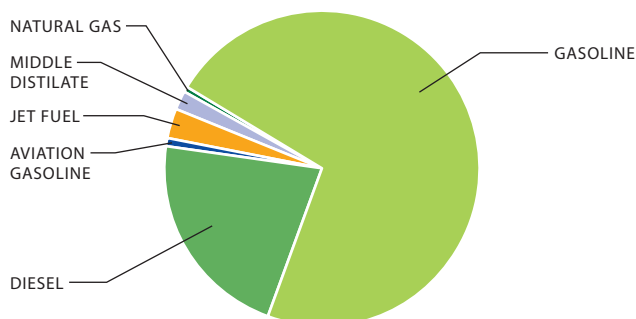
Transportation and Heating Fuels

Wisconsinites spent \$11.7 billion on transportation in 2011, an increase of 23.9 percent, or \$2.3 billion, over 2010.

The increase in expenditures is due primarily to an increase in prices. Of the \$4.6 billion of residential energy spending, about \$1.8 billion (39.2 percent) pays for natural gas and petroleum for space heating.

Transportation Expenditures

2011 MILLIONS OF DOLLARS AND PERCENT OF TOTAL

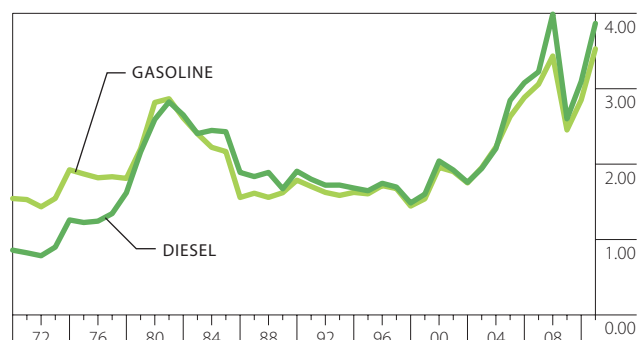


Type of Fuel	2011 Millions of Dollars	2011 Percent of Total
Natural Gas	0.9	0.01%
Aviation Gasoline	9.5	0.1%
Middle Distillate	119.1	1.0%
Jet Fuel	264.4	2.3%
Diesel	2,447.7	20.9%
Gasoline ^a	8,866.9	75.7%

Transportation Fuel Prices

Type of Fuel	2010 Price Per Gallon ^{b,c}	2011 Price Per Gallon ^{b,c}
Gasoline	\$2.851	\$3.529
Diesel	\$3.097	\$3.867

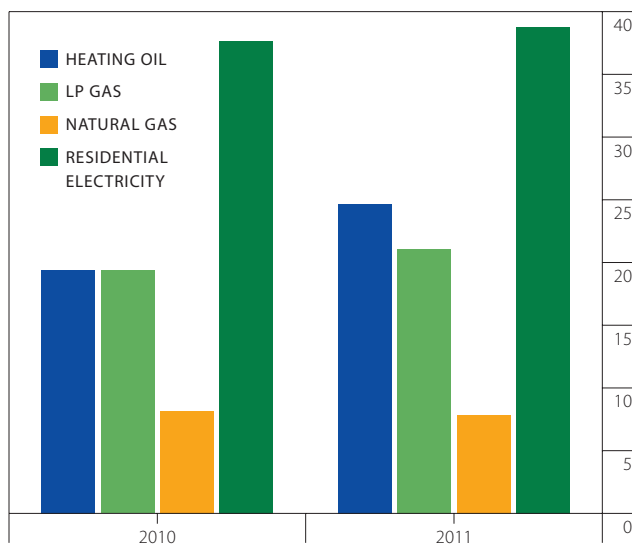
1970-2011 DOLLARS PER GALLON^{b,c}



Heating Fuels Prices

Fuel	% Change	2010 Price ^d	2011 Price ^d
Heating Oil	↑ 27.3%	\$2.69 per gallon	\$3.42 per gallon
LP Gas	↑ 8.8%	\$1.85 per gallon	\$2.01 per gallon
Natural Gas	↓ 3.9%	\$8.17 per MMBtu	\$7.85 per MMBtu
Residential Electricity	↑ 3.1%	\$0.128 per kWh	\$0.132 per kWh

2010-2011 DOLLARS PER MILLION BTU



Prices for residential fuels are updated once a week in the winter (October to March) and once a month in the summer (April to September) and are posted on the SEO webpage. Visit energyindependence.wi.gov and click on Statistics/Tables and Heating Fuels.

^a Includes ethanol.

^b From the American Automobile Association, Daily Fuel Gauge Report. <http://www.fuelgaugereport.aaa.com/>

^c Prices are in 2011 dollars.

^d 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 SEO 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.

Source: Wisconsin State Energy Office.

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 27.2 percent in 2011. Coal is the leading resource energy source in Wisconsin, comprising 29.8 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.

In 2011, renewables increased by 4.4 percent to comprise 5.4 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 (25.3 percent), industrial (27.0 percent) and transportation (24.8 percent) sectors each account for about one-quarter of Wisconsin's resource energy consumption. The commercial and agricultural sectors account for 20.6 percent and 2.2 percent, respectively.

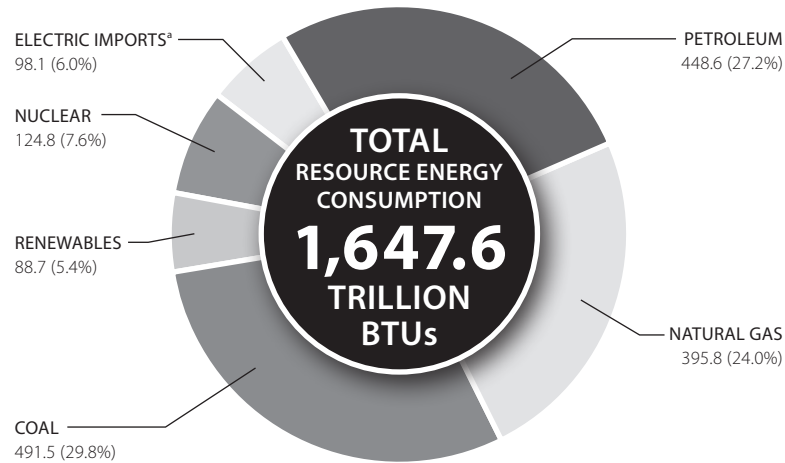
In 2011, end-use energy consumption increased in all sectors except transportation. The residential sector saw a 3.5 percent increase, the commercial sector a 2.9 percent increase, and increases of 2.2 and 8.3 percent for the industrial and agriculture sectors respectively. Energy use in the transportation sector decreased 2.4 percent.

RESOURCE Energy Consumption	2011	Percent of Wisconsin's Resource Energy Consumption
Resource Energy Consumption	↓ 0.8% overall	
BY FUEL		
Coal Consumption, Utilities	↓ 6.0%	29.8%
Petroleum Consumption	↓ 1.5%	27.2%
Natural Gas Consumption	↑ 5.9%	24.0%
Electricity Imports	↑ 22.5%	6.0%
Renewables	↑ 4.4%	5.4%
BY ECONOMIC SECTOR		
Transportation	↓ 2.4%	24.8%
Residential	↑ 0.4%	25.3%
Industrial	↓ 0.6%	27.0%
Commercial	↓ 0.7%	20.6%
Agricultural	↑ 2.1%	2.2%

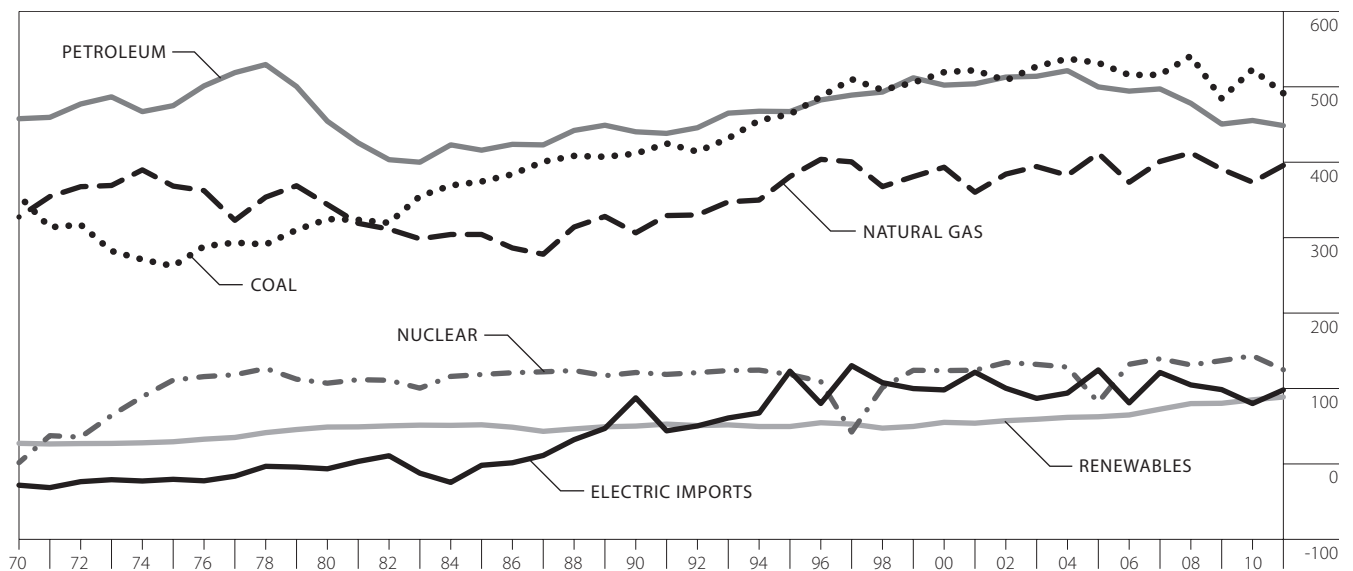
END-USE Energy Consumption	2011	Percent of Wisconsin's End-Use Energy Consumption
End-Use Energy Consumption	↑ 1.0% overall	
BY FUEL		
Petroleum Consumption	↓ 1.5%	39.0%
Natural Gas Consumption	↑ 5.1%	30.3%
Electricity Consumption	↓ 0.1%	20.4%
Renewables Consumption	↑ 3.8%	6.5%
Coal Consumption, Non-Utilities	↓ 2.0%	3.8%
BY ECONOMIC SECTOR		
Transportation	↓ 2.4%	35.6%
Industrial	↑ 2.2%	23.9%
Residential	↑ 3.5%	22.8%
Commercial	↑ 2.9%	15.3%
Agricultural	↑ 8.3%	2.4%

Wisconsin Resource Energy Consumption, by Type of Fuel

2011 TRILLIONS OF BTU AND PERCENT OF TOTAL



1970-2011 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 State Energy Office

Wisconsin Resource Energy Consumption, by Type of Fuel

RESOURCE ENERGY CONSUMPTION

0.8%

Resource energy consumption decreased 0.8 percent in 2011. Petroleum use decreased 1.5 percent; natural gas, increased 5.9 percent; coal, decreased 6.0 percent; and renewables increased 4.4 percent.

1970-2011 TRILLIONS OF BTU AND PERCENT OF TOTAL

Year	Petroleum		Natural Gas		Coal ^a		Renewables ^b		Nuclear ^d		Electric Imports ^c		Total
1970	457.7	40.1%	327.4	28.7%	355.4	31.1%	27.3	2.4%	1.7	0.1%	-28.2	-2.5%	1,141.3
1975	475.0	38.8%	368.3	30.0%	262.3	21.4%	29.4	2.4%	111.2	9.1%	-20.4	-1.7%	1,225.8
1980	454.4	35.7%	344.0	27.0%	324.6	25.5%	48.9	3.8%	107.0	8.4%	-6.5	-0.5%	1,272.5
1985 ^r	416.0	32.9%	304.2	24.1%	374.4	29.6%	51.9	4.1%	118.6	9.4%	-1.8	-0.1%	1,263.3
1990 ^r	440.3	31.1%	306.4	21.6%	411.4	29.0%	50.2	3.5%	121.2	8.6%	87.7	6.2%	1,417.2
1995 ^r	467.2	29.1%	381.0	23.8%	463.7	28.9%	49.6	3.1%	118.5	7.4%	123.0	7.7%	1,603.0
1996 ^r	482.6	29.8%	403.8	25.0%	486.9	30.1%	54.6	3.4%	109.3	6.8%	80.2	5.0%	1,617.4
1997 ^r	489.0	30.1%	400.5	24.6%	510.1	31.4%	52.8	3.3%	42.3	2.6%	130.3	8.0%	1,625.1
1998 ^r	493.0	30.6%	367.7	22.8%	495.8	30.7%	47.4	2.9%	101.5	6.3%	107.7	6.7%	1,613.1
1999 ^r	511.9	30.6%	381.0	22.8%	505.5	30.2%	49.7	3.0%	124.1	7.4%	99.9	6.0%	1,672.2
2000 ^r	502.2	29.7%	393.4	23.2%	519.4	30.7%	55.1	3.3%	123.8	7.3%	98.1	5.8%	1,692.0
2001 ^r	504.0	29.9%	360.2	21.4%	521.9	31.0%	54.0	3.2%	124.3	7.4%	121.6	7.2%	1,686.0
2002 ^r	512.9	30.2%	384.2	22.6%	508.5	30.0%	57.3	3.4%	134.4	7.9%	100.4	5.9%	1,697.7
2003 ^r	514.0	30.0%	394.3	23.0%	527.0	30.8%	59.2	3.5%	132.0	7.7%	86.9	5.1%	1,713.4
2004 ^r	521.4	30.2%	382.7	22.2%	537.2	31.1%	61.7	3.6%	128.4	7.4%	94.0	5.4%	1,725.4
2005 ^r	499.8	29.2%	411.8	24.0%	531.7	31.1%	62.5	3.7%	81.8	4.8%	124.7	7.3%	1,712.4
2006 ^r	494.3	29.8%	373.4	22.5%	515.7	31.0%	64.9	3.9%	132.1	8.0%	81.0	4.9%	1,661.4
2007 ^r	497.2	28.5%	401.0	22.9%	515.9	29.5%	72.6	4.2%	139.4	8.0%	121.3	6.9%	1,747.4
2008 ^r	478.1	27.4%	412.4	23.6%	540.8	31.0%	80.0	4.6%	131.3	7.5%	104.7	6.0%	1,747.3
2009 ^r	450.6	27.4%	390.8	23.8%	484.5	29.5%	80.4	4.9%	137.0	8.3%	98.5	6.0%	1,641.7
2010 ^r	455.4	27.4%	373.6	22.5%	523.0	31.5%	85.0	5.1%	143.4	8.6%	80.1	4.8%	1,660.5
2011 ^p	448.6	27.2%	395.8	24.0%	491.5	29.8%	88.7	5.4%	124.8	7.6%	98.1	6.0%	1,647.6

^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.

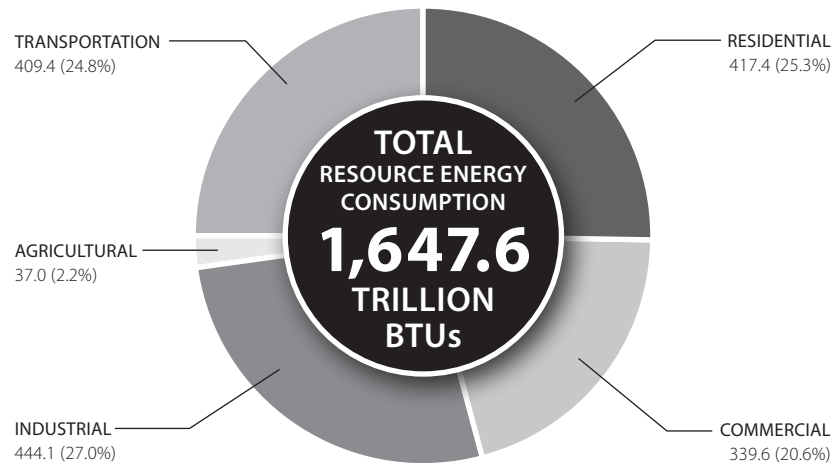
^p Preliminary estimates.

^r Revised due to revisions in contributing tables.

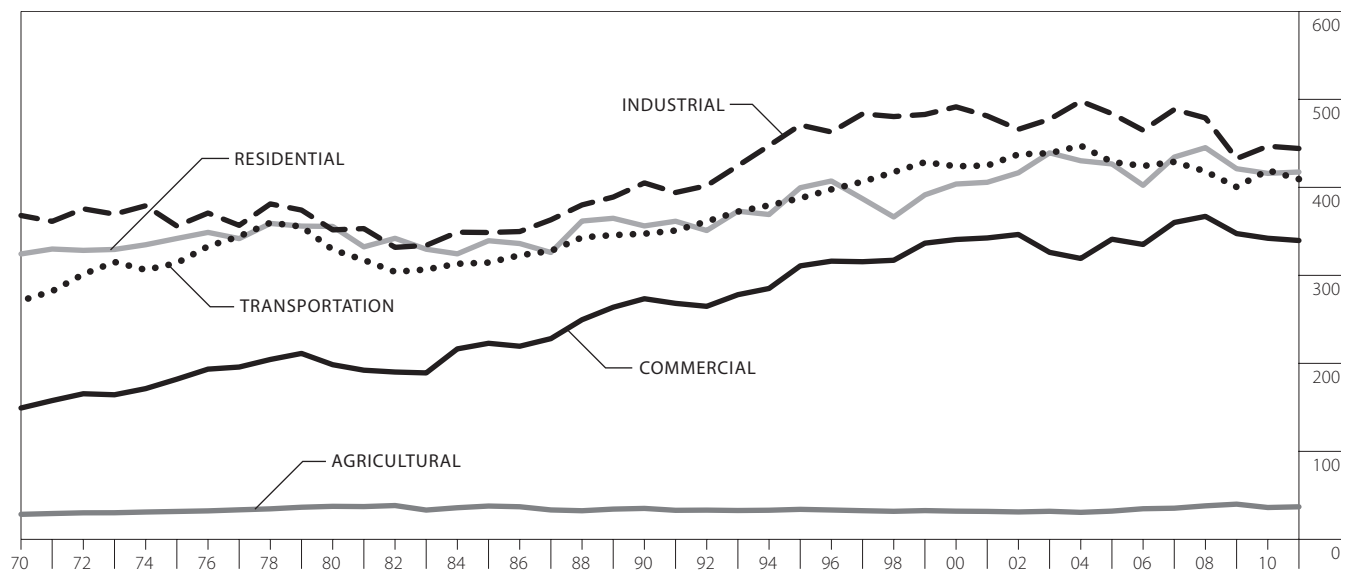
Source: Compiled from tables in this publication for Wisconsin petroleum, natural gas, coal, renewable resources and electricity use, by economic sector, and for Wisconsin electric utility energy use.

Wisconsin Resource Energy Consumption, by Economic Sector

2011 TRILLIONS OF BTU AND PERCENT OF TOTAL



1970-2011 TRILLIONS OF BTU



Source: Wisconsin State Energy Office.

Wisconsin Resource Energy Consumption, by Economic Sector

RESOURCE ENERGY CONSUMPTION

0.8%

Total resource energy consumption decreased 0.8 percent in 2011. The residential and agricultural sector saw increases of 0.4 and 2.1 percent, respectively. Other sectors saw decreases of 0.7 percent (commercial), 0.6 percent (industrial) and 2.4 percent (transportation).

1970-2011 TRILLIONS OF BTU AND PERCENT OF TOTAL

Year	Residential		Commercial		Industrial		Agricultural ^a		Transportation		Total ^b
1970	324.3	28.4%	149.3	13.1%	368.0	32.2%	28.4	2.5%	271.2	23.8%	1,141.3
1975	341.9	27.9%	182.0	14.9%	356.1	29.1%	31.7	2.6%	314.0	25.6%	1,225.8
1980	355.6	27.9%	198.5	15.6%	351.7	27.6%	37.5	2.9%	329.2	25.9%	1,272.5
1985 ^r	339.4	26.9%	222.8	17.6%	348.7	27.6%	37.9	3.0%	314.5	24.9%	1,263.2
1990 ^r	356.2	25.1%	273.4	19.3%	405.1	28.6%	35.2	2.5%	347.3	24.5%	1,417.2
1995 ^r	399.6	24.9%	310.8	19.4%	470.8	29.4%	34.1	2.1%	387.7	24.2%	1,603.0
1996 ^r	407.2	25.2%	316.1	19.5%	462.9	28.6%	33.4	2.1%	397.7	24.6%	1,617.4
1997 ^r	387.0	23.8%	315.5	19.4%	483.5	29.8%	32.6	2.0%	406.4	25.0%	1,625.1
1998 ^r	366.3	22.7%	317.1	19.7%	480.5	29.8%	31.9	2.0%	417.3	25.9%	1,613.2
1999 ^r	391.5	23.4%	336.6	20.1%	482.8	28.9%	32.7	2.0%	428.6	25.6%	1,672.2
2000 ^r	403.8	23.9%	340.7	20.1%	491.5	29.0%	32.0	1.9%	424.0	25.1%	1,692.0
2001 ^r	405.8	24.1%	342.5	20.3%	481.1	28.5%	31.8	1.9%	424.8	25.2%	1,686.0
2002 ^r	416.6	24.5%	346.5	20.4%	465.9	27.4%	31.2	1.8%	437.5	25.8%	1,697.7
2003 ^r	439.2	25.6%	326.2	19.0%	477.4	27.9%	31.9	1.9%	438.8	25.6%	1,713.4
2004 ^r	430.2	24.9%	319.2	18.5%	497.9	28.9%	30.7	1.8%	447.3	25.9%	1,725.4
2005 ^r	426.6	24.9%	341.1	19.9%	483.7	28.3%	32.1	1.9%	428.9	25.0%	1,712.4
2006 ^r	402.3	24.2%	335.1	20.2%	464.9	28.0%	34.8	2.1%	424.3	25.5%	1,661.4
2007 ^r	434.4	24.9%	360.1	20.6%	488.5	28.0%	35.4	2.0%	429.0	24.6%	1,747.4
2008 ^r	445.1	25.5%	367.0	21.0%	478.9	27.4%	38.1	2.2%	418.2	23.9%	1,747.3
2009 ^r	421.2	25.7%	347.5	21.2%	432.7	26.4%	40.0	2.4%	400.4	24.4%	1,641.7
2010 ^r	415.9	25.0%	342.2	20.6%	446.8	26.9%	36.2	2.2%	419.4	25.3%	1,660.4
2011 ^p	417.4	25.3%	339.6	20.6%	444.1	27.0%	37.0	2.2%	409.4	24.8%	1,647.6

^a Beginning in 2005, the Wisconsin SEO 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.

^b Totals may not add due to rounding.

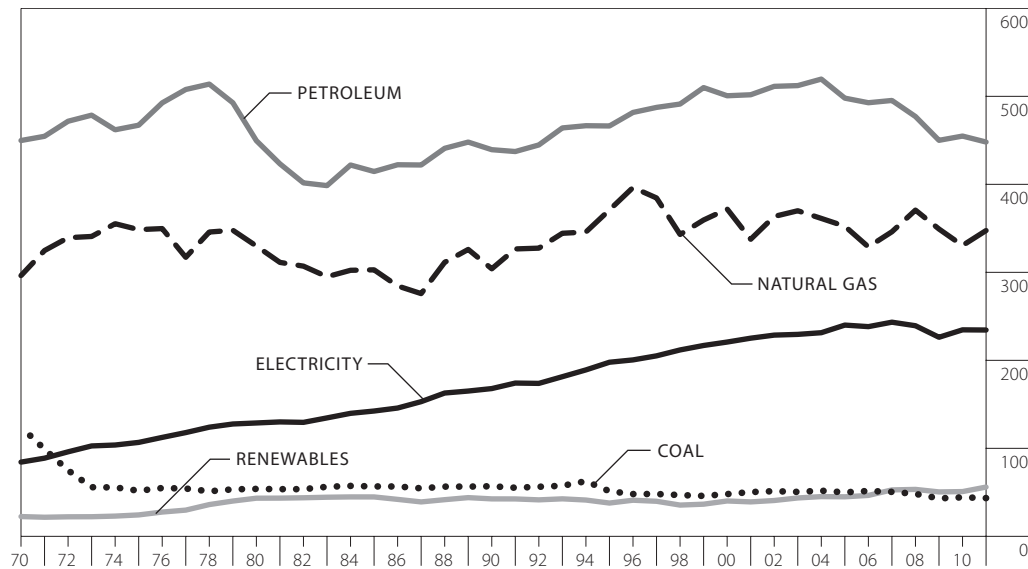
^p Preliminary estimates.

^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

1970-2011 TRILLIONS OF BTU



1970-2011 TRILLIONS OF BTU AND PERCENT OF TOTAL

Year	Petroleum		Natural Gas		Coal		Renewables		Electricity		Total
1970	449.8	46.0%	296.3	30.3%	124.3	12.7%	22.5	2.3%	84.4	8.6%	977.2
1975	467.2	46.8%	348.5	34.9%	51.8	5.2%	24.3	2.4%	106.7	10.7%	998.6
1980 ^r	449.6	44.7%	329.9	32.8%	53.9	5.4%	43.3	4.3%	128.8	12.8%	1,005.6
1985 ^r	414.6	43.1%	302.8	31.5%	56.7	5.9%	44.9	4.7%	142.4	14.8%	961.5
1990 ^r	439.4	43.4%	304.0	30.1%	56.9	5.6%	43.3	4.3%	167.9	16.6%	1,011.5
1995 ^r	466.3	41.3%	370.9	32.9%	51.3	4.5%	41.9	3.7%	197.8	17.5%	1,128.3
2000 ^r	500.7	42.1%	372.0	31.3%	48.0	4.0%	48.1	4.0%	220.8	18.6%	1,189.5
2001 ^r	501.8	43.2%	337.6	29.1%	50.3	4.3%	46.4	4.0%	225.2	19.4%	1,161.3
2002 ^r	511.3	42.5%	363.5	30.2%	51.3	4.3%	48.2	4.0%	228.7	19.0%	1,203.0
2003 ^r	512.2	42.2%	370.0	30.5%	50.5	4.2%	52.1	4.3%	229.5	18.9%	1,214.3
2004 ^r	519.6	42.7%	361.3	29.7%	51.9	4.3%	53.8	4.4%	231.4	19.0%	1,217.9
2005 ^r	498.0	41.6%	352.4	29.5%	50.0	4.2%	55.3	4.6%	240.1	20.1%	1,195.7
2006 ^r	492.7	42.1%	328.9	28.1%	51.6	4.4%	57.5	4.9%	238.3	20.4%	1,169.0
2007 ^r	495.3	41.2%	346.1	28.8%	50.5	4.2%	66.4	5.5%	243.4	20.3%	1,201.6
2008 ^r	477.1	39.5%	370.7	30.7%	48.2	4.0%	71.7	5.9%	239.3	19.8%	1,207.0
2009 ^r	450.0	39.5%	349.2	30.7%	43.1	3.8%	69.9	6.1%	226.2	19.9%	1,138.4
2010 ^r	454.8	40.0%	330.5	29.1%	44.3	3.9%	72.4	6.4%	234.7	20.6%	1,136.8
2011 ^p	448.1	39.0%	347.5	30.3%	43.5	3.8%	75.1	6.5%	234.5	20.4%	1,148.7

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.

**END-USE
ENERGY
1.0%
IN 2011**

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.

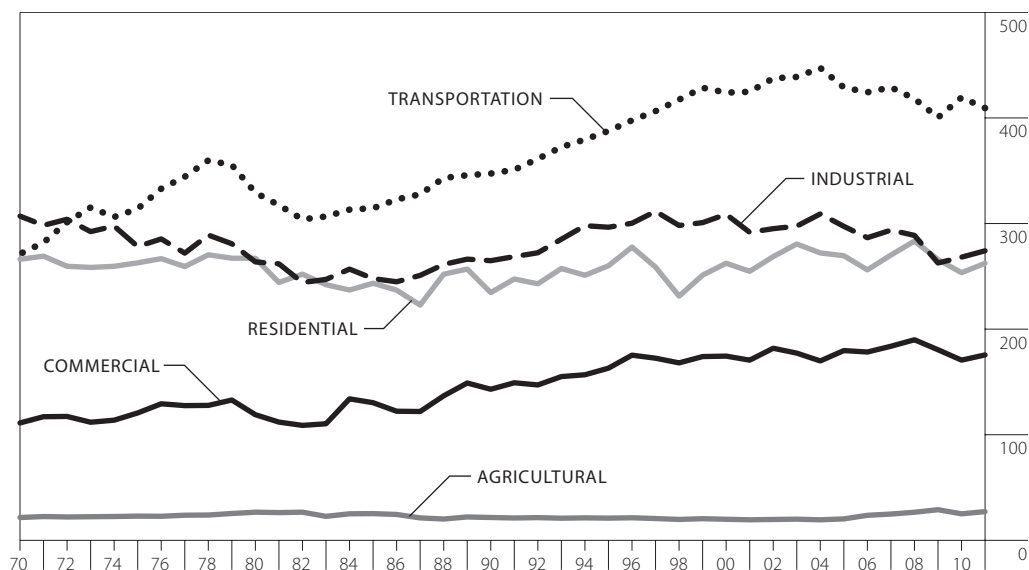
End use energy increased by 1.0 percent overall in 2011, after dropping by 0.14 percent in 2010. Petroleum continues to be the most-used end use energy source in Wisconsin (39.0 percent).

Wisconsin End-Use Energy Consumption, by Economic Sector

**END-USE
ENERGY
1.0%
IN 2011**

End use energy consumption increased 1.0 percent in 2011. The transportation sector continues to be the largest consumer of end use energy in Wisconsin (35.6 percent).

1970-2011 TRILLIONS OF BTU



1970-2011 TRILLIONS OF BTU AND PERCENT OF TOTAL

Year	Residential		Commercial		Industrial		Agricultural		Transportation		Total
1970	266.2	27.2%	111.2	11.4%	307.0	31.4%	21.6	2.2%	271.2	27.8%	977.2
1975	262.8	26.3%	120.6	12.1%	278.2	27.9%	22.9	2.3%	314.0	31.4%	998.6
1980 ^r	267.1	26.6%	119.0	11.8%	263.6	26.2%	26.7	2.7%	329.2	32.7%	1,005.6
1985 ^r	243.5	25.3%	130.3	13.6%	247.9	25.8%	25.3	2.6%	314.5	32.7%	961.5
1990 ^r	234.6	23.2%	143.1	14.1%	264.8	26.2%	21.6	2.1%	347.3	34.3%	1,011.5
1995 ^r	260.0	23.0%	163.0	14.4%	296.5	26.3%	21.0	1.9%	387.7	34.4%	1,128.3
2000 ^r	262.4	22.1%	174.5	14.7%	308.7	26.0%	20.0	1.7%	424.0	35.6%	1,189.5
2001 ^r	254.7	21.9%	170.6	14.7%	291.7	25.1%	19.5	1.7%	424.8	36.6%	1,161.3
2002 ^r	268.7	22.3%	181.9	15.1%	295.1	24.5%	19.8	1.6%	437.5	36.4%	1,203.0
2003 ^r	280.6	23.1%	177.3	14.6%	297.5	24.5%	20.0	1.7%	438.8	36.1%	1,214.3
2004 ^r	272.1	22.3%	169.9	13.9%	309.1	25.4%	19.4	1.6%	447.3	36.7%	1,217.9
2005 ^r	269.5	22.5%	179.7	15.0%	297.3	24.9%	20.3	1.7%	428.9	35.9%	1,195.7
2006 ^r	256.1	21.9%	178.3	15.3%	286.6	24.5%	23.7	2.0%	424.3	36.3%	1,169.0
2007 ^r	270.2	22.5%	183.8	15.3%	293.8	24.4%	24.9	2.1%	429.0	35.7%	1,201.6
2008 ^r	283.4	23.5%	190.0	15.7%	288.8	23.9%	26.6	2.2%	418.2	34.6%	1,207.0
2009 ^r	265.8	23.4%	180.5	15.9%	262.6	23.1%	29.0	2.5%	400.4	35.2%	1,138.4
2010 ^r	253.5	22.3%	170.7	15.0%	268.2	23.6%	25.1	2.2%	419.4	36.9%	1,136.8
2011 ^p	262.3	22.8%	175.6	15.3%	274.2	23.9%	27.2	2.4%	409.4	35.6%	1,148.7

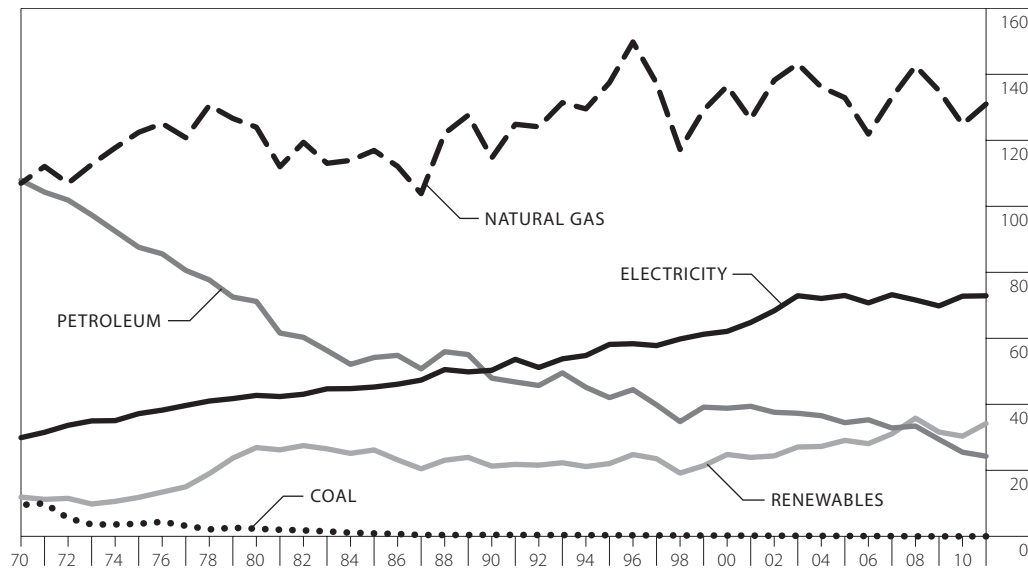
^p Preliminary estimates.

^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

1970-2011 TRILLIONS OF BTU



1970-2011 TRILLIONS OF BTU AND PERCENT OF TOTAL

Year	Petroleum		Natural Gas		Coal		Renewables ^a		Electricity		Total End Use	Total Resource ^b
1970	107.9	40.5%	107.0	40.2%	9.5	3.6%	11.9	4.5%	29.9	11.2%	266.2	324.3
1975	87.6	33.3%	122.4	46.6%	3.8	1.4%	11.8	4.5%	37.2	14.1%	262.8	341.9
1980 ^r	71.2	26.7%	124.0	46.4%	2.3	0.9%	26.9	10.1%	42.7	16.0%	267.1	355.6
1985 ^r	54.2	22.3%	116.9	48.0%	0.9	0.4%	26.2	10.8%	45.2	18.6%	243.5	339.4
1990 ^r	47.9	20.4%	114.7	48.9%	0.4	0.2%	21.3	9.1%	50.3	21.4%	234.6	356.2
1995 ^r	42.0	16.2%	137.5	52.9%	0.3	0.1%	22.0	8.5%	58.2	22.4%	260.0	399.6
2000 ^r	38.8	14.8%	136.4	52.0%	0.2	0.1%	24.8	9.5%	62.1	23.7%	262.4	403.8
2005 ^r	34.4	12.8%	132.9	49.3%	0.1	0.0%	29.1	10.8%	73.0	27.1%	269.5	426.6
2006 ^r	35.3	13.8%	121.9	47.6%	0.1	0.0%	28.1	11.0%	70.7	27.6%	256.1	402.3
2007 ^r	32.8	12.2%	133.0	49.2%	0.1	0.0%	31.0	11.5%	73.2	27.1%	270.2	434.4
2008 ^r	33.4	11.8%	142.5	50.3%	0.0	0.0%	35.8	12.6%	71.6	25.3%	283.4	445.1
2009 ^r	29.4	11.1%	135.0	50.8%	0.0	0.0%	31.6	11.9%	69.8	26.3%	265.8	421.2
2010 ^r	25.5	10.1%	124.9	49.3%	0.0	0.0%	30.3	12.0%	72.8	28.7%	253.5	415.9
2011 ^p	24.3	9.3%	131.0	49.9%	0.0	0.0%	34.2	13.0%	72.9	27.8%	262.3	417.4

^a Renewables includes wood/biomass, solar photovoltaic and solar thermal, 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.

RESIDENTIAL
END-USE
ENERGY
3.5%
IN 2011

Residential end use energy increased 3.5 percent in 2011. 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 (0.2 percent), renewables (12.6 percent) and natural gas (4.9) consumption increased from 2010, while petroleum use decreased by 4.8 percent.

Between 1970 and 2011, petroleum use in the residential sector declined 77.5 percent.

Wisconsin Commercial Energy Use, by Type of Fuel

**COMMERCIAL
END-USE
ENERGY
2.9%
IN 2011**

In 2011, commercial sector end use energy increased 2.9 percent. Since 1980, commercial end use energy has increased 47.6 percent.

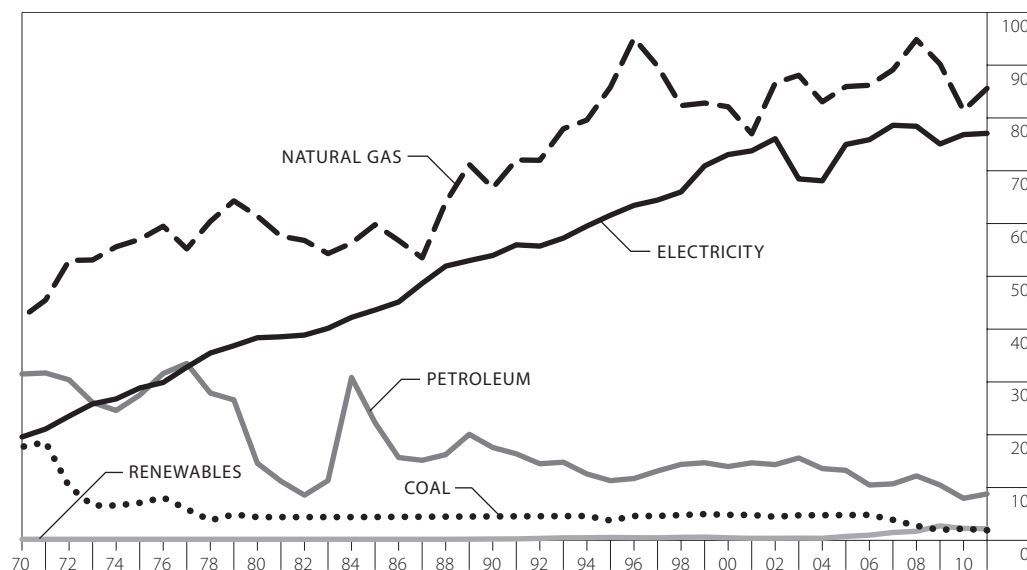
Electricity energy use doubled (100.9 percent) over the same period. The commercial sector saw decreases in renewables (2.8 percent) and coal (13.3 percent), and increases in every other sector:

petroleum (10.6 percent), natural gas (5.2 percent), and electricity (0.3 percent).

Natural gas remains the major energy source, comprising 48.8 percent of commercial sector energy, followed by electricity at 43.9 percent. Electricity use in this sector increased 293.6 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 5.0 percent of total commercial energy consumption.

1970-2011 TRILLIONS OF BTU



1970-2011 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	111.2	149.3
1975	27.5	22.8%	57.0	47.2%	7.1	5.9%	0.2	0.2%	28.8	120.6	182.0
1980	14.6	12.3%	61.4	51.6%	4.4	3.7%	0.2	0.2%	38.4	119.0	198.5
1985 ^r	22.3	17.1%	59.8	45.9%	4.4	3.4%	0.2	0.2%	43.6	130.3	222.8
1990 ^r	17.6	12.3%	66.8	46.7%	4.5	3.2%	0.3	0.2%	54.0	143.1	273.4
1995 ^r	11.3	6.9%	85.9	52.7%	3.8	2.3%	0.6	0.3%	61.6	163.0	310.8
2000 ^r	14.0	8.0%	82.1	47.1%	4.8	2.8%	0.5	0.3%	73.1	174.5	340.7
2005 ^r	13.3	7.4%	85.9	47.8%	4.8	2.7%	0.7	0.4%	75.0	179.7	341.1
2006 ^r	10.5	5.9%	86.2	48.3%	4.8	2.7%	1.0	0.6%	75.9	178.3	335.1
2007 ^r	10.7	5.8%	89.1	48.5%	3.9	2.1%	1.5	0.8%	78.6	183.8	360.1
2008 ^r	12.2	6.4%	94.9	49.9%	2.7	1.4%	1.7	0.9%	78.4	189.9	367.0
2009 ^r	10.5	5.8%	90.2	50.0%	2.0	1.1%	2.7	1.5%	75.1	180.5	347.5
2010 ^r	8.0	4.7%	81.4	47.7%	2.2	1.3%	2.3	1.3%	76.8	170.7	342.2
2011 ^p	8.8	5.0%	85.6	48.8%	1.9	1.1%	2.2	1.3%	77.1	175.6	339.6

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

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

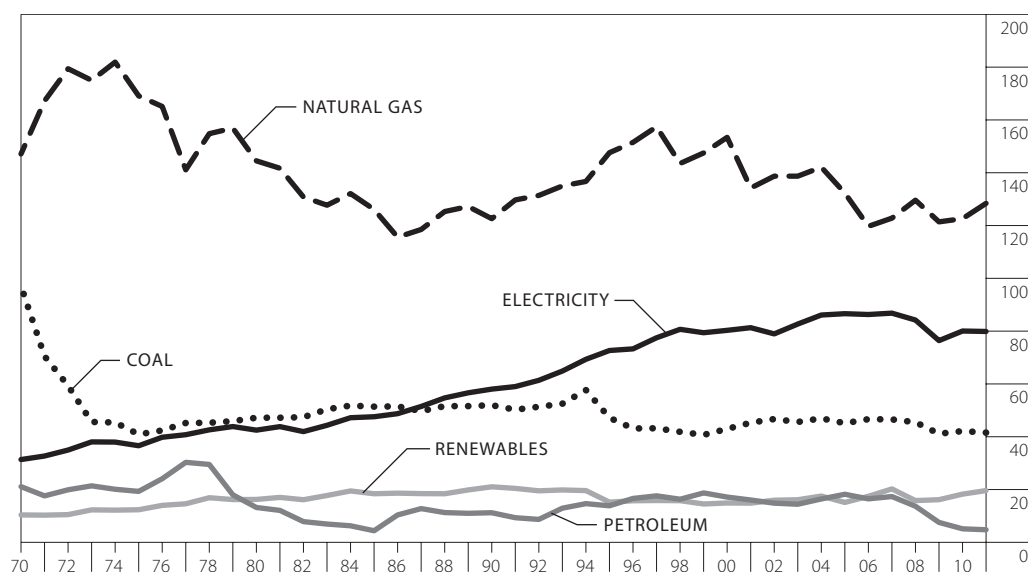
^p Preliminary estimates.

^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.

Wisconsin Industrial Energy Use, by Type of Fuel

1970-2011 TRILLIONS OF BTU



1970-2011 TRILLIONS OF BTU AND PERCENT OF TOTAL

Year	Petroleum		Natural Gas		Coal		Renewables ^a		Electricity		Total End Use	Total Resource ^{b,c}
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 ^r	4.4	1.8%	126.1	50.9%	51.4	20.7%	18.4	7.4%	47.6	19.2%	247.9	348.7
1990 ^r	11.2	4.2%	122.6	46.3%	51.9	19.6%	21.0	7.9%	58.0	21.9%	264.8	405.1
1995 ^r	13.8	4.7%	147.6	49.8%	47.2	15.9%	15.2	5.1%	72.7	24.5%	296.5	470.8
2000 ^r	17.2	5.6%	153.4	49.7%	43.0	13.9%	14.9	4.8%	80.3	26.0%	308.7	491.5
2005 ^r	18.2	6.1%	132.3	44.5%	45.1	15.2%	15.1	5.1%	86.6	29.1%	297.3	483.7
2006 ^r	16.5	5.7%	119.7	41.8%	46.7	16.3%	17.4	6.1%	86.3	30.1%	286.6	464.9
2007 ^r	17.4	5.9%	122.8	41.8%	46.6	15.8%	20.2	6.9%	86.8	29.6%	293.8	488.5
2008 ^r	13.7	4.7%	129.6	44.9%	45.5	15.8%	15.8	5.5%	84.2	29.2%	288.8	478.9
2009 ^r	7.5	2.9%	121.4	46.2%	41.1	15.7%	16.2	6.2%	76.4	29.1%	262.6	432.7
2010 ^r	5.1	1.9%	122.6	45.7%	42.1	15.7%	18.3	6.8%	80.0	29.8%	268.2	446.8
2011 ^p	4.8	1.7%	128.4	46.8%	41.6	15.2%	19.6	7.1%	79.9	29.1%	274.2	444.1

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

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

^c Totals may not add due to rounding.

^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.

INDUSTRIAL END-USE ENERGY

2.2%

IN 2011

End use energy consumption in the industrial sector increased 2.2 percent in 2011, following an increase of 2.1 percent in 2010.

The major industrial energy sources are natural gas (46.8 percent) and electricity (29.1 percent), trailed by coal (15.2 percent), renewables (7.1 percent) and petroleum (1.7 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. The use of petroleum, coal and electricity declined in the industrial sector by 6.8, 1.4 and 0.2 percent, respectively. The sector saw increases in natural gas (4.7 percent) and renewables (7.4 percent).

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

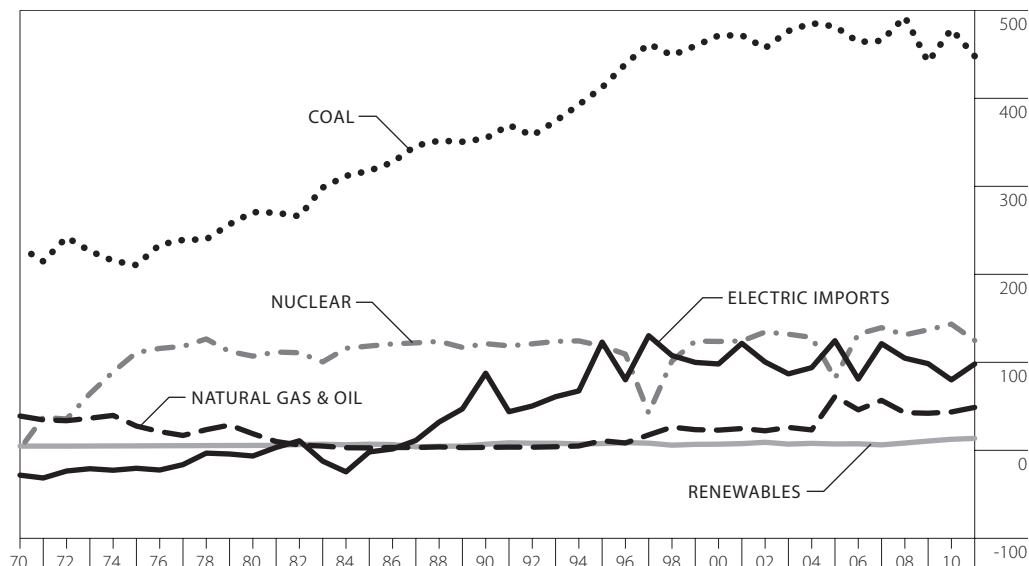
ENERGY USE
FOR ELECTRIC
GENERATION
3.3%
IN 2011

Wisconsin's energy use for electric generation decreased by 3.3 percent in 2011. Since the early 1980s, coal and nuclear power have been dominate fuels for electricity generation.

Coal use decreased 6.4 percent and imports of electricity (and associated losses) from other states and Canada increased 22.5 percent. Petroleum use decreased by 2.4 while natural gas increased by 12.2 percent as utilities switched from coal to natural gas at some power plants.

In 2011, of the electricity produced in Wisconsin, coal provided 61.1 percent of the energy. The proportion of energy provided by petroleum, natural gas, renewables and hydropower was only 9.4 percent, and balance of electricity was nuclear or imports to the state.

1970-2011 TRILLIONS OF BTU



1970-2011 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 ^r	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 ^r	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 ^r	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	1.9	0.2%	59.4	7.8%	481.7	63.7%	7.2	1.0%	81.8	10.8%	124.7	16.5%	5.1	0.7%	756.7
2006 ^r	1.5	0.2%	44.5	6.1%	464.1	63.5%	7.4	1.0%	132.1	18.1%	81.0	11.1%	4.9	0.7%	730.7
2007 ^r	1.9	0.2%	54.9	7.0%	465.4	59.0%	6.2	0.8%	139.4	17.7%	121.3	15.4%	4.5	0.6%	789.1
2008 ^r	1.1	0.1%	41.7	5.3%	492.6	63.2%	8.3	1.1%	131.3	16.8%	104.7	13.4%	4.9	0.6%	779.7
2009 ^r	0.6	0.1%	41.6	5.7%	441.4	60.5%	10.5	1.4%	137.0	18.8%	98.5	13.5%	4.6	0.6%	729.6
2010 ^r	0.5	0.1%	43.1	5.7%	478.7	63.1%	12.6	1.7%	143.4	18.9%	80.1	10.6%	6.9	0.9%	758.4
2011 ^p	0.5	0.1%	48.3	6.6%	448.0	61.1%	13.6	1.9%	124.8	17.0%	98.1	13.4%	6.6	0.9%	733.4

^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.

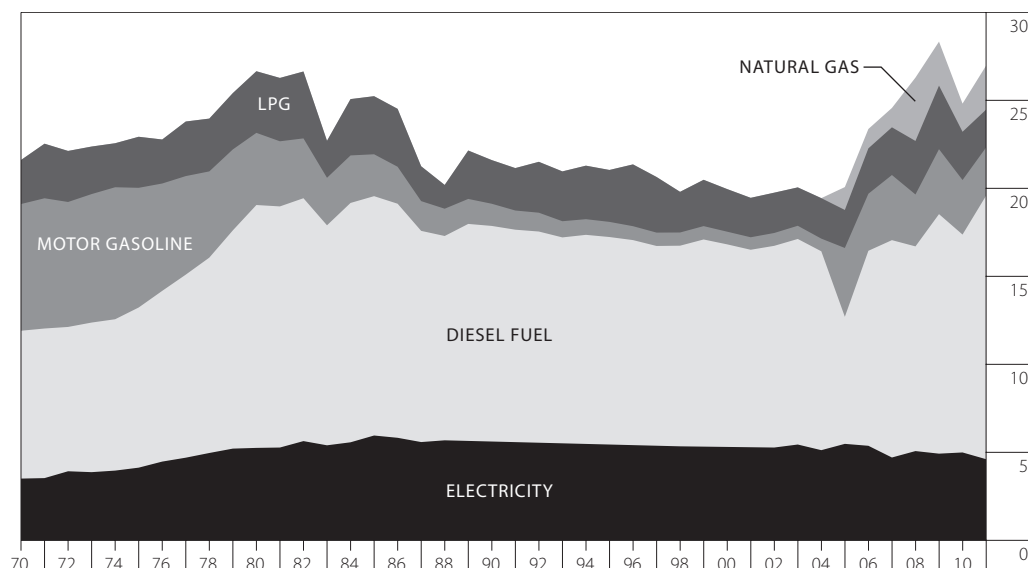
^p Preliminary estimates.

^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 (1971-2011); American Gas Association, *Gas Facts* (1970-1995); U.S. Department of Energy, Energy Information Administration, *Electric Power Monthly*, [DOE/EIA-0226(2013/05)] (May 2013); Public Service Commission of Wisconsin, unpublished data (2005-2011); telephone survey of wastewater treatment facilities and landfills on biogas production (2007-2010).

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

1970-2011 TRILLIONS OF BTU



1970-2011 TRILLIONS OF BTU AND PERCENT OF TOTAL

Year	Motor Gasoline	Diesel Fuel ^a	LPG	Other Fuel ^b	Total Petroleum	Electricity	Natural Gas ^d	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	13.6	3.3		19.3	6.0		25.2	37.9
1990	1.3	12.3	2.5		16.0	5.6		21.6	35.2
1995	0.9	11.8	3.0		15.6	5.4		21.0	34.1
2000	0.7	11.5	2.4		14.7	5.3		20.0	32.0
2005 ^{e,f}	3.9	7.2	2.2	0.3	13.6	5.5	1.3	20.3	32.1
2010 ^r	3.1	12.4	2.7	0.2	18.4	5.0	1.6	25.1	36.2
2011 ^p	2.7	15.0	2.2	0.2	20.1	4.6	2.5	27.2	37.0

^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.

^d Natural gas consumption for 2008 reflects the high price of natural gas in that year, as well as the inclusion of nurseries and greenhouses in the sample.

^e 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.

^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 (1991-2011); National Agriculture Statistics Service, unpublished expenditure data (2005-2011); United States Department of Agriculture, Economic Research Service data, <http://www.ers.usda.gov/data/FarmIncome> (2005-2011); Energy Information Administration, petroleum navigator, <http://www.eia.gov/petroleum/data.cfm> (2005-2011).

AGRICULTURAL
END-USE
ENERGY
8.4%
IN 2011

Agricultural energy end use increased by 8.4 percent in 2011.

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 2.4 percent of total end use energy in Wisconsin.

2011 reflects the first year that natural gas is reported in the agriculture sector. Natural gas is used primarily for space heating and crop drying, along with liquefied propane gas (LPG).

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

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.

1970-2011 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 ^r	6.0	84.1	22.8		112.9	1,595
2004 ^r	5.8	81.2	24.1		111.1	1,501
2005 ^{c,r}	31.2	52.1	22.6	1.9	107.9	1,606
2006 ^r	25.9	80.0	27.1	2.2	135.2	1,574
2007 ^r	29.6	89.1	28.3	1.9	149.0	1,379
2008	23.6	83.9	31.8	2.0	141.3	1,486
2009 ^r	29.5	98.1	37.8	4.8	170.3	1,443
2010 ^r	24.8	89.3	28.7	1.7	144.5	1,463
2011 ^p	21.9	108.0	22.5	1.5	153.9	1,351

^a Fuel oil and kerosene, through 2004.

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

^c The State Energy Office 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.

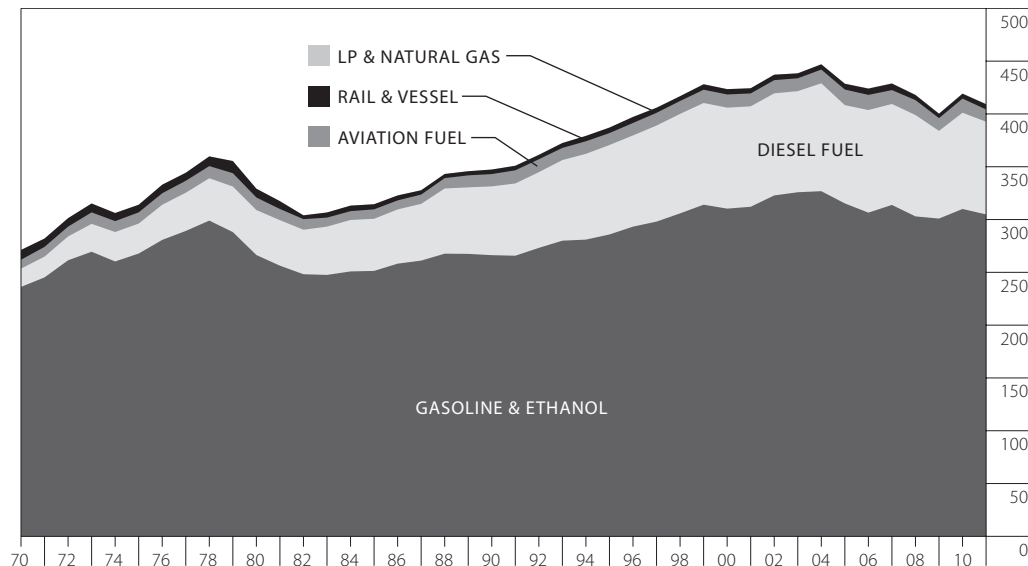
^p Preliminary estimates.

^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* (1991-2011); National Agriculture Statistics Service, unpublished expenditure data (2005-2011); United States Department of Agriculture, Economic Research Service data, <http://www.ers.usda.gov/data/FarmIncome> (2005-2011); Energy Information Administration, petroleum navigator, <http://www.eia.gov/petroleum/data.cfm> (2005-2011).

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

1970-2011 TRILLIONS OF BTU



Year	Motor Gasoline ^a	Ethanol	Diesel Fuel	Aviation		Rail Distillate & Residual	LPG	Natural Gas ^b	Total
				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		314.5
1990 ^r	265.6	0.7	65.2	0.6	11.0	4.3	NA		347.3
1995 ^r	281.8	4.1	84.7	0.7	10.6	5.2	0.6		387.7
2000 ^r	302.4	7.9	95.6	0.8	11.7	5.0	0.5		424.0
2005 ^r	304.9	10.4	93.1	0.5	14.3	5.5	0.3	0.0238	428.9
2006 ^r	295.5	11.0	97.2	0.4	13.9	5.9	0.3	0.0247	424.3
2007 ^r	300.2	13.6	95.6	0.4	12.8	6.2	0.2	0.0237	429.0
2008 ^r	284.7	18.3	96.0	0.3	13.8	4.8	0.2	0.0199	418.2
2009 ^r	281.5	19.4	83.1	0.3	11.8	4.2	0.2	0.0204	400.4
2010 ^r	288.4	21.6	91.1	0.3	13.1	4.6	0.2	0.0346	419.4
2011 ^p	285.7	19.2	87.8	0.3	11.3	5.0	0.2	0.0630	409.4

^a Excludes ethanol.

^b Compressed natural gas gasoline gallon equivalents (GGE). Assumes energy content of one standard GGE is 114,818.76 Btus.

^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* (1970-2011) and *Petroleum Supply Annual*, DOE/EIA-3340 (1982-2011); US Department of Energy, Form EIA-782C, "Monthly Report of Petroleum Products Sold for Consumption" (1983-2011); WI Office of Energy Independence surveys of airport fixed base operators (2007-2009) and railways (2007-2011).

TRANSPORTATION ENERGY USE

2.4%

MOTOR GASOLINE USE

1.0%

ETHANOL USE

11.1%

Transportation energy use decreased 2.4 percent in 2011. Motor gasoline use decreased 1.0 percent, while ethanol use decreased 11.1 percent—the first decrease in ethanol consumption since ethanol was introduced to Wisconsin in 1982. The decrease in consumption is linked to both the decrease in overall gasoline consumption and overall reduced ethanol production related to high feedstock costs.

Diesel fuel is used primarily for trucking freight. Diesel fuel use decreased 3.7 percent. Transportation activities consume 35.6 percent of Wisconsin's total end use energy, accounting for 87.0 percent of petroleum use.

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

AVERAGE
PRICE OF
GASOLINE
\$.738
PER GALLON

In 2011, the average statewide price of gasoline increased by \$.738 a gallon, to \$3.529/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). Wisconsin is seeing a growing use of compressed natural gas (CNG) as a transportation fuel. CNG can be produced from fossil fuel sources, or from biological sources as BioCNG. CNG and BioCNG are measured in gasoline gallon equivalents (GGE), and are available from a variety of fueling stations across the state. See <http://www.stateenergyoffice.wi.gov> for more information on natural gas as a transportation fuel.

1970-2011 MILLIONS OF GALLONS

Year	Motor Gasoline ^a	Ethanol	Diesel Fuel	Aviation		Distillate & Residual			Natural Gas ^b	Total
				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	2,124.5	8.3	471.1	5.0	81.6	29.1	9.0	NA		2,728.6
1995 ^r	2,254.1	48.5	612.5	5.6	78.6	35.1	6.9	6.1		3,047.3
1996 ^r	2,307.8	56.8	624.6	5.7	82.0	38.4	3.7	6.0		3,125.0
1997 ^r	2,345.4	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		3,280.0
1999 ^r	2,461.5	75.4	696.3	6.1	87.4	37.0	0.0	5.1		3,368.8
2000 ^r	2,419.4	93.8	691.2	6.0	87.0	35.9	0.0	5.3		3,338.6
2001 ^r	2,438.6	85.9	687.7	5.9	85.0	35.2	0.0	4.6		3,342.9
2002 ^r	2,523.0	88.2	698.9	4.9	88.2	36.9	0.0	4.0		3,444.1
2003 ^r	2,538.7	100.9	692.1	4.3	86.1	33.7	0.0	3.8		3,459.6
2004 ^r	2,545.6	102.5	738.5	4.2	92.5	35.7	0.0	3.7		3,522.7
2005 ^r	2,439.2	123.0	672.7	4.1	105.7	35.1	0.0	3.0	0.208	3,383.0
2006 ^r	2,364.1	130.4	702.6	3.5	102.9	37.2	0.0	3.2	0.215	3,344.2
2007 ^r	2,401.7	161.2	691.3	2.8	94.6	43.2	0.0	2.3	0.207	3,397.4
2008 ^r	2,277.3	217.0	693.9	2.6	102.4	34.7	0.0	2.4	0.174	3,330.5
2009 ^r	2,252.3	229.7	600.4	2.4	87.0	30.1	0.0	2.2	0.178	3,204.3
2010 ^r	2,307.6	255.4	658.8	2.4	97.0	33.3	0.0	2.3	0.302	3,357.0
2011 ^p	2,285.5	227.1	634.6	2.4	83.7	35.8	0.0	1.6	0.549	3,271.2

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

^b Compressed natural gas gasoline gallon equivalents (GGE). Assumes that the energy content of one standard GGE is 114,818.76 Btus.

^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* (1970-2011) and *Petroleum Supply Annual*, DOE/EIA-3340 (1982-2011); US Department of Energy, Form EIA-782C, "Monthly Report of Petroleum Products Sold Into States for Consumption" (1983-2011); WI Office of Energy Independence surveys of airport fixed base operators (2000-2009) and railways (2000-2011).

CHAPTER 2

Energy Use by Type of Fuel

UW Oshkosh Uses Digester Technology to Generate **Renewable Electricity** from Waste

Often when people think of renewable energy, they think of solar or wind power. However, in 2011, biogas was responsible for 20 percent of Wisconsin's renewable electricity generation. Biodigesters turn waste into energy by taking advantage of the natural process of decomposition. In nature, decomposing materials release methane into the atmosphere where it becomes a greenhouse gas. In a biodigester, the methane is captured and combusted to generate renewable electricity.

UW-Oshkosh is serious about biodigester technology—not just because of the renewable electricity, but also because of the research opportunities. UWO is affiliated with three different biodigesters—one 'dry' and two 'wet'.

The 'dry' biodigester is one-of-a-kind in this part of the world. The digester is filled with agricultural plant and food waste, and campus food waste from the student dining halls. This waste decomposes, produces biogas, and is combusted in the on-site turbine, generating electricity that is sold to the grid.

But that's not all, the dry digester also provides an opportunity to research and understand how bioplastics and bioproducts degrade. Understanding how well bioplastics decompose and how much biogas is produced from plastics provides valuable information to bioplastics manufacturers seeking to develop food packing and other materials that can safely be disposed of without long-term environmental impacts.

UWO's wet biodigesters use a different kind of waste of which Wisconsin has plentiful suppliers...cow manure.

At Wisconsin's largest Dairy Farm, Rosendale Dairy, the biodigester serves two functions—renewable electricity generation and a living, learning, renewable-energy laboratory. The Rosendale biodigester will process approximately 240 tons per day of separated solids—23 percent total solids will be combined with up to 58,000 gallons per day of liquid manure produced by the dairy's 8,500 cows.

Small dairies can also benefit from biodigester technology. UWO worked with the State Energy Office and BIOFerm to install an anaerobic biodigester at the Allen Farm—a farm with fewer than 500 head of cattle. While also producing waste-to-energy renewable electricity, the research component of this biodigester focuses on providing an answer to concerns about livestock waste infiltrating ground and surface waters.



"There are research opportunities at all three of our biodigesters. We have undergraduate students, graduate students and faculty working at each site and in conjunction with our Environmental Research and Innovation Center (ERIC) lab. The research includes improvement of operations, feedstock optimization, development of new technologies, logistical optimization, development of value-added products," said Greg Kleinheintz, the UWO Associate Dean of the College of Letters and Sciences and Professor of Engineering Technology.

Funding for the research and renewable energy efforts comes from the UW-Oshkosh Foundation, private industry, utilities and the State Energy Office.

Wisconsin Petroleum Use, by Economic Sector

OVERALL
PETROLEUM
USE
1.5%

Overall petroleum use measured in British thermal units (Btu) decreased 1.5 percent in 2011. Eighty-seven percent of the petroleum used in Wisconsin was for transportation, which saw a decrease of 1.9 percent.

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

1970-2011 TRILLIONS OF BTU AND PERCENT OF TOTAL

Year	Residential		Commercial		Industrial		Agricultural ^a		Transportation ^b		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 ^r	54.2	13.0%	22.3	5.4%	4.4	1.1%	19.3	4.6%	314.4	75.6%	1.4	0.3%	416.0	414.6
1990 ^r	47.9	10.9%	17.6	4.0%	11.2	2.5%	16.0	3.6%	346.6	78.7%	1.0	0.2%	440.3	439.4
1995 ^r	42.0	9.0%	11.3	2.4%	13.8	3.0%	15.6	3.3%	383.6	82.1%	0.8	0.2%	467.2	466.3
1996 ^r	44.5	9.2%	11.7	2.4%	16.6	3.4%	16.0	3.3%	392.9	81.4%	0.9	0.2%	482.6	481.7
1997 ^r	39.8	8.1%	13.1	2.7%	17.6	3.6%	15.3	3.1%	401.6	82.1%	1.5	0.3%	489.0	487.4
1998 ^r	34.8	7.1%	14.4	2.9%	16.3	3.3%	14.5	2.9%	411.3	83.4%	1.8	0.4%	493.0	491.2
1999 ^r	39.1	7.6%	14.7	2.9%	18.7	3.7%	15.2	3.0%	422.2	82.5%	2.0	0.4%	511.9	509.9
2000 ^r	38.8	7.7%	14.0	2.8%	17.2	3.4%	14.6	2.9%	416.1	82.8%	1.6	0.3%	502.2	500.7
2001 ^r	39.4	7.8%	14.7	2.9%	16.0	3.2%	14.2	2.8%	417.5	82.8%	2.2	0.4%	504.0	501.8
2002 ^r	37.6	7.3%	14.3	2.8%	14.8	2.9%	14.5	2.8%	430.1	83.9%	1.5	0.3%	512.9	511.3
2003 ^r	37.3	7.3%	15.6	3.0%	14.4	2.8%	14.6	2.8%	430.3	83.7%	1.8	0.3%	514.0	512.2
2004 ^r	36.6	7.0%	13.6	2.6%	16.4	3.2%	14.3	2.7%	438.7	84.1%	1.8	0.3%	521.4	519.6
2005 ^r	34.4	6.9%	13.3	2.7%	18.2	3.6%	13.5	2.7%	418.5	83.7%	1.9	0.4%	499.8	498.0
2006 ^r	35.3	7.1%	10.5	2.1%	16.5	3.3%	17.2	3.5%	413.3	83.6%	1.5	0.3%	494.3	492.7
2007 ^r	32.8	6.6%	10.7	2.2%	17.4	3.5%	19.0	3.8%	415.4	83.5%	1.9	0.4%	497.2	495.3
2008 ^r	33.4	7.0%	12.2	2.6%	13.7	2.9%	17.9	3.7%	399.9	83.6%	1.1	0.2%	478.1	477.1
2009 ^r	29.4	6.5%	10.5	2.3%	7.5	1.7%	21.6	4.8%	381.0	84.6%	0.6	0.1%	450.6	450.0
2010 ^r	25.5	5.6%	8.0	1.7%	5.1	1.1%	18.5	4.1%	397.8	87.4%	0.5	0.1%	455.4	454.8
2011 ^p	24.3	5.4%	8.8	2.0%	4.8	1.1%	20.1	4.5%	390.2	87.0%	0.5	0.1%	448.6	448.1

^a In 2005, the SEO 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.

^b These figures do not include any ethanol. In 2011 these figures were historically revised to remove ethanol.

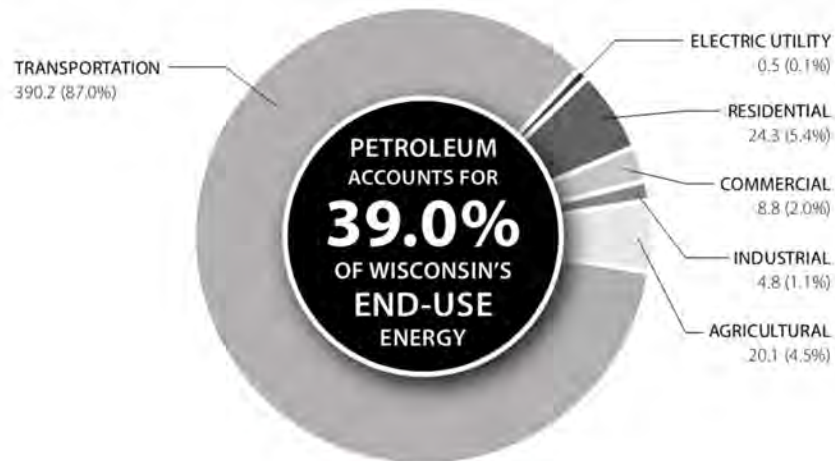
^p Preliminary estimates.

^r Revised.

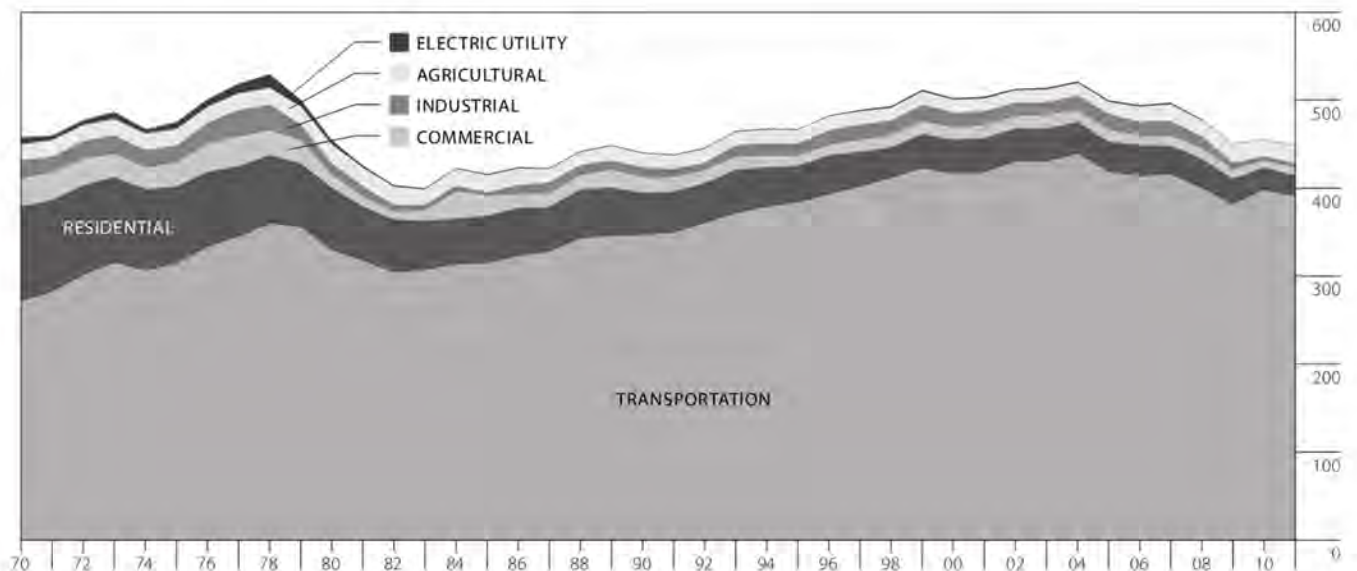
Source: Wisconsin Department of Commerce, Bureau of Petroleum Inspection, *Report on Petroleum Products Inspected and Delivered to Wisconsin* (1970-1995); Wisconsin Department of Revenue, *Collection of Petroleum Inspection Fees* (1996-2006) and *Fuel Tax Statistical Report* (1996-2011); State Energy Office phone and email surveys of airport fixed base operators (2000-2009) and railways (2000-2011); US Department of Energy, Form EIA-782C, *Monthly Report of Petroleum Products Sold into States for Consumption* (1983-2007); US Department of Energy, Form EIA-821 (2003-2011); unpublished data from the National Agriculture Statistics Service (2005-2011).

Wisconsin Petroleum Use, by Economic Sector

2011 TRILLIONS OF BTU AND PERCENT OF TOTAL



1970-2011 TRILLIONS OF BTU



Source: Wisconsin State Energy Office.

Wisconsin Petroleum Use, in Btu, by Type of Product

Middle distillate, which decreased by 0.3 percent since 2010, is used both as a heating fuel in furnaces and boilers, and as diesel fuel in trucks. Light distillate, which decreased by 5.0 percent since 2010, includes kerosene and is primarily used as a thinner during periods of cold weather.

1970-2011 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 ^r	254.2	8.4	14.0	114.7	1.6	23.1	415.9
1990 ^r	267.4	11.0	10.9	120.0	6.1	24.8	440.3
1995 ^r	283.3	10.6	11.1	126.7	4.5	30.9	467.2
1996 ^r	290.0	11.1	12.1	129.6	5.8	34.2	482.6
1997 ^r	294.7	11.3	12.8	132.1	6.2	31.8	489.0
1998 ^r	301.3	11.5	13.0	133.5	6.5	27.3	493.0
1999 ^r	309.2	11.8	13.8	140.0	7.7	29.4	511.9
2000 ^r	303.9	11.7	12.9	136.6	6.8	30.3	502.2
2001 ^r	306.3	11.5	12.9	137.2	7.0	29.2	504.0
2002 ^r	316.7	11.9	12.4	134.7	7.1	30.0	512.9
2003 ^r	318.6	11.6	12.0	138.1	5.9	27.7	514.0
2004 ^r	319.4	12.5	12.5	141.7	6.9	28.3	521.4
2005 ^r	309.3	14.3	11.4	128.7	8.6	27.5	499.8
2006 ^r	299.2	13.9	11.4	133.0	5.1	31.8	494.3
2007 ^r	304.3	12.8	10.3	133.7	4.8	31.3	497.2
2008 ^r	287.9	13.8	10.6	130.7	3.9	31.2	478.1
2009 ^r	285.5	11.8	9.0	109.7	1.3	33.2	450.6
2010 ^r	291.9	13.1	9.5	111.9	0.6	28.4	455.3
2011 ^p	288.7	11.3	9.0	111.6	0.7	27.2	448.6

^a Includes both vehicle and aviation gasoline.

^b Does not include ethanol. In 2011 these figures were historically revised to remove 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* (1996-2011); U.S. Department of Energy, Form EIA-782C, *Monthly Report of Petroleum Products Sold into States for Consumption* http://www.eia.gov/oil_gas/petroleum/data_publications/prime_supplier_report/psr.html, (1983-2011); WI State Energy Office telephone and email surveys of airport fixed base operators (2000-2009) and railways (2000-2011); unpublished expenditure data from the National Agriculture Statistics Service (2005-2011).

Wisconsin Petroleum Use, in Gallons, by Type of Product

1970-2011 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 ^r	2,033.3	62.2	103.7	826.9	10.8	241.5	3,278.4
1990 ^r	2,139.5	81.6	81.0	864.9	40.7	260.2	3,467.9
1995 ^r	2,266.6	78.6	82.0	913.7	30.3	323.8	3,694.9
1996 ^r	2,319.8	82.0	89.4	934.2	38.7	357.9	3,821.9
1997 ^r	2,357.4	84.0	95.1	952.6	41.7	332.9	3,863.6
1998 ^r	2,410.3	85.0	96.0	962.6	43.5	285.9	3,883.4
1999 ^r	2,473.7	87.4	102.5	1,009.5	51.4	307.7	4,032.2
2000 ^r	2,431.2	87.0	95.7	984.6	45.5	317.5	3,961.4
2001 ^r	2,450.2	85.0	95.3	988.9	46.6	306.1	3,972.0
2002 ^r	2,533.7	88.2	91.9	971.2	47.3	314.7	4,047.0
2003 ^r	2,549.0	86.1	88.7	995.8	39.7	290.0	4,049.4
2004 ^r	2,555.6	92.5	92.3	1,021.9	46.3	296.9	4,105.4
2005 ^r	2,474.6	105.7	84.6	928.1	57.4	288.4	3,938.7
2006 ^r	2,393.6	102.9	84.1	959.0	34.1	332.6	3,906.2
2007 ^r	2,434.2	94.6	76.6	963.9	32.1	328.1	3,929.4
2008 ^r	2,303.5	102.4	78.6	942.0	25.8	327.1	3,779.5
2009 ^r	2,284.2	87.0	66.7	791.0	9.0	348.2	3,586.1
2010 ^r	2,334.8	97.0	70.5	807.1	3.9	297.2	3,610.5
2011 ^p	2,309.8	83.7	66.9	804.7	4.5	285.4	3,555.0

GASOLINE
USE

1.1%

JET FUEL

13.7%

LP USE

4.0%

In 2011, gasoline use decreased by 1.1 percent, jet fuel decreased by 13.7 percent, and LP use decreased by 4.0 percent.

^a Includes both vehicle and aviation gasoline.

^b Does not include the ethanol. In 2011, these numbers were historically revised to remove all 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* (1996-2011); U.S. Department of Energy Form EIA-782C, *Monthly Report of Petroleum Products Sold into States for Consumption* (1983-2011)

http://www.eia.gov/oil_gas/petroleum/data_publications/prime_supplier_report/psr.html; WI State Energy Office telephone and email surveys of airport fixed base operators (2000-2009) and railways (2000-2011); unpublished data from the National Agriculture Statistics Service (2005-2011).

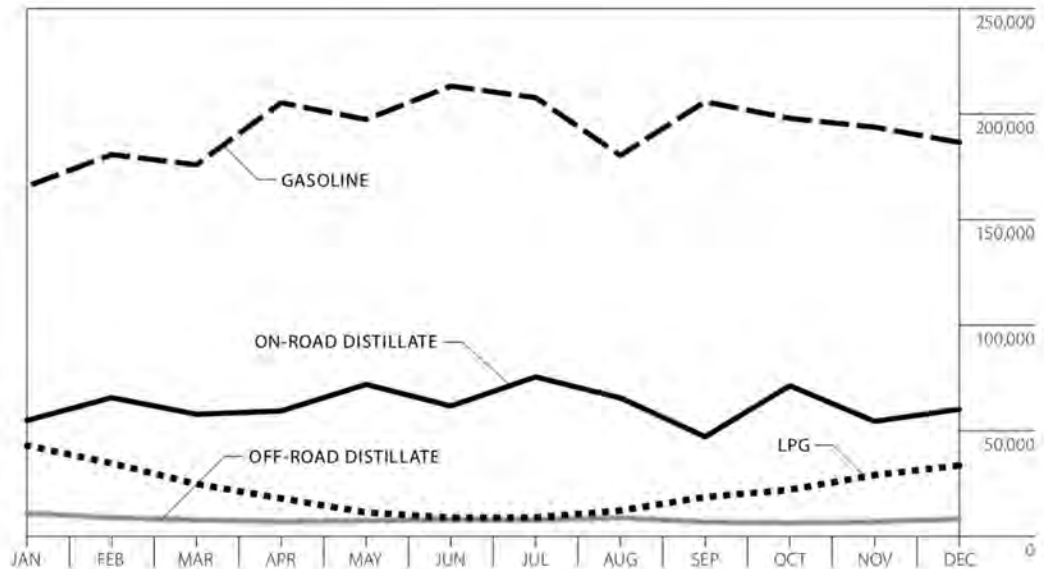
Petroleum Product Deliveries to Wisconsin, by Month

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.

2011 THOUSANDS OF GALLONS



Month	Off-Road Distillate ^a	On-Road Distillate ^b	LPG ^c	Gasoline ^d
January	10,751	54,621	42,675	165,501
February	8,588	65,447	34,278	180,523
March	7,502	57,555	24,481	175,690
April	6,762	59,135	17,664	205,039
May	7,102	71,690	11,042	197,128
June	7,659	61,466	8,520	212,952
July	7,524	75,260	8,603	207,492
August	8,491	65,312	11,910	180,069
September	6,570	46,888	18,333	205,532
October	6,231	71,046	21,750	197,684
November	6,624	54,213	28,764	193,503
December	7,989	59,963	33,254	186,268
Total	91,792	742,596	261,272	2,307,382

^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.

^b On-road diesel fuel sales in Wisconsin.

^c Liquefied petroleum gas (propane) deliveries.

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

Source: Wisconsin Department of Revenue, Monthly Motor Fuel Consumption Report (2008-2011); U.S. Department of Energy, Form EIA-782C.

Monthly Report of Petroleum Products Sold into States for Consumption (2011).

http://www.eia.gov/oil_gas/petroleum/data_publications/prime_supplier_report/psr.html.

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

1994-2011 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	49,191	723	122,960
2006	210,386	77,614	50,498	2,302	130,414
2007	283,873	69,963	86,472	4,800	161,235
2008	447,388	68,047	143,849	5,100	216,996
2009	462,022	74,142	150,347	5,200	229,689
2010	438,260	77,968	174,399	2,995	255,362
2011	496,366	76,927	147,704	2,447	227,078

ETHANOL
PRODUCTION
13.3%

In 2011, Wisconsin ethanol production increased 13.3 percent. Ethanol use in Wisconsin decreased 11.1 percent with decreased consumption of RFG (1.3 percent), E10 (15.3 percent) and E85 (18.3 percent).

The decreased consumption of ethanol in Wisconsin in 2011 is related to a number of factors, including: the sunset of a per-gallon tax credit (valued at \$0.45/gallon) for producers and distributors, and increased prices for corn feedstock due to the drought.

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

^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.

^p Preliminary.

^r Revised.

NA – Not Available.

Source: Wisconsin Department of Revenue; Wisconsin State Energy Office survey of E85 distributors; U.S. Department of Energy, Form EIA-782C, *Monthly Report of Petroleum Products Sold into States for Consumption* (2011)
http://www.eia.gov/oil_gas/petroleum/data_publications/prime_supplier_report/psr.html.

Wisconsin Liquefied Petroleum Gas Use, by Economic Sector

LPG USE
4.0%

Liquefied petroleum gas (LPG), (propane), use decreased 4.0 percent in 2011.

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

1970-2011 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 ^r	158.2	65.5%	29.4	12.2%	19.3	8.0%	34.6	14.3%	NA	0.0%	241.5
1990 ^r	162.1	62.3%	36.5	14.0%	35.7	13.7%	25.9	10.0%	NA	0.0%	260.2
1995 ^r	203.8	62.9%	48.0	14.8%	35.0	10.8%	30.9	9.5%	6.1	1.9%	323.8
1996 ^r	219.5	61.3%	51.7	14.5%	43.9	12.3%	36.8	10.3%	6.0	1.7%	357.9
1997 ^r	210.3	63.2%	48.7	14.6%	35.0	10.5%	33.1	9.9%	5.8	1.7%	332.9
1998 ^r	183.5	64.2%	42.5	14.9%	30.1	10.5%	24.2	8.5%	5.7	2.0%	285.9
1999 ^r	197.9	64.3%	45.8	14.9%	31.4	10.2%	27.6	9.0%	5.1	1.7%	307.7
2000 ^r	211.0	66.5%	47.2	14.9%	28.7	9.0%	25.3	8.0%	5.3	1.7%	317.5
2001 ^r	204.0	66.7%	45.8	15.0%	28.3	9.2%	23.5	7.7%	4.6	1.5%	306.1
2002 ^r	213.1	67.7%	47.6	15.1%	26.0	8.3%	24.0	7.6%	4.0	1.3%	314.7
2003 ^r	198.9	68.6%	43.7	15.1%	20.7	7.1%	22.8	7.9%	3.8	1.3%	290.0
2004 ^r	203.2	68.5%	44.7	15.1%	21.2	7.1%	24.1	8.1%	3.7	1.2%	296.9
2005 ^r	198.5	68.8%	43.6	15.1%	20.7	7.2%	22.6	7.8%	3.0	1.0%	288.4
2006 ^r	228.3	68.6%	50.2	15.1%	23.8	7.1%	27.1	8.1%	3.2	1.0%	332.6
2007 ^r	224.6	68.5%	49.4	15.1%	23.4	7.1%	28.4	8.6%	2.3	0.7%	328.1
2008 ^r	221.2	67.6%	48.7	14.9%	23.1	7.1%	31.8	9.7%	2.4	0.7%	327.1
2009 ^r	232.6	66.8%	51.2	14.7%	24.3	7.0%	37.8	10.9%	2.2	0.6%	348.2
2010 ^r	201.0	67.6%	44.2	14.9%	21.0	7.1%	28.7	9.7%	2.3	0.8%	297.2
2011 ^p	197.3	69.1%	43.4	15.2%	20.6	7.2%	22.5	7.9%	1.6	0.6%	285.4

^a Starting with 2005 data, the SEO 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* (1974-2011) and Form EIA-782C, *Monthly Report of Petroleum Products Sold into States for Consumption* (1983-2011) http://www.eia.gov/oil_gas/petroleum/data_publications/prime_supplier_report/psr.html; National Agricultural Statistics Service, unpublished data (2005-2011); Wisconsin Department of Revenue, *Monthly Motor Fuel Consumption Report* (2008-2011).

Wisconsin Natural Gas Use, by Economic Sector

In 2011, cooler winter weather led to increased natural gas use in the residential sector. Overall, natural gas end-use increased by 5.1 percent from 2010. Natural gas end-use is up 14.3 percent from 1990.

1970-2011 TRILLIONS OF BTU AND PERCENT OF TOTAL

Year	Residential		Commercial ^a		Industrial		Electric ^b		Agricultural ^c		Transportation ^d		Total	Total End Use
1970 ^e	107.0	32.7%	42.2	12.9%	147.1	44.9%	31.1	9.5%					327.4	296.3
1975 ^e	122.4	33.2%	57.0	15.5%	169.1	45.9%	19.8	5.4%					368.3	348.5
1980 ^e	124.0	36.0%	61.4	17.8%	144.5	42.0%	14.1	4.1%					344.0	329.9
1985 ^e	116.9	38.4%	59.8	19.7%	126.1	41.4%	1.4	0.5%					304.2	302.8
1990 ^e	114.7	37.4%	66.8	21.8%	122.6	40.0%	2.4	0.8%					306.4	304.0
1995 ^e	137.5	36.1%	85.9	22.5%	147.6	38.7%	10.1	2.7%					381.1	371.0
1996 ^e	149.8	37.1%	95.1	23.6%	151.5	37.5%	7.4	1.8%					403.8	396.4
1997 ^e	137.3	34.3%	89.8	22.4%	157.4	39.3%	16.0	4.0%					400.5	384.5
1998 ^e	117.2	31.9%	82.3	22.4%	143.5	39.0%	24.6	6.7%					367.7	343.1
1999 ^e	129.1	33.9%	82.8	21.7%	147.5	38.7%	21.5	5.6%					380.9	359.4
2000 ^e	136.4	34.7%	82.1	20.9%	153.4	39.0%	21.4	5.4%					393.4	372.0
2001 ^e	126.4	35.1%	77.0	21.4%	134.2	37.3%	22.6	6.3%					360.1	337.6
2002 ^e	138.2	36.0%	86.6	22.5%	138.7	36.1%	20.7	5.4%					384.2	363.5
2003 ^e	143.2	36.3%	88.1	22.3%	138.7	35.2%	24.3	6.2%					394.3	370.0
2004 ^e	136.1	35.6%	83.0	21.7%	142.1	37.1%	21.4	5.6%					382.7	361.2
2005 ^e	132.9	32.3%	85.9	20.9%	132.3	32.1%	59.4	14.4%	1.3	0.3%	0.02	0.01%	411.8	352.5
2006 ^e	121.9	32.6%	86.2	23.1%	119.7	32.1%	44.5	11.9%	1.1	0.3%	0.03	0.01%	373.4	329.0
2007 ^e	133.0	33.2%	89.1	22.2%	122.8	30.6%	54.9	13.7%	1.1	0.3%	0.02	0.01%	401.0	346.1
2008 ^e	142.5	34.6%	94.9	23.0%	129.6	31.4%	41.7	10.1%	3.6	0.9%	0.02	0.00%	412.4	370.7
2009 ^e	135.0	34.6%	90.2	23.1%	121.4	31.1%	41.6	10.6%	2.5	0.6%	0.02	0.01%	390.8	349.2
2010 ^e	124.9	33.4%	81.4	21.8%	122.6	32.8%	43.1	11.5%	1.6	0.4%	0.04	0.01%	373.6	330.6
2011 ^p	131.0	33.1%	85.6	21.6%	128.4	32.4%	48.3	12.2%	2.5	0.6%	0.06	0.02%	395.8	347.5

^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.

^c Data on agricultural use of natural gas became available in 2005, and was previously included in the commercial sector figures. The 2008 spike in consumption is due to a confluence of factors including a wet, fall crop harvest.

^d Prior to 2000, natural gas for transportation was rolled into the commercial sector.

^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*, 1991-2011 [DOE/EIA-0131(08)] (March 2012) and *Natural Gas Monthly* [DOE/EIA-0130 (2012/03)] (March 2012). <http://www.eia.gov/naturalgas/monthly/>; <http://www.eia.gov/naturalgas/annual/>; U.S. Department of Agriculture/ National Agriculture Statistics Service, unpublished data (2005-2011).

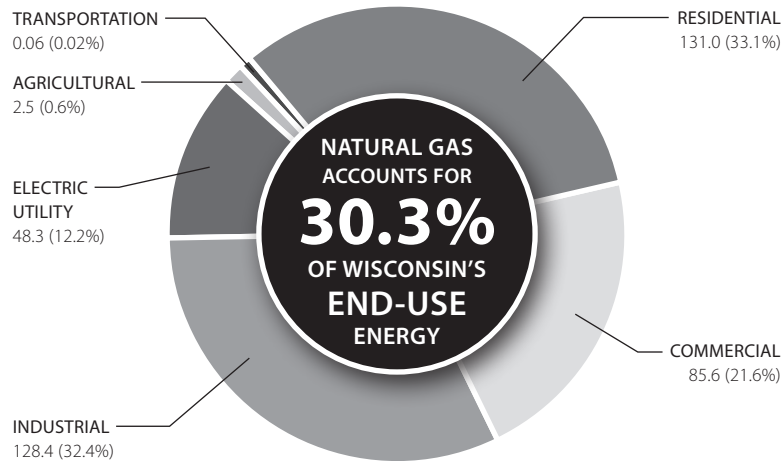
NATURAL GAS
END-USE
5.1%
FROM 2010

In the electric sector, natural gas used to generate electricity increased by 12.2 percent. The electric sector includes natural gas used by utilities and independent power producers who generate and sell electricity to other companies. The agriculture sector saw a 53.1 increase in natural gas use in 2011 over 2010, most likely attributable to falling natural gas prices. Agriculture sector use includes farms (e.g., crop drying) and greenhouses and nurseries.

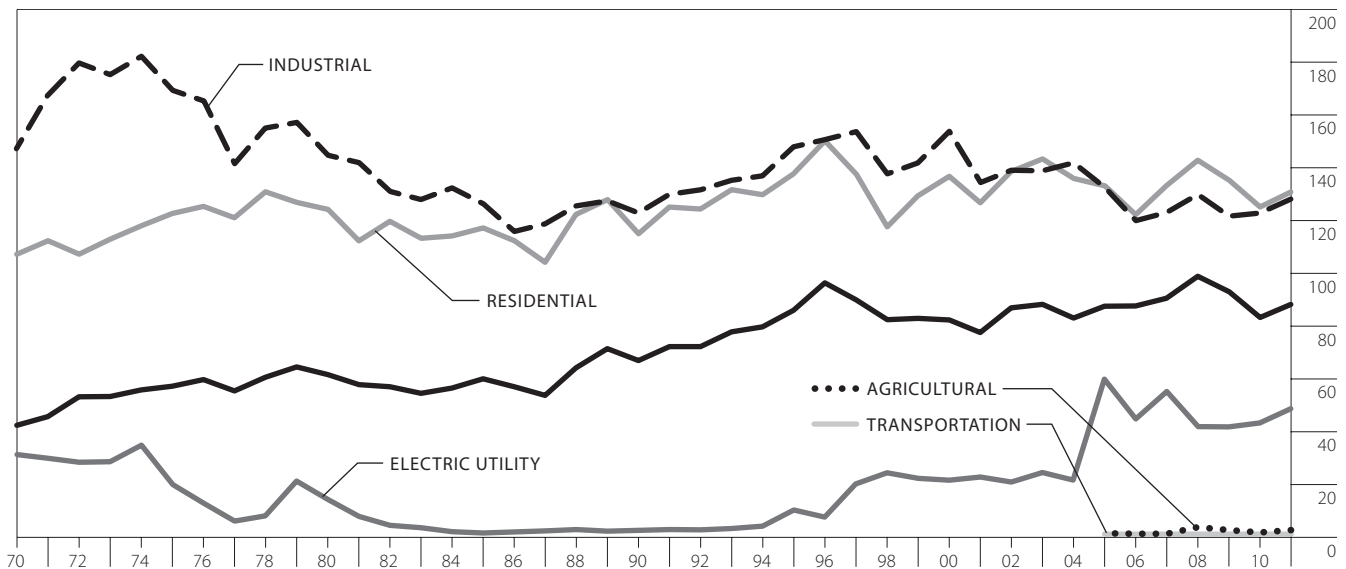
A map of Natural Gas Company Territories and Major Pipelines can be found in the Map Appendix in this publication.

Wisconsin Natural Gas Use, by Economic Sector

2011 TRILLIONS OF BTU AND PERCENT OF TOTAL



1970-2011 TRILLIONS OF BTU



Source: Wisconsin State Energy Office.

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

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. Figures on this page do not match figures elsewhere in this publication due to different data sources.

This table was completely revised in 2009 to account for new methodology that more accurately tracks gas consumption across Wisconsin.

1970-2011 TRILLIONS OF BTU

Year	Residential		Commercial, Industrial & Electric			Total to Ultimate Utility Customers	Commercial, Industrial and Electric Transport Gas	Total Sold and Used ^{c,d}
	General	Heating	Firm ^a	Interruptible ^b	Heating			
1970	7.6	101.3	27.4	121.9	47.6	324.0	0.0	324.0
1975	6.8	112.4	36.6	135.2	60.6	362.8	0.0	362.8
1980	4.3	116.8	25.0	99.6	62.2	343.5	0.0	343.5
1985	2.8	114.7	13.4	95.6	65.6	306.7	0.0	306.7
1990	2.1	112.1	3.7	32.6	59.8	228.4	75.1	303.5
1995	1.8	135.0	3.3	50.2	78.7	289.9	87.4	377.2
1996	1.9	145.8	3.3	37.6	86.2	294.1	103.3	397.4
1997	1.8	134.2	3.3	23.6	79.3	260.6	133.3	394.0
1998	1.6	113.6	3.2	17.1	66.7	216.4	141.8	358.2
1999	1.6	125.1	3.0	18.3	72.5	231.6	147.0	378.6
2000	1.6	132.0	2.8	16.4	77.8	241.9	147.5	389.4
2001	1.4	123.7	3.2	14.7	70.0	224.5	133.3	357.7
2002	1.4	134.6	4.2	16.2	73.6	244.0	138.2	382.2
2003	1.5	140.2	4.3	12.1	77.6	253.9	136.0	390.0
2004	1.5	133.0	4.3	9.1	73.0	234.8	138.2	373.0
2005	1.4	129.9	3.4	9.6	72.8	239.5	157.3	396.8
2006	1.4	118.7	3.0	8.6	69.9	214.1	145.0	359.1
2007	1.5	129.7	3.3	8.6	74.2	232.4	159.7	392.1
2008	1.7	139.0	3.5	9.7	81.2	247.6	158.1	405.7
2009	1.7	131.7	3.5	9.0	76.7	231.4	153.3	384.8
2010 ^r	1.7	121.8	3.1	8.5	70.1	214.5	153.8	368.3
2011 ^p	1.8	127.7	3.3	8.3	74.2	226.4	155.6	382.0

^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 (1994-2011).

In 2011, 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.

Wisconsin Natural Gas Sales, by Month

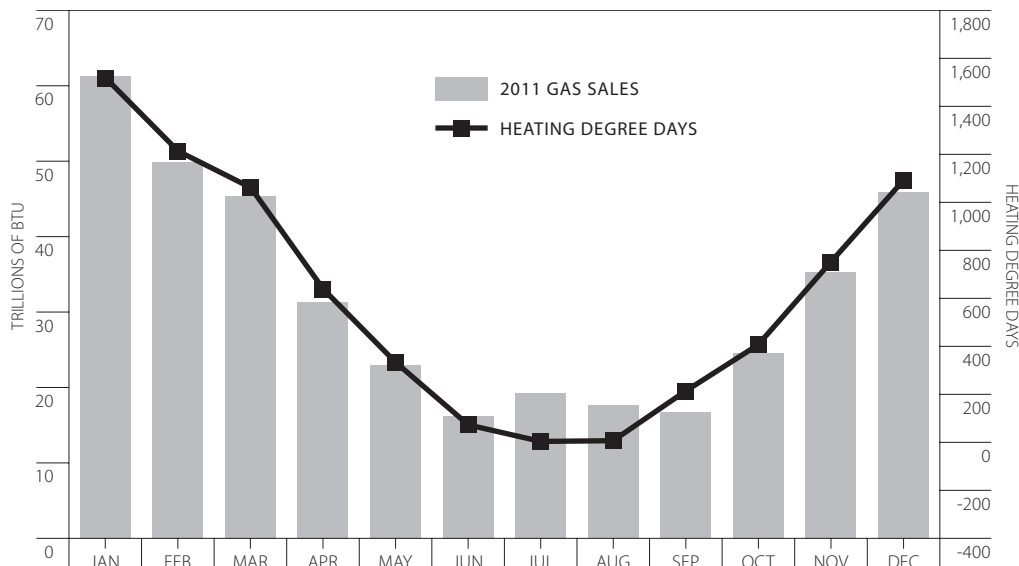
NATURAL GAS
3.7%

In 2011, cooler weather during the winter heating season months led to a 3.7 percent increase in natural gas use compared to the 2010. 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.

July peaks in consumption are due to utilities using natural gas for electricity generation to meet increased demand driven by air conditioning use.

Springtime consumption is higher because a building's baseline temperature is colder following winter. This trend is reversed in the fall when buildings retain heat from the summer.

2011 GAS SALES AND HEATING DEGREE DAYS



This graph has been revised to correct for baseline natural gas consumption unrelated to space heating. Baseline consumption is not weather variable.

1976-2011 TRILLIONS OF BTU

Month	1976	1980	1985	1990	1995	2000	2005	2006	2007	2008	2009	2010	2011 ^a
January	50.9	52.8	51.3	40.6	52.7	60.1	60.2	44.9	54.3	62.2	67.5	61.4	61.3
February	40.3	47.3	42.3	39.3	48.7	47.1	45.7	49.3	61.5	58.8	49.1	48.7	49.9
March	38.5	42.9	32.2	34.3	39.1	37.7	48.3	42.2	41.1	49.0	43.1	36.4	45.4
April	26.5	27.4	21.2	25.2	32.9	32.0	28.8	23.6	32.4	30.3	30.4	22.3	31.3
May	22.3	17.6	14.4	18.9	20.0	21.6	22.8	19.8	19.1	20.5	18.3	19.5	23.0
June	16.0	14.1	11.2	12.7	15.5	15.9	21.2	18.5	16.0	15.6	17.4	17.8	16.2
July	14.6	13.4	11.1	11.5	15.2	15.6	20.2	17.7	17.7	17.1	14.7	18.6	19.3
August	15.8	13.5	11.7	12.8	17.6	18.0	21.0	18.4	20.3	16.9	16.0	19.9	17.6
September	16.3	14.8	13.1	14.1	16.9	17.6	18.4	17.6	17.3	16.7	17.5	16.7	16.7
October	27.4	25.9	18.7	22.7	25.2	24.2	24.0	31.2	25.1	26.4	28.4	22.0	24.6
November	38.9	32.2	31.2	30.3	44.7	40.6	35.8	35.6	37.4	37.8	32.4	34.7	35.3
December	51.3	46.3	48.6	44.3	54.5	63.7	55.1	45.0	54.6	59.1	54.5	55.1	45.9
Total^a	358.8	348.2	306.9	306.9	383.0	394.1	401.5	363.8	396.8	410.4	389.5	373.1	386.7

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

^p Preliminary estimates.

Source: Wisconsin natural gas utility monthly AF2 reports submitted to the Public Service Commission of Wisconsin (1976-2011).
www.psc.wi.gov/apps35/ERF_search/content/SearchResult.aspx

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

1970-2011

Year	Residential		Commercial, Industrial & Electric				Total
	General	Space Heating	Firm	Interruptible	Space Heating	Transportation	
1970	183,695	566,676	13,806	3,104	50,783		818,064
1975	157,684	700,766	11,685	3,716	65,666		939,517
1980	112,700	853,300	10,058	2,206	78,736		1,057,000
1985	90,500	922,500	9,220	2,312	85,468		1,110,000
1990	77,000	1,046,557	9,713	1,257	101,487	740	1,236,754
1995	62,000	1,229,424	7,723	1,426	122,275	569	1,423,417
1996	60,900	1,263,670	7,115	2,159	124,930	803	1,459,577
1997	59,200	1,302,148	6,954	1,405	130,087	1,138	1,500,932
1998	57,900	1,332,168	7,199	1,255	133,854	1,501	1,533,877
1999	56,000	1,370,909	7,221	1,124	135,241	1,999	1,572,494
2000	54,700	1,404,259	7,095	1,005	139,764	2,136	1,608,959
2001	51,500	1,433,036	7,511	1,233	142,844	2,326	1,638,450
2002	49,200	1,465,500	8,208	1,362	147,404	2,448	1,674,122
2003	48,900	1,492,555	8,295	1,396	148,181	2,394	1,701,721
2004	48,300	1,521,419	8,956	1,377	149,323	2,441	1,731,816
2005	45,700	1,546,921	7,673	1,266	152,145	2,509	1,756,214
2006	45,400	1,566,372	6,790	1,234	154,307	2,450	1,776,553
2007	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	158,421	2,371	1,815,639
2009 ^p	45,700	1,610,914	6,927	1,209	159,763	2,340	1,826,853
2010 ^p	45,800	1,617,783	6,900	1,203	160,151	2,332	1,834,169
2011 ^p	45,800	1,626,034	6,931	1,195	160,910	2,342	1,843,212

9,043
NEW
CUSTOMERS

Wisconsin gas utilities added 9,043 new customers in 2011.

This table was completely revised in 2009 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.

^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 Gas Sales and Sales Ratio (1994-2011), U.S. Department of Energy, Natural Gas Annual, 1991-2011 [DOE/EIA-0131(11)] (March 2012). <http://www.eia.gov/naturalgas/annual/>.

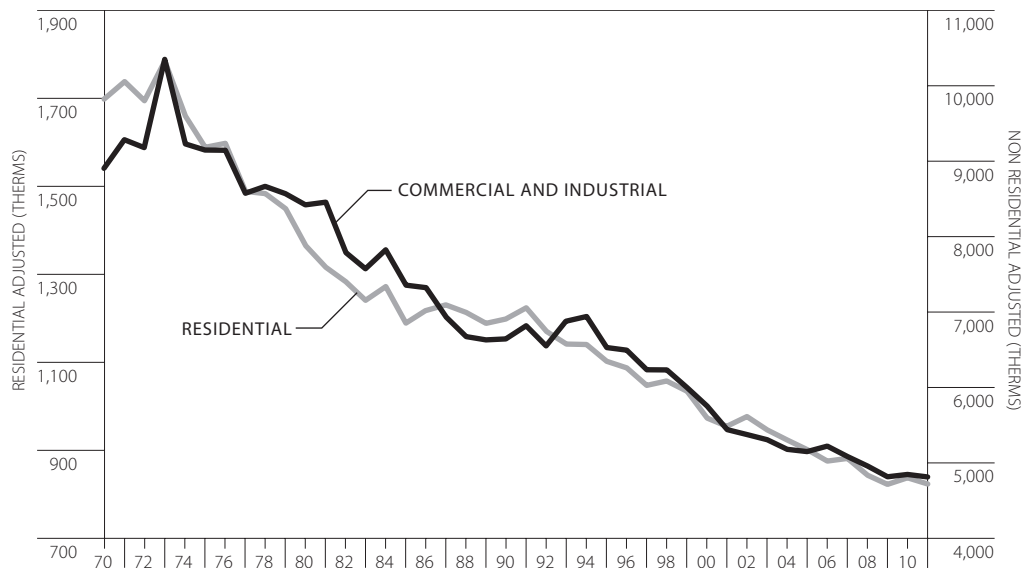
Wisconsin Natural Gas Sales Per Customer, by Public Service Commission of Wisconsin Sector

RESIDENTIAL
SPACE HEATING**1.7%**COMMERCIAL
& INDUSTRIAL
SPACE HEATING**0.7%**

Natural gas use for residential space heating, adjusted for weather conditions, decreased 1.7 percent in 2011, while Commercial and Industrial space heating decreased 0.7 percent in 2011. Figures in this table were revised to include updated weather-correction methodology.

Data in this table have been historically revised to reflect 1981-2010 30-year weather normal, and 2010 population weight by weather zone.

1970-2011 THERMS PER CUSTOMER



Year	Residential			Commercial, Industrial & Electric			
	General	Space Heating Actual	Space Heating Adjusted ^a	Firm	Interruptible	Space Heating Actual	Space Heating Adjusted ^a
1970	412	1,788	1,697	19,852	393,886	9,377	8,900
1975	432	1,603	1,587	31,297	364,846	9,234	9,139
1980	384	1,443	1,364	32,065	451,417	8,900	8,412
1985	310	1,250	1,187	19,336	413,392	7,742	7,348
1990	277	1,078	1,197	5,705	259,679	5,973	6,635
1995	295	1,104	1,101	5,991	352,144	6,540	6,521
2000	296	950	972	4,667	163,625	5,615	5,746
2001	274	873	953	5,054	119,572	4,974	5,433
2002	279	929	975	6,129	119,077	5,112	5,367
2003	310	950	945	6,289	86,533	5,327	5,299
2004	302	885	922	5,805	66,183	4,966	5,171
2005	304	848	900	5,541	75,815	4,843	5,141
2006	299	763	874	5,710	69,685	4,552	5,213
2007	334	826	880	6,177	71,737	4,768	5,076
2008	372	878	842	6,404	81,151	5,160	4,950
2009	382	827	821	6,524	74,036	4,840	4,807
2010	363	761	836	5,863	70,742	4,405	4,838
2011 ^p	395	794	822	6,205	69,211	4,644	4,805

^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 1981-2010 30-year normal of 7,531 HDDs. In the commercial category, the space heating use was adjusted the same way.

^p Preliminary estimates.

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* (1990-1993), and form PSC-AF 2 (1990-2011).

Wisconsin Natural Gas Deliveries, by Pipeline Company

1970-2011 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	60.3%	14.8	3.7%	19.8	4.9%	84.0	20.9%	40.8	10.2%	401.2
2005	253.2	60.9%	16.1	3.9%	19.6	4.7%	84.0	20.2%	42.9	10.3%	415.8
2006	219.0	57.2%	14.6	3.8%	19.9	5.2%	88.6	23.2%	40.6	10.6%	382.7
2007	249.9	58.9%	18.8	4.4%	18.0	4.2%	88.4	20.8%	48.9	11.5%	424.0
2008	258.3	58.4%	17.9	4.0%	17.5	4.0%	94.9	21.4%	53.9	12.2%	442.5
2009	243.0	58.8%	17.6	4.3%	18.5	4.5%	80.6	19.5%	53.5	12.9%	413.2
2010	226.9	59.9%	18.8	5.0%	12.2	3.2%	77.1	20.3%	43.9	11.6%	378.7
2011 ^p	237.9	57.7%	18.8	4.6%	11.4	2.8%	78.0	18.9%	66.1	16.0%	412.1

^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 estimates.

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 1991-2011.

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.

Wisconsin Coal Use, in Btu, by Economic Sector

**TOTAL
COAL
CONSUMPTION**
6.0%

Wisconsin's total coal consumption decreased 6.0 percent in 2011.

Coal use declined in all sectors because of decreased economic activity in 2011, and increased use of natural gas.

Wisconsin total coal use has increased by 87.4 percent since 1975. Industrial coal consumption decreased 1.4 percent in 2011. Commercial sector use of coal is limited primarily to state facilities and large institutions, and decreased by 13.3 percent.

1970-2011 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/ton), where the utility sector uses sub-bituminous coal with a lower energy and sulfur content (19.6 MMBtu/ton). Utilities use low-sulfur coal to 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	0.1	0.0%	3.9	0.8%	46.6	9.0%	465.4	90.2%	515.9	50.5
2008	0.0	0.0%	2.7	0.5%	45.5	8.4%	492.6	91.1%	540.8	48.2
2009	0.0	0.0%	2.0	0.4%	41.1	8.5%	441.4	91.1%	484.5	43.1
2010	0.0	0.0%	2.2	0.4%	42.1	8.1%	478.7	91.5%	523.0	44.3
2011 ^p	0.0	0.0%	1.9	0.4%	41.6	8.5%	448.0	91.2%	491.5	43.5

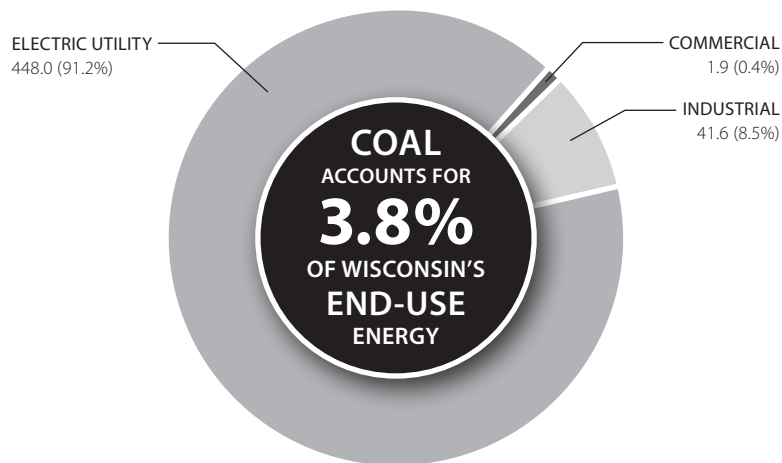
^a Includes petroleum coke co-fired with coal.

^p Preliminary estimates.

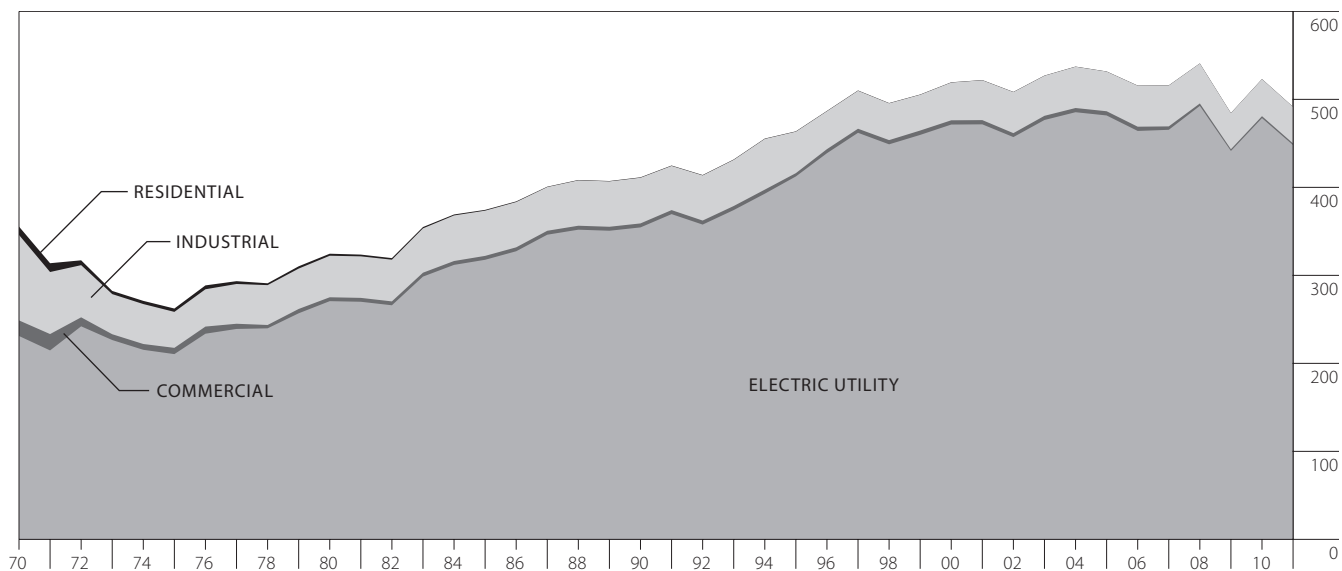
Source: U.S. Department of Energy, Energy Information Administration, *State Energy Data Report*, [DOE/EIA-0214(94)] (October 1996); *Coal Distribution* [DOE/EIA-0125 (95/4Q)] (1980-1995); Wisconsin Department of Natural Resources, *Annual Survey of Point Source Emissions*, unpublished (1971-2011); annual reports of various Wisconsin electric generating utilities (1995-2011); U.S. Department of Commerce, Bureau of the Census of Housing (1970, 1980, 1990 and 2000).

Wisconsin Coal Use, by Economic Sector

2011 TRILLIONS OF BTU AND PERCENT OF TOTAL



1970-2011 TRILLIONS OF BTU



Source: Wisconsin State Energy Office.

Wisconsin Coal Use, in Tons, by Economic Sector

COAL
USE DECREASED
1,604
THOUSAND
TONS

The total weight of coal used in Wisconsin decreased 1,604 thousand tons (6.1 percent) in 2011.

1970-2011 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	3	0.0%	185	0.7%	1,972	7.6%	23,745	91.7%	25,905
2008	0	0.0%	131	0.5%	1,927	7.1%	25,132	92.4%	27,190
2009	0	0.0%	94	0.4%	1,742	7.2%	22,518	92.5%	24,354
2010	0	0.0%	105	0.4%	1,785	6.8%	24,423	92.8%	26,313
2011 ^p	0	0.0%	91	0.4%	1,760	7.1%	22,858	92.5%	24,709

^a Includes petroleum coke co fired with coal.

^p Preliminary estimates.

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 (1971-2011); annual reports of various Wisconsin electric generating utilities (1995-2011); 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.

Wisconsin Electric Utility Coal Use, by Plant

1975-2011 THOUSANDS OF TONS

Utility / Plant Name	1975	1980	1985	1990	1995	2000	2005	2008	2009	2010	2011 ^p
Dairyland Power Cooperative											
Alma	502	1,188	1,268	1,506	1,231	1,754	2,031	2,010	1,732	1,441	1,314
Genoa	801	915	914	680	788	928	1,172	1,172	985	940	543
Stoneman ^c	111	74	44	30	0	0	38	13	13	0	0
Madison Gas and Electric Co.											
Blount Street ^d	77	144	61	95	137	215	228	115	15	12	0
Northern States Power Co.											
Bay Front	52	100	36	45	30	115	152	132	100	60	51
Wisconsin Electric Power Co.											
Oak Creek ^f	2,873	2,542	2,528	1,522	2,093	3,410	3,255	3,371	2,687	3,670	4,642
Pleasant Prairie	0	581	2,564	4,703	5,073	5,295	5,373	4,982	4,762	4,730	4,096
Port Washington ^d	691	683	348	126	430	641	0	0	0	0	0
Valley	536	774	528	463	458	690	780	761	612	566	484
Wisconsin Power and Light Co.											
Blackhawk ^e	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	4,563	4,053	4,589	4,396
Edgewater	976	1,056	2,112	2,180	2,702	2,531	2,533	2,777	2,473	2,624	2,674
Nelson Dewey	512	552	541	497	615	580	729	642	569	632	575
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	1,379	958	1,161	584
Weston	239	329	1,275	1,555	1,702	1,972	2,143	2,859	3,363	3,864	3,404
Municipal Utilities											
Manitowoc ^a	142	67	91	116	160	108	140	240	144	134	95
Menasha	58	28	25	25	2	10	6	116	52	0	0
Total^b	9,776	13,715	16,208	18,087	21,042	24,050	24,577	25,132	22,518	24,423	22,858

^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.

^c Biomass replaced coal as the primary fuel.

^d Natural Gas replaced coal as the primary fuel.

^e This power plant is retired.

^f The Oak Creek coal use also includes the Elm Road generating station.

^p Preliminary estimates.

Source: Wisconsin Department of Natural Resources, Annual Survey of Point Source Emissions, unpublished (1975-2011); annual reports of various Wisconsin electric generating utilities (1995-2011); U.S. Department of Energy, *Electric Power Monthly* [DOE/EIA-0226 (2009/03)] (March 2012).

COAL
USE BY
ELECTRIC
UTILITIES
6.4%

Coal use by Wisconsin's electric utilities decreased 6.4 percent in 2011. The largest power plants—Pleasant Prairie, Oak Creek, Elm Road and Columbia—used 57.5 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 8.6 percent of Wisconsin's utility coal.

A map of Wisconsin's generating plants, including major coal plants, can be found in the Map Appendix at the back of the book.

Wisconsin Manufacturing Industry Coal Use, by Industry Group

PAPER & ALLIED PRODUCTS

91.1%

Wisconsin's industrial coal use continues to be dominated by paper and allied products, which consumed 91.1 percent of the industrial coal used in 2011.

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

1971-2011 THOUSANDS OF TONS

SIC Industry Group	1971	1975	1980	1985	1990	1995	2000	2005	2006	2007	2008	2009	2010	2011 ^p
20 Food and Kindred	213	56	64	72	43	10	15	21	21	22	14	12	9	10
26 Paper and Allied	1,940	1,469	1,737	1,878	1,863	1,825	1,700	1,765	1,833	1,838	1,835	1,648	1,661	1,603
32 Stone, Clay and Glass	79	13	8	49	116	120	80	121	116	108	51	61	64	70
33 Primary Metals	114	50	80	66	95	—	—	—	—	—	27	21	51	77
37 Transport Equipment	107	35	30	37	32	22	12	4	6	4	—	—	—	—
Total Manufacturing	2,810	1,716	2,001	2,176	2,200	1,998	1,820	1,911	1,976	1,972	1,927	1,742	1,785	1,760

^p Preliminary.

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 (1972-2011).

Coal Deliveries to Wisconsin Industries, by Region of Origin

COAL FROM WESTERN U.S.

41.3%

Coal currently used by Wisconsin industry comes primarily from the western part of the country (41.3 percent). There has been a gradual decline in industrial coal use. Industrial coal from Illinois has declined 52.7 percent since 1985.

1975-2011 THOUSANDS OF TONS

Origin ^a	1975	1980	1985	1990	1995	2000	2005 ^r	2006 ^r	2007	2008	2009 ^r	2010	2011 ^p
Eastern PA	39	136	24	4	5	8	137	152	148	141	48	18	45
Western PA	11	125	192	38	33	11	0	0	0	0	0	0	0
Northern WV	93	339	150	230	384	75	174	110	98	78	99	93	93
Ohio	91	129	43	0	10	0	37	18	19	0	0	0	0
Southern No. 1 (WV and VA) ^b	35	88	2	1	15	190	13	4	0	0	0	2	0
Southern No. 2 (WV and KY) ^c	1,210	497	757	628	529	326	244	248	261	259	126	173	150
Western KY	111	127	147	98	196	179	192	193	197	195	96	91	99
Illinois	515	520	624	300	228	147	102	107	106	135	307	310	295
Indiana	55	114	89	43	67	52	207	202	215	217	213	194	194
Western U.S.	11	3	0	0	0	0	0	0	0	0	0	0	0
CO and NM ^d	0	0	0	0	0	0	190	327	322	203	103	207	218
Wyoming	24	16	0	346	250	521	368	424	423	446	421	405	372
Utah	1	0	0	0	0	0	70	27	0	7	13	18	19
MO and WA ^e	281	220	158	0	15	0	0	0	0	0	0	5	7
Total	2,477	2,314	2,186	1,688	1,733	1,509	1,734	1,811	1,789	1,680	1,427	1,516	1,493

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

^b Includes only West Virginia Southern beginning in 2010.

^c Includes East Kentucky beginning in 2010.

^d Includes only Colorado beginning in 2010.

^e Includes only Missouri beginning in 2010.

^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 (2010/4Q)] (March 2012), www.eia.gov/coal/distribution/quarterly and www.eia.gov/coal/distribution/annual

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

1975-2011 THOUSANDS OF TONS

Transportation Mode and Type of Receiving Facility	1975	1980	1985	1990	1995	2000	2005 ^r	2006	2007	2008 ^r	2009 ^r	2010 ^r	2011 ^p
Rail													
Electric Utilities	7,631	11,140	13,194	17,237	18,815	25,072	21,723	25,181	24,063	25,368	21,890	23,027	22,782
Coke Plants	29	11	0	0	0	0	0	0	0	0	0	0	0
Other Industrial	850	1,047	846	811	772	1,169	1,176	1,441	1,377	1,469	1,299	1,321	1,164
Residential/Commercial	170	3	5	1	3	33	417	28	56	96	75	59	39
Subtotal	8,680	12,201	14,045	18,049	19,590	26,274	23,316	26,650	25,496	26,933	23,263	24,407	23,985
Great Lakes Shipping													
Electric Utilities	2,211	1,713	1,118	429	1,005	753	1,571	1,483	518	0	59	0	0
Coke Plants	224	167	0	0	0	0	0	0	0	0	0	0	0
Other Industrial	992	981	1,024	822	788	331	47	6	39	0	0	0	155
Residential/Commercial	212	46	11	1	0	0	0	0	0	41	14	34	44
Subtotal	3,639	2,907	2,153	1,252	1,793	1,084	1,618	1,489	557	41	72	34	200
River Barge													
Electric Utilities	1,756	1,487	1,042	855	1,083	32	1,507	401	454	49	434	176	0
Other Industrial	0	62	246	55	120	4	23	6	18	11	8	12	11
Residential/Commercial	0	1	10	2	126	129	0	0	0	32	24	19	10
Subtotal	1,756	1,550	1,298	912	1,329	165	1,530	407	472	92	466	207	21
Truck													
Electric Utilities	0	0	2	31	0	0	0	144	50	70	0	59	59
Other Industrial	0	1	45	1	53	5	488	359	355	199	120	184	162
Residential/Commercial	0	0	0	0	0	0	1	1	0	1	0	0	0
Subtotal	0	1	47	32	53	5	489	504	405	271	120	243	222
Total^a	14,075	16,659	17,543	20,245	22,765	27,528	26,953	29,050	26,930	27,336	23,921	24,891	24,428

^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.

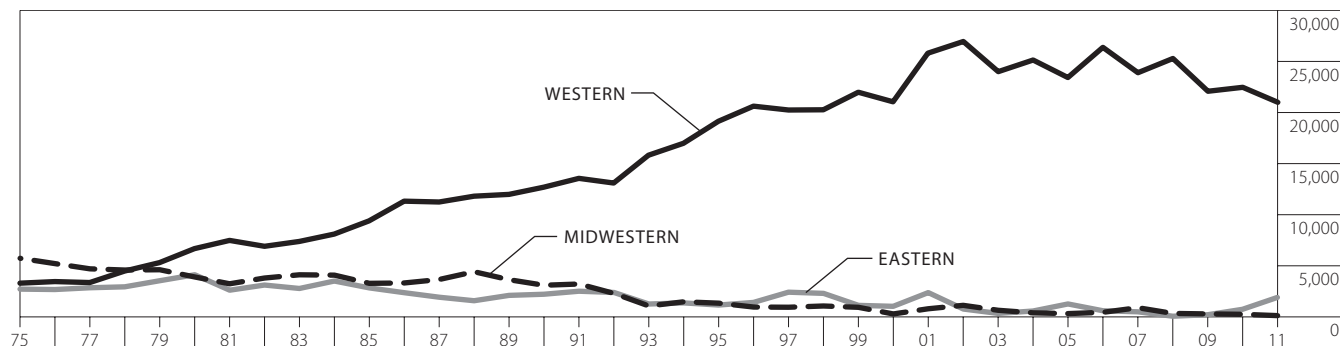
Source: U.S. Bureau of Mines, "Bituminous Coal and Lignite Distribution", *Mineral Industry Surveys* (1973-1976); U.S. Department of Energy, Energy Information Administration, *Bituminous and Subbituminous Coal and Lignite Distribution* (1977-1979), *Coal Industry Annual* [DOE/EIA - 0584] (2000), *Coal Distribution* [DOE/EIA-0125 (99/4Q)] (1980-1999) and *Quarterly Coal Report* [DOE/EIA-0121 (2010/4Q)] (March 2012) (2001-2011), www.eia.gov/coal/distribution/quarterly and www.eia.gov/coal/distribution/annual

COAL
SHIPPED BY RAIL
1.7%

Coal shipped by rail decreased 1.7 percent in 2011. Total coal deliveries decreased by 1.9 percent. Ninety-eight 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.

Coal Deliveries to Wisconsin Power Plants, by Region of Origin

1975-2011 THOUSANDS OF TONS



Coal Deliveries to Wisconsin Power Plants, by State of Origin

**COAL
DELIVERIES**
1.8%

Coal deliveries to Wisconsin power plants decreased 1.8 percent. This resulted in a decrease of coal stockpiled at Wisconsin utilities for future use.

1975-2011 THOUSANDS OF TONS

State	1975	1980	1985	1990	1995	2000	2005 ^r	2006	2007	2008 ^r	2009 ^r	2010	2011 ^p
Eastern													
Kentucky	2,073	2,816	2,122	196	95	47	758	269	179	0	10	10	10
Pennsylvania	572	1,007	639	1,760	941	826	0	3	12	0	76	650	1,764
West Virginia	5	233	0	136	57	34	251	260	240	0	0	18	67
Other States	1	0	9	59	0	62	190	2	0	0	59	0	0
Subtotal	2,651	4,056	2,770	2,151	1,093	969	1,199	534	431	0	145	678	1,842
Midwestern													
Illinois	4,857	3,364	1,478	1,136	1,232	0	97	297	686	155	220	183	59
Indiana	785	205	1,731	1,893	46	221	159	84	146	120	5	3	0
Ohio	27	272	0	0	0	0	0	0	0	0	0	0	0
Other States	0	1	9	0	0	0	0	0	0	0	0	0	0
Subtotal	5,669	3,842	3,218	3,029	1,278	221	256	381	832	275	225	186	59
Western													
Montana	2,161	2,575	2,235	1,983	2,102	463	591	1,237	1,961	562	501	535	482
Wyoming	1,053	4,042	7,101	10,605	15,223	19,192	20,581	23,150	19,811	23,307	20,841	21,383	19,841
Other States ^a	20	0	0	43	1,758	1,320	2,174	1,907	2,050	1,342	670	482	617
Subtotal	3,234	6,617	9,336	12,631	19,083	20,975	23,346	26,294	23,822	25,212	22,012	22,400	20,940
Total	11,554	14,515	15,324	17,811	21,454	22,165	24,801	27,209	25,085	25,487	22,382	23,263	22,841

^a Colorado.^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), and *Quarterly Coal Report* [DOE/EIA-0121 (2009/4Q)] (March 2012), www.eia.gov/coal/distribution/quarterly and www.eia.gov/coal/distribution/annual

Wisconsin Electric Utility Sales, by Economic Sector

1970-2011 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	20,729	29.7%	22,232	31.8%	25,286	36.2%	1,574	2.3%	69,821
2007	21,454	30.1%	23,032	32.3%	25,436	35.7%	1,379	1.9%	71,301
2008	20,986	29.9%	22,978	32.8%	24,672	35.2%	1,486	2.1%	70,122
2009	20,458	30.9%	21,995	33.2%	22,390	33.8%	1,443	2.2%	66,286
2010	21,323	31.0%	22,514	32.7%	23,452	34.1%	1,463	2.1%	68,752
2011 ^p	21,356	31.1%	22,585	32.9%	23,403	34.1%	1,351	2.0%	68,695

TOTAL
ELECTRICITY
SALES
0.1%

Total electricity sales decreased 0.1 percent in 2011 but have grown 4.1 percent over the past ten years. In 2011, electricity sales increased in the Residential and Commercial sectors, but decreased in the Industrial and Agricultural sectors.

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

^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.

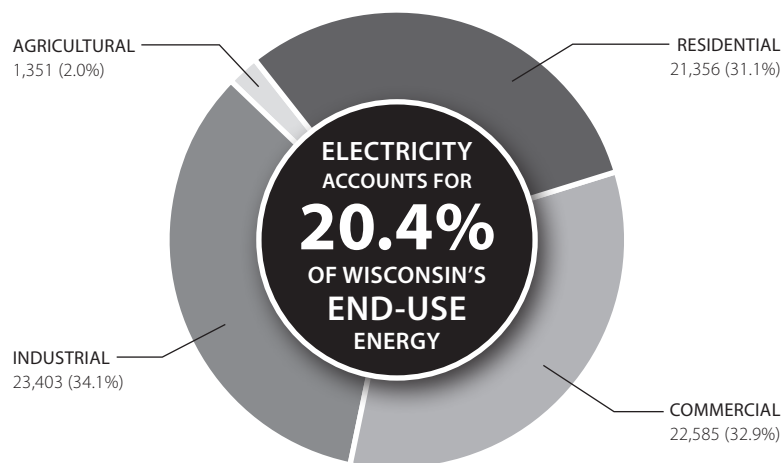
^p Preliminary estimates.

^r Revised.

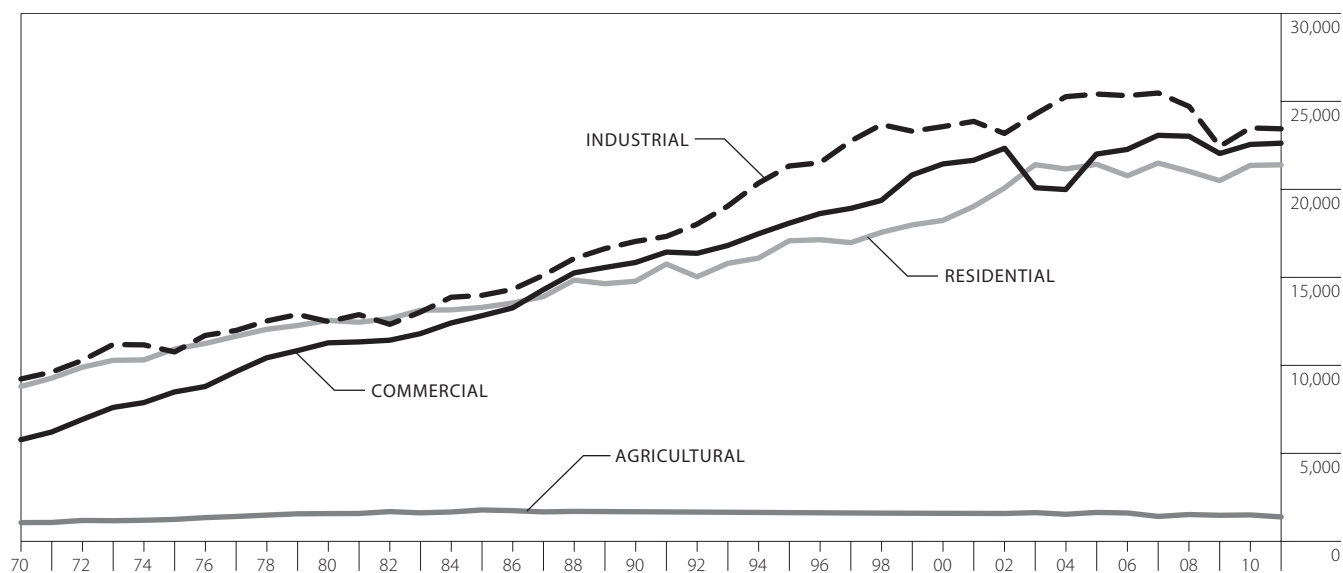
Source: Sectoral disaggregation by Wisconsin State Energy Office, based on Public Service Commission of Wisconsin, *Statistics of Wisconsin Public Utilities*, Bulletin #8 (1970-1994); U.S. Department of Agriculture, Rural Electrification Administration, Annual Statistical Report, REA Bulletin 1-1 (1970-1994); 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 (2013/05)] (May 2013) (1989-2011). 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/> (2009-2011).

Wisconsin Electric Utility Sales, by Economic Sector

2011 MILLIONS OF kWh AND PERCENT OF TOTAL



1970-2011 MILLIONS OF kWh



Source: Wisconsin State Energy Office.

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

1970-2011 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 ^r	58,407	83.7%	7,902	11.3%	3,512	5.0%	69,821
2007	59,585	83.6%	8,079	11.3%	3,637	5.1%	71,301
2008	58,429	83.3%	7,947	11.3%	3,746	5.3%	70,122
2009 ^r	55,051	83.1%	7,485	11.3%	3,750	5.7%	66,286
2010	57,183	83.2%	7,759	11.3%	3,810	5.5%	68,752
2011 ^p	57,145	83.2%	7,750	11.3%	3,800	5.5%	68,695

Investor owned utilities supply the vast majority of power to Wisconsin electricity customers (83.2 percent). The relative amounts of power supplied by the three types of suppliers have changed very little over the past 20 years.

^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 (2012/02)] (February 2012). www.eia.doe.gov/cneaf/electricity/epm/epm_sum.html

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

SUMMER
PEAK
DEMAND
5.7%

Wisconsin's 2011 summer peak electricity demand for the eastern Wisconsin utilities^a increased 5.7 percent due to warmer weather in July. The increase compared to 2010 was 662 megawatts.

WINTER
PEAK
DEMAND
4.6%

Winter peak demand decreased 4.6 percent in 2011 due to warmer December weather. Summer peak demand in 2011 exceeded winter peak demand by 3,613 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 2011; the peak demand will be adjusted to include January and February in the next edition of this publication.

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

1970-2011

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 ^r	68,796	11,698	9,237	67.1
2008	66,931	11,060	9,482	68.9
2009	63,349	11,267	9,114	64.2
2010	65,092	11,568	9,036	64.2
2011 ^p	66,300	12,230	8,617	61.9

^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.

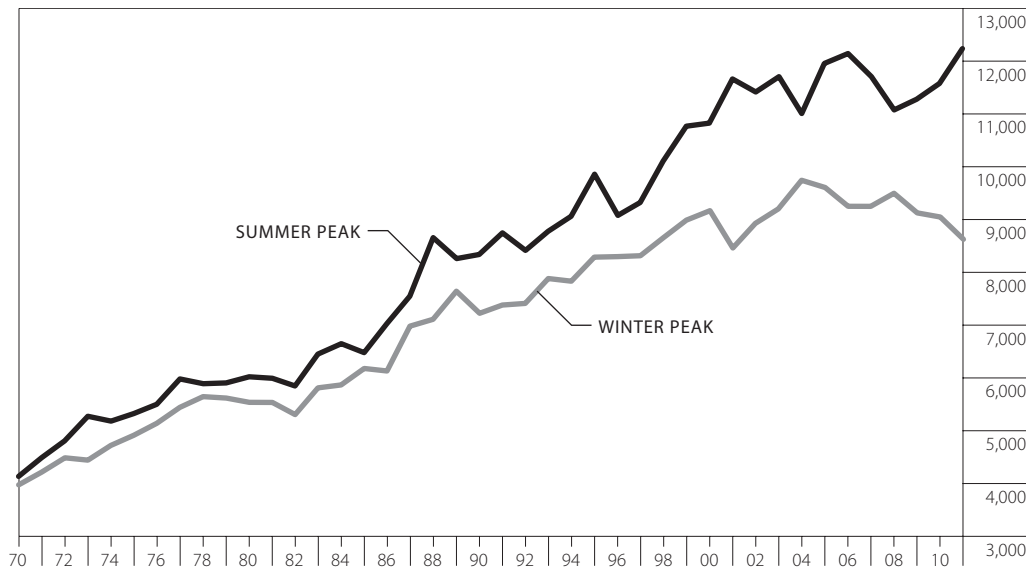
^p Preliminary estimates.

^r Revised.

Source: Wisconsin electric utility annual reports submitted to the Public Service Commission of Wisconsin (1970-2012); <http://psc.wi.gov/apps40/annlreport/default.aspx>

Eastern Wisconsin Electric Utility Non-Coincident Peak Demand

1970-2011 MEGAWATTS



HIGHEST
PEAK
12,230
MEGAWATTS
SUMMER
2011

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

2011

Month	Load (Millions of kWh) ^a	Non-Coincident Peak Demand (MW) ^b
January	5,742	8,580
February	4,996	8,664
March	5,472	8,102
April	5,108	7,757
May	5,238	8,918
June	5,568	11,210
July	6,733	12,230
August	6,254	11,252
September	5,157	10,765
October	5,368	7,952
November	5,097	8,265
December	5,567	8,617
Total	66,300	

The highest non-coincident peak demand in 2011 was seen in July.

^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 (2011).

<http://psc.wi.gov/apps40/annlreport/default.aspx>

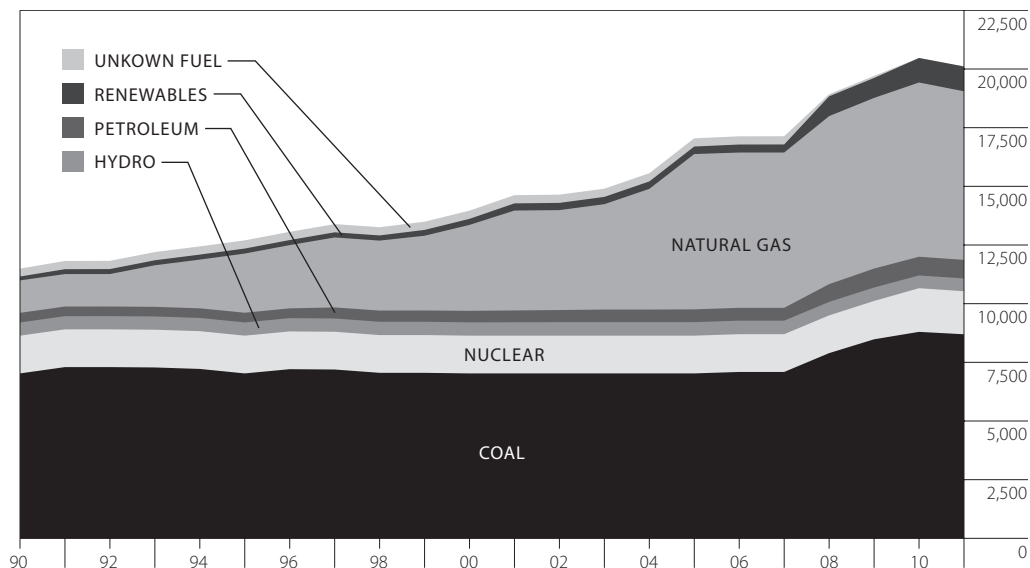
Wisconsin Electric Generating Capacity, by Type of Plant

**ELECTRIC
GENERATION
CAPACITY**
362.6
MEGAWATTS
(1.8 PERCENT)
IN 2011

In 2011, Wisconsin's electric generation capacity decreased by 362.6 megawatts (1.8 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 photovoltaic 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.

1990-2011 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
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	8,482	1,634	574	806	7,272	850	89	19,706
2010	8,799	1,861	544	796	7,426	1,044	0	20,470
2011 ^p	8,696	1,834	546	790	7,184	1,058	0	20,107

^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 (1990-2011); EIA data were used in previous publications.

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

1990-2011 MEGAWATTS

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.

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	1,017	11,960	566	13,543	5,071	1,092	6,163	19,706
2010	1,030	12,772	565	14,367	5,357	745	6,102	20,469
2011 ^p	972	12,520	593	14,085	5,306	716	6,022	20,107

2011 saw an overall capacity decrease of 1.8 percent from 2010. The decreases according to producers were: Investor Owned Utilities (IOUs), 2.0 percent; IPP, 1.0 percent; non-utilities, 3.8 percent; and Cooperatives, 5.6 percent.

Municipal producers saw an increase of 4.9 percent.

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

^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 (1990-2011).

Wisconsin Electric Power Generation, by Type of Plant

**ELECTRIC
UTILITY
GENERATION**
2.7%

Total electric generation by Wisconsin utilities decreased 2.7 percent in 2011, and generation from Independent Power Producers (IPPs) decreased by 2.7 percent as well. Industrial, or non-utility, generation increased by 0.4 percent. In 2011, 91 percent of Wisconsin's power was produced in-state, and Wisconsin's power imports increased by 22.5 percent.

Utility energy production from renewable sources increased by 10.9 percent in 2011, while production from coal decreased by 2.1 percent.

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

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.

1970-2011 MILLIONS OF kWh

Year	Electricity Generation by Utilities ^a						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
2005	45,219	7,574	1,499	75	2,185	105	56,657	2,648	275	2,923	11,031	70,336
2006	42,936	12,234	1,446	215	1,928	234	58,993	3,662	2,534	6,196	7,166	69,821
2007 ^r	39,460	0	1,314	123	3,132	277	44,306	16,263	2,913	19,176	10,731	71,301
2008 ^{ir}	41,270	0	1,428	70	2,451	508	45,726	15,126	2,874	18,000	9,269	70,122
2009 ^r	36,554	0	1,353	38	2,597	997	41,539	16,027	2,687	18,713	8,720	66,286
2010 ^r	39,427	0	2,027	39	3,164	817	45,473	16,193	2,783	18,976	7,086	68,752
2011 ^p	38,591	0	1,928	37	2,790	906	44,251	15,761	2,794	18,555	8,683	68,695

^a From 1970 to 1989, hydroelectric data were sourced from the Public Service Commission of Wisconsin bulletins; from 1990 to 2006, and current year data, are from the federal Department of Energy, Energy Information Administration (EIA). 2007, 2008 and 2009 are from the Public Service Commission of Wisconsin.

^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 2011, 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*.

ⁱ Starting with the 2008 publication, these data were revised from previous publications that used federal Department of Energy, Energy Information Administration data. 2009 data are EIA-sourced data that will be revised using PSC data when available.

^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); US Department of Energy, Energy Information Administration, *Electric Power Monthly* [DOE/EIA-0226 (2012/05)] (May 2012) (1990-2006); Public Service Commission of Wisconsin, unpublished electrical generation data (2007-2011).

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

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

1970-2011 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	Not Available	7.14	1.89
2009 ^e	2.33	Not Available	4.52	1.81
2010 ^e	2.41	Not Available	3.70	1.85
2011 ^e	2.76	Not Available	2.76	2.03

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

^b Nuclear cost.

^e Estimate by Wisconsin State Energy Office 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 (1990-2011).
<http://psc.wi.gov/apps40/annlreport/content/munilist.aspx>

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, 2006, and 2007 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.

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

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 almost double the previous peak in 1983 of 2.21 cents per kWh. The cost of purchased power has risen in recent years and is 31.4 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, 2006, and 2007 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 remain high for nuclear generation.

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 below reflect costs incurred by Wisconsin's five largest investor owned utilities.

1970-2011 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
1983	2.58	1.61	29.27	0.56	2.21	NA	2.21
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
2010 ^e	3.86	4.15	8.19	1.28	4.16	6.06	4.59
2011 ^e	4.25	4.01	7.49	1.37	4.33	5.69	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 State Energy Office 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 (1990-2011).
<http://psc.wi.gov/apps40/annlreport/content/munilist.aspx>

Electric Utility Sulfur Dioxide Emissions

1980-2011 TONS

Year	1980	1990	2000	2005	2006 ^r	2007	2008 ^r	2009 ^r	2010 ^r	2011 ^p
Dairyland Power Cooperative										
Alma	23,641	6,510	3,445	8,816	11,748	10,748	9,558	4,809	4,189	1,196
Genoa	43,516	28,130	8,165	13,074	13,658	12,480	11,970	6,479	8,874	3,296
J.P. Madgett	4,088	7,330	5,376	7,762	7,807	8,028	9,114	10,041	4,976	4,827
Stoneman	4,663	790	0	0	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	278	1
Northern States Power Co.										
Bay Front	2,708	393	786	1,196	944	1,149	1,041	735	347	286
Wisconsin Electric Power Co.										
Oak Creek	122,472	45,650	22,831	12,903	13,594	13,695	14,472	14,823	13,032	14,021
Pleasant Prairie	4,972	26,933	28,726	33,656	28,566	2,229	1,092	988	1,195	928
Port Washington	42,295	4,009	15,572	2	2	4	4	6	6	5
Valley	41,761	14,053	15,835	8,482	7,087	6,848	6,887	5,376	4,890	4,226
Wisconsin Power and Light Co.										
Blackhawk	2,006	0	0	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	14,527	12,340
Columbia 2	14,614	13,909	13,270	12,370	11,780	13,332	13,303	12,396	13,192	12,429
Edgewater 1-4	60,014	38,021	8,962	9,103	7,675	7,166	7,205	5,666	5,758	5,785
Edgewater 5	0	6,744	8,744	7,741	8,084	9,502	7,858	7,782	8,779	8,340
Nelson Dewey	32,304	10,985	14,275	14,999	14,519	15,064	13,531	12,646	13,454	11,505
Rock River	14,139	7,220	24	12	2	2	2	4	0	0
Wisconsin Public Services Corp.										
Pulliam	42,087	25,631	6,314	12,175	10,869	10,448	8,446	4,386	5,517	3,507
Weston 1, 2	21,009	6,589	3,340	3,988	3,278	2,983	2,852	2,060	2,601	1,679
Weston 3	0	7,598	8,358	9,540	9,318	6,125	7,338	5,912	7,216	5,593
Weston 4	0	0	0	0	0	0	333	972	1,120	904
Municipal Utilities										
Manitowoc	1,318	1,727	3,282	217	732	1,033	1,706	794	593	435
Marshfield	1,651	139	0	0	0	0	0	0	0	0
Menasha	991	695	79	0	0	0	0	0	0	0
Total										
Utility Sources	513,622	275,523	189,363	175,734	162,896	135,691	133,231	108,105	110,544	91,305
All Other Sources	172,777	101,517	87,115	68,600	67,392	67,838	101,419	89,849	94,150	40,474
All Stationary Sources	686,399	377,040	276,478	244,334	230,288	203,529	234,650	197,954	204,694	131,779
Percent Utility Sources	74.8%	73.1%	68.5%	71.9%	70.7%	66.7%	56.8%	54.6%	54.0%	68.9%

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> (1986-2011).

SULFUR
DIOXIDE
EMISSIONS

17.4%

Utility sulfur dioxide emissions decreased 17.4 percent from 2010 to 2011. 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.

Electric Utility Nitrogen Oxides Emissions

**NITROGEN
OXIDES
EMISSIONS
9.6%**

Utility nitrogen oxides emissions decreased 9.6 percent from 2010 to 2011. 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.

1989-2011 TONS

Year	1989	1990	2000	2005	2006	2007	2008	2009 ^r	2010 ^r	2011 ^p
Dairyland Power Cooperative										
Alma	1,934	1,962	2,774	3,834	4,252	4,883	3,671	1,100	763	367
Genoa	5,243	5,304	3,611	3,717	3,909	3,556	2,696	1,574	1,669	769
J.P. Madgett	4,728	4,963	4,845	4,469	4,098	4,114	3,962	3,636	2,898	2,932
Madison Gas and Electric Co.										
Blount Street	1,511	1,165	1,480	1,187	490	463	568	78	88	47
Northern States Power Co.										
Bay Front	0	0	1,288	1,527	1,171	1,590	1,562	916	665	535
Wisconsin Electric Power Co.										
Oak Creek	13,967	8,917	19,786	4,650	4,634	4,646	4,978	5,530	4,982	5,657
Pleasant Prairie	17,701	16,356	18,452	11,318	8,745	2,560	2,862	2,623	2,711	2,498
Port Washington	1,005	771	4,074	45	85	111	129	129	131	115
Valley	4,414	4,874	7,259	3,893	3,435	3,268	3,106	1,817	1,446	1,250
Wisconsin Power and Light Co.										
Columbia 1	6,059	6,844	7,981	3,022	2,699	2,655	2,715	2,438	2,899	2,781
Columbia 2	7,943	10,336	6,874	2,829	2,448	2,484	2,549	2,329	2,447	2,703
Edgewater 1-4	16,583	16,684	12,817	3,781	2,726	2,697	2,805	1,409	1,503	1,563
Edgewater 5	2,960	3,638	8,743	2,282	2,276	1,976	1,698	1,552	1,791	1,735
Nelson Dewey	9,997	9,997	5,413	3,060	2,848	2,938	2,589	2,382	3,082	3,237
Rock River	4,367	3,697	419	373	125	108	88	33	6	6
Wisconsin Public Services Corp.										
Pulliam	6,769	7,087	8,045	9,235	8,164	8,222	6,591	3,391	2,705	1,348
Weston 1, 2	3,003	3,308	3,262	3,754	2,622	3,039	2,699	971	1,212	786
Weston 3	2,374	2,360	3,228	4,385	3,965	2,529	2,593	2,034	1,492	1,165
Weston 4	0	0	0	0	0	0	281	794	922	914
Municipal Utilities										
Manitowoc	923	923	102	88	146	278	593	245	234	22
Total										
Utility Sources	111,481	109,186	120,453	67,449	58,838	52,117	48,735	34,981	33,646	30,430
All Other Sources	86,473	24,774	19,625	45,232	41,282	42,660	48,287	43,196	48,621	22,132
All Stationary Sources	197,954	133,960	140,078	112,681	100,120	94,777	97,022	78,177	82,267	51,209
Percent Utility Sources	56.3%	81.5%	86.0%	59.9%	58.8%	55.0%	50.2%	44.7%	40.9%	56.8%

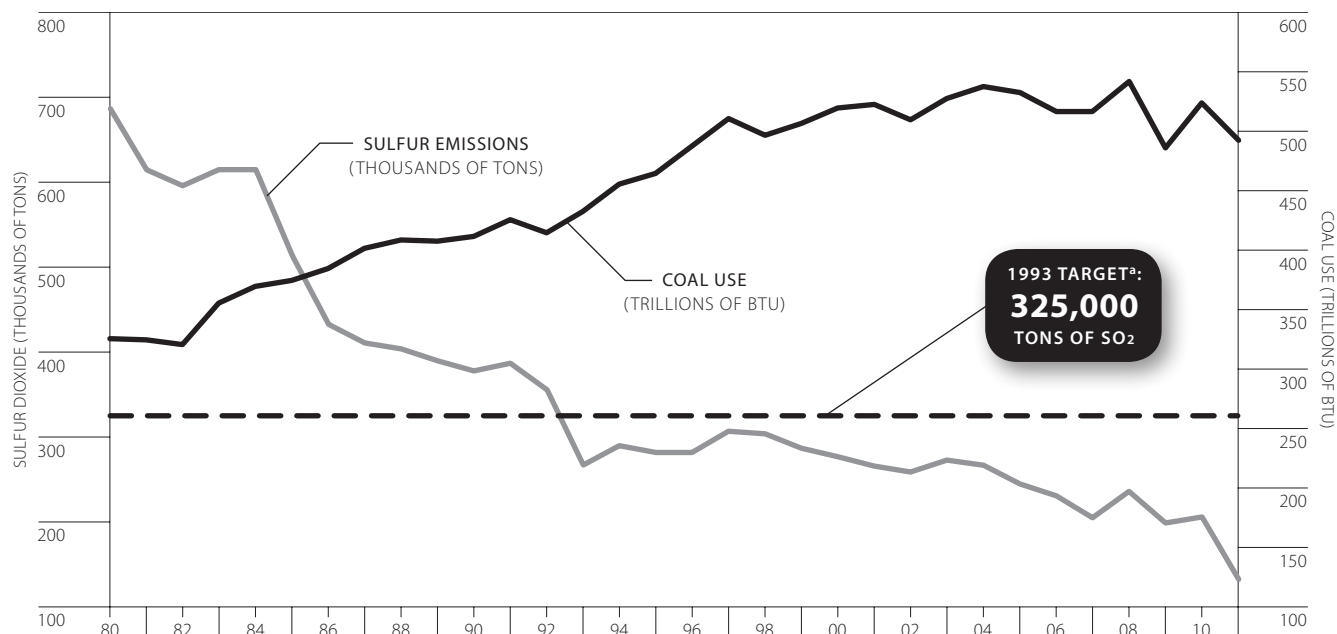
^p Preliminary estimates.

^r Revised.

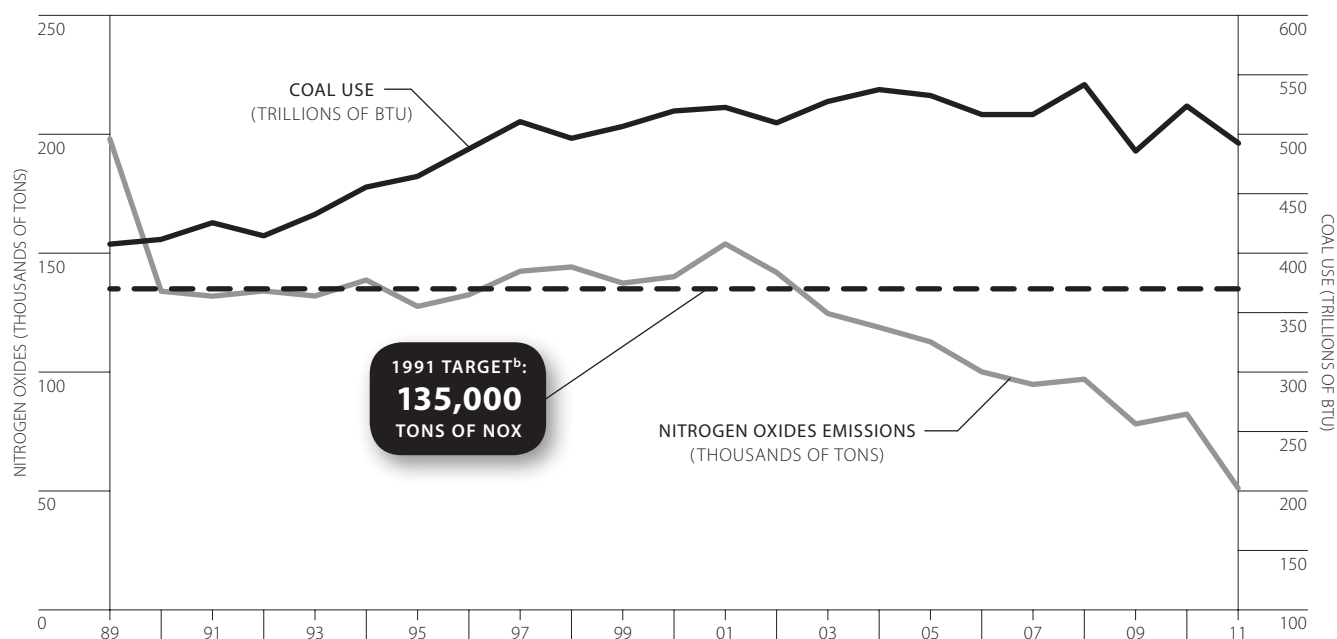
Source: Wisconsin Department of Natural Resources, Annual Survey of Point Source Emissions, Sulfur Dioxide and Nitrogen Oxides Emissions Report PUBL-AM-343 and published by facility on the Wisconsin Department of Natural Resources website at <http://dnr.wi.gov/air/emission/ObtainEmissionSummary1995toPresent.htm> (1986-2011).

Wisconsin Sulfur Dioxide and Nitrogen Oxides Emissions and Coal Use

1980-2011 SULFUR DIOXIDE EMISSIONS AND COAL USE



1989-2011 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 State Energy Office.

Wisconsin Utility Power Plant Inventory, 2011

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 4, 5	136.0	2	Coal	Blu Sky Green Field	145.2	88	Wind	DePere	187.2	1	Gas
Elk Mound	71.0	2	Gas	Byron	1.3	2	Wind	Lincoln	9.2	14	Wind
Flambeau	22.0	3	Hydro ^b	Concord	381.2	4	Gas	Pulliam 31	91.0	1	Gas
Genoa 3	345.6	1	Coal, Oil	Germantown 1, 2, 3, 4	244.8	4	Oil	Pulliam 5-8	350.2	4	Coal
J.P. Madgett	387.0	1	Coal, Oil	Germantown 5	106.9	1	Gas	Various Hydro	57.2	38	Hydro ^b
Seven Mile Creek	4.1	4	LFG ⁱ	Milwaukee	11.0	1	Coal	Various Solar	0.1	8	Solar
Various Biogas Methane	1.6	2	Gas	Paris	381.2	4	Gas	W. Marinette 31, 32, 34	166.6	3	Gas
Madison Gas and Electric Co.				Pleasant Prairie 1, 2	1233.0	2	Coal	Weston 1-3	492.1	3	Coal
Blount Street 6, 7	100.0	2	Gas, RDF ^c	Pleasant Prairie 3	2.0	1	Oil	Weston 31, 32	76.3	2	Gas
Fitchburg 1, 2	57.6	2	Gas	Port Washington 1-6	1182.0	6	Gas	Municipal Utilities			
Nine Springs	16.2	1	Gas	S. Oak Creek 5-8	1191.6	4	Coal	Manitowoc, City of	5.5	1	Gas
Portables	54.0	1	Oil	Valley 1,2	272.0	2	Coal	Manitowoc, City of	117.4	3	Coke
Rosiere	11.2	17	Wind	Valley 3	2.7	1	Oil	Menasha, City of	28.0	3	Coal
Sycamore	41.6	2	Gas	Various Hydro	13.6	8	Hydro ^b	Merchant/IPP			
Various Solar	0.1	8	Solar	Various Solar	0.003	3	Solar	Kewaunee	560.1	1	Nuclear
West Campus	169.3	3	Gas	Wisconsin Power and Light Co.				Point Beach	1073.6	2	Nuclear
Northern States Power Co.				Cedar Ridge	67.7	41	Wind	Statewide Utilities			
Bay Front 4, 5, 6	67.2	3	Wood, Coal	Edgewater 3	60.0	1	Coal	Statewide	422.9	221	Renewables
Flambeau	16.0	1	Gas	Nelson Dewey 1, 2	200.0	2	Coal	Statewide	8694.8	64	Coal
French Island 1, 2	30.4	2	Wood, RDF ^c	Rock River 3-6	144.0	4	Gas	Statewide	545.9	320	Hydro ^b
French Island 3, 4	157.6	2	Oil	Sheepskin	40.0	1	Gas	Statewide	7183.5	84	Gas
Various Hydro	240.9	58	Hydro ^b	South Fond Du Lac	344.0	4	Gas	Statewide	789.8	100	Oil
Wheaton 1-6	322.2	6	Gas, Oil	Valley Trail	2.0	2	LFG ⁱ	Statewide	635.1	74	Wind
Shared Ownership				Various Hydro	36.6	11	Hydro ^b	Statewide Totals ^j	18272.0	863	All
Columbia 1 ^f	512.0	1	Coal	Various Solar	0.010	5	Solar				
Columbia 2 ^f	511.0	1	Coal								
Edgewater 4 ^g	330.0	1	Coal								
Edgewater 5 ^h	380.0	1	Coal								
Elm Road C1 ^k	1200.0	2	Coal								
W. Marinette 33 ^e	83.5	1	Gas								
Weston 4 ^d	595.0	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 (2008-2011).

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 back of this publication.



Wind power uses turbines — residential and commercial or utility sized — to generate electricity for distribution on the electric grid. A map of wind production sites, and wind energy potential across Wisconsin can be found in the back of this publication.

Biogas is produced from the state's landfills and agricultural manure digesters. In Wisconsin statutes and in data from U.S. Energy Information Administration, biogas is included in the definition of 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 back of this publication.



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 back of this publication.

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 State Energy Office website at: <http://www.stateenergyoffice.wi.gov/docview.asp?docid=11272&locid=160>.



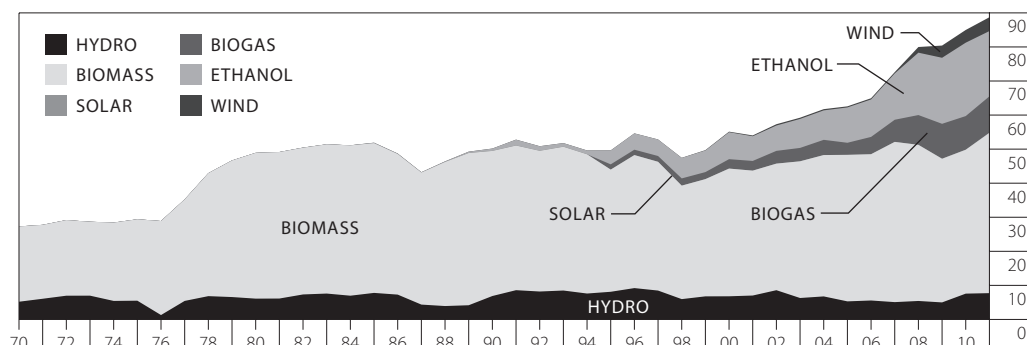
Wisconsin Total Renewable Energy Use, by Type of Fuel

**OVERALL
RENEWABLE
ENERGY
END-USE
4.4%**

Overall renewable energy resource use in Wisconsin increased 4.4 percent in 2011. Ethanol use in the transportation sector decreased 11.0 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.

This table includes all renewable energy used in Wisconsin for all applications, including space heating, electricity generation, transportation fuels, and for other applications that displace fossil fuels.

1970-2011 TRILLIONS OF BTU



1970-2011 TRILLIONS OF BTU AND PERCENT OF TOTAL

Year	Hydro		Biomass		Solar		Biogas		Ethanol ^a		Wind		Total
1970	5.2	19.0%	22.1	81.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.00	0.0%	27.3
1975	5.5	18.7%	23.9	81.3%	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.00	0.0%	29.4
1980	6.1	12.5%	42.8	87.5%	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.00	0.0%	48.9
1985	7.8	15.0%	44.0	84.7%	0.0	0.0%	0.0	0.0%	0.1	0.2%	0.00	0.0%	51.9
1990	6.9	13.7%	42.6	84.9%	0.0	0.0%	0.0	0.0%	0.7	1.4%	0.00	0.0%	50.2
1995	8.1	16.4%	35.9	72.3%	0.0	0.0%	1.5	3.1%	4.1	8.3%	0.00	0.0%	49.6
2000 ^r	6.8	12.3%	37.5	68.0%	0.0	0.0%	2.8	5.0%	7.9	14.4%	0.16	0.3%	55.1
2005	5.3	8.5%	43.0	68.8%	0.00652	0.0%	3.5	5.7%	10.4	16.6%	0.32	0.5%	62.6
2006	5.6	8.6%	42.9	66.1%	0.01227	0.0%	5.1	7.8%	11.0	16.9%	0.35	0.5%	64.9
2007 ^b	5.1	7.0%	47.0	64.8%	0.01674	0.0%	6.5	8.9%	13.6	18.7%	0.38	0.5%	72.6
2008	5.4	6.8%	45.8	57.3%	0.02728	0.0%	8.7	10.9%	18.3	22.9%	1.67	2.1%	80.0
2009	5.0	6.2%	42.2	52.4%	0.03528	0.0%	10.2	12.7%	19.4	24.1%	3.59	4.5%	80.4
2010 ^r	7.6	8.9%	42.2	49.7%	0.04930	0.1%	9.8	11.6%	21.6	25.4%	3.73	4.4%	85.0
2011 ^p	7.7	8.7%	47.1	53.0%	0.07449	0.1%	10.6	12.0%	19.2	21.6%	4.06	4.6%	88.7

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

^b All 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.

^p Preliminary estimates.

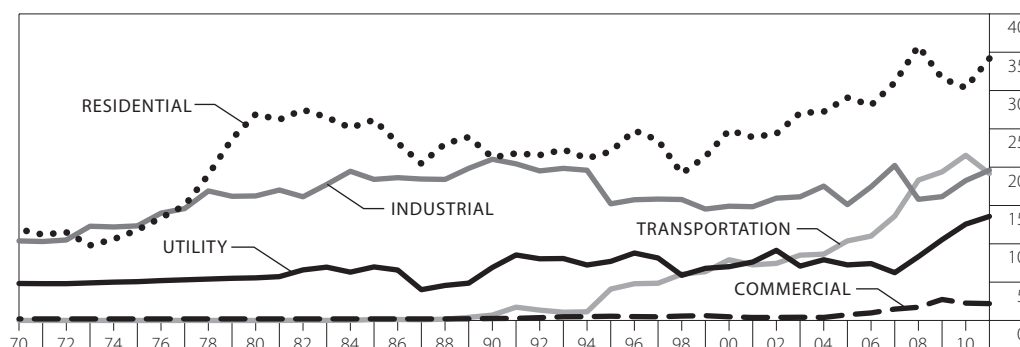
^r Revised.

Source: U.S. Department of Energy, Energy Information Administration, *Estimates of U.S. Wood Energy Consumption from 1949 to 1981* (August 1983); Public Service Commission of Wisconsin, unpublished data compiled from annual reports (2007-2011); Focus on Energy, aggregated data (2005-2011); survey data from conversations and emails with utilities, independent operators of landfills and/or waste water treatment plants, and public schools (2007-2011); Department of Revenue *Monthly Motor Fuel Consumption Report* (2000-2011); Energy Center of Wisconsin, *Wisconsin Agricultural Biogas Casebook* (2008); Wisconsin Department of Natural Resources, Annual Survey of Point Source Emissions, unpublished (1972-2011); Wisconsin Department of Administration, Division of Energy, "Wisconsin Residential Wood Energy Model," unpublished (1981-2011); Compiled from renewable energy tables in this publication.

Wisconsin Total Renewable Energy Production and Use, by Economic Sector

This table includes all renewable energy used in Wisconsin for all applications, including space heating, electricity generation, transportation fuels, and for other applications that displace fossil fuels.

1970-2011 TRILLIONS OF BTU



1970-2011 TRILLIONS OF BTU AND PERCENT OF TOTAL

Year	Residential		Commercial		Industrial		Electric Utility		Transportation		Total Resources	Total End Use
1970	11.9	43.6%	0.2	0.7%	10.4	38.0%	4.8	17.7%	0.0	0.0%	27.3	22.5
1975	11.8	40.1%	0.2	0.7%	12.3	42.0%	5.1	17.2%	0.0	0.0%	29.4	24.3
1980 ^a	26.9	55.0%	0.2	0.4%	16.2	33.2%	5.6	11.4%	0.0	0.0%	48.9	43.3
1985	26.2	50.4%	0.2	0.4%	18.4	35.5%	7.0	13.5%	0.1	0.2%	51.9	44.9
1990	21.3	42.4%	0.3	0.5%	21.0	41.9%	6.9	13.8%	0.7	1.4%	50.2	43.3
1995	22.0	44.4%	0.6	1.1%	15.2	30.7%	7.7	15.5%	4.1	8.3%	49.6	41.9
2000	24.8	45.0%	0.5	0.9%	14.9	27.0%	7.0	12.7%	7.9	14.4%	55.1	48.1
2005	29.1	46.5%	0.7	1.2%	15.1	24.2%	7.2	11.6%	10.4	16.6%	62.5	55.3
2006	28.1	43.3%	1.0	1.5%	17.4	26.9%	7.4	11.4%	11.0	17.0%	64.9	57.5
2007 ^a	31.0	42.8%	1.5	2.0%	20.2	27.9%	6.2	8.6%	13.6	18.7%	72.6	66.4
2008	35.8	44.8%	1.7	2.2%	15.8	19.8%	8.3	10.4%	18.3	22.9%	80.0	71.7
2009	31.6	39.3%	2.7	3.4%	16.2	20.1%	10.5	13.1%	19.4	24.1%	80.4	69.9
2010 ^r	30.3	35.7%	2.3	2.7%	18.3	21.5%	12.6	14.8%	21.6	25.4%	85.0	72.4
2011 ^p	34.2	38.5%	2.2	2.5%	19.6	22.1%	13.6	15.3%	19.2	21.6%	88.7	75.1

^a 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.

^p Preliminary estimates.

^r Revised.

Source: Focus on Energy aggregated and verified savings data (2005-2011); survey data from conversations and emails with utilities, independent operators of landfills and/or waste water treatment plants, and public schools (2007-2011); Department of Revenue *Monthly Motor Fuel Consumption Report* (2000-2011); Energy Center of Wisconsin, *Wisconsin Agricultural Biogas Casebook* (2008); Public Service Commission of Wisconsin, unpublished data compiled from utility annual reports (1970-2011). <http://psc.wi.gov/apps/annlreport/default>

**TOTAL
RENEWABLE
END-USE
ENERGY
3.8%**

Wisconsin's total, renewable end use energy increased by 3.8 percent. The residential and industrial sectors use the most renewable energy, primarily due to woodburning in these sectors. Residential and commercial data also include solar hot water, photovoltaic systems and wind power. Data reported in the electric sector represents resource energy, meaning that the renewable fuels are used to generate electricity—by the utilities and through distributed generation—sold through the grid. Transportation sector renewable energy measures use of ethanol blended with gasoline and sold as reformulated gasoline, 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.

Wisconsin Renewable Energy Electricity Generated and Purchased

RENEWABLE
ELECTRICITY
GENERATION
7.5%

In 2011, Wisconsin's electric utilities and non-utilities, such as paper mills, increased their generation of electricity generated from renewable energy sources by 7.5 percent. The primary renewable energy source used was hydropower, which represents 43.0 percent of Wisconsin's renewable electricity generation.

Sales of renewable energy generated in Wisconsin comprise approximately 7.7 percent of total electric sales in Wisconsin, an increase of 7.6 percent over 2010.

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.

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.

1990-2011 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	1,550.7	76.9%	148.2	7.3%	224.3	11.1%	93.5	4.6%	0.46	0.0%	2,017.1
2006	1,626.9	56.7%	815.8	28.4%	322.2	11.2%	102.7	3.6%	0.91	0.0%	2,868.6
2007 ^a	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	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	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
2010 ^r	2,216.9	45.4%	913.0	18.7%	655.3	13.4%	1,092.3	22.4%	7.54	0.2%	4,885.0
2011 ^p	2,258.9	43.0%	1,080.3	20.6%	710.0	13.5%	1,190.5	22.7%	13.20	0.3%	5,253.0

^a 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).

^p Preliminary estimates.

^r Revised.

Source: Public Service Commission of Wisconsin, unpublished data compiled from annual reports (2007-2011); Focus on Energy aggregated and verified savings data (2005-2011); survey data from conversations and emails with utilities, independent operators of landfills and/or waste water treatment plants, and public schools (2007-2011); Department of Revenue *Monthly Motor Fuel Consumption Report* (2000-2011); Energy Center of Wisconsin, *Wisconsin Agricultural Biogas Casebook* (2008).

Wisconsin Electric Utility and Non-Utility Hydroelectric Generation

1970-2011 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	1,499.0	338.6	1,837.6	51.7	1,550.7	29.3
2006	1,446.0	326.3	1,772.3	180.9	1,626.9	30.7
2007	1,314.0	272.6	1,586.6	169.2	1,483.2	34.0
2008	1,428.0	272.6	1,700.6	157.6	1,585.6	33.6
2009	1,352.7	251.2	1,603.9	108.2	1,460.9	30.3
2010	2,026.7	330.3	2,357.0	190.3	2,217.0	39.7
2011 ^p	2,048.1	339.6	2,387.7	210.8	2,258.9	30.7

^a Including Wisconsin power cooperatives and Independent Power Producers.

^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.

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) (1990-2008), http://www.eia.doe.gov/cneaf/electricity/epa/epa_sprdshts.html; Public Service Commission of Wisconsin, unpublished electrical production data (2005-2011).

ELECTRIC
UTILITY
HYDROELECTRIC
PRODUCTION
1.3%

Total Wisconsin hydroelectric production—utility and non-utility—increased 1.3 percent from 2010 to 2011. Because hydroelectric production is impacted by rainfall, among other factors, precipitation inches are provided in this table. In 2011, total precipitation in Wisconsin fell by 22.6 percent from 2010.

Beginning in 2009, the utility figure includes production by Independent Power Producers who are required under law to sell their power to regulated utilities. Non-utility figures represent hydroelectric generation from the industrial sector, such as paper companies.

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

Wisconsin Wood Use, by Economic Sector

WOOD
ENERGY USE
11.0%

Wood energy use in Wisconsin increased by 11.0 percent in 2011. 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.

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.

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

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.

1970-2011 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	26.2	59.5%	0.20	0.5%	17.6	40.0%	44.0
1990	21.3	51.2%	0.26	0.6%	20.0	48.2%	41.5
1995	22.0	62.4%	0.55	1.6%	12.7	36.0%	35.3
1996	24.8	64.5%	0.50	1.3%	13.2	34.2%	38.5
1997	23.5	63.4%	0.48	1.3%	13.1	35.2%	37.0
1998	19.2	58.8%	0.57	1.8%	12.8	39.4%	32.6
1999	21.4	63.6%	0.62	1.8%	11.5	34.4%	33.5
2000	24.8	67.8%	0.48	1.3%	11.2	30.8%	36.5
2001	23.9	67.0%	0.38	1.1%	11.3	31.8%	35.6
2002	24.4	67.0%	0.37	1.0%	11.5	31.8%	36.3
2003	27.1	69.0%	0.36	0.9%	11.7	29.9%	39.1
2004	27.2	67.5%	0.32	0.8%	12.7	31.5%	40.3
2005	29.1	69.6%	0.27	0.6%	12.2	29.3%	41.5
2006	28.1	67.7%	0.24	0.6%	11.0	28.1%	39.4
2007	31.0	67.4%	0.44	1.0%	12.2	27.9%	43.7
2008	35.8	80.2%	0.54	1.2%	6.8	15.7%	43.1
2009	31.6	77.9%	0.89	2.2%	6.0	15.6%	38.5
2010	30.3	74.1%	0.37	0.9%	8.1	21.0%	38.8
2011 ^p	34.2	75.6%	0.27	0.6%	8.7	20.2%	43.1

^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.

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 (1972-2011); USDA Forest Service, *Residential Fuelwood Consumption and Production in Wisconsin* (1994); Wisconsin Department of Administration, Division of Energy, "Wisconsin Residential Wood Energy Model," unpublished (1981-2011), and *Directory of Wisconsin Wood Burning Facilities* (1995).

Wisconsin Manufacturing Industry Use of Wood Fuel, by Industry Group

1972-2011 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	0.23	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	1,155.3	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	0.09	994.5	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	1,123.9	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	272.9	3.08	20.7	0.23	599.3	6.77
2009	256.7	2.90	4.0	0.05	249.3	2.82	21.8	0.25	531.8	6.01
2010	314.2	3.55	2.5	0.03	379.1	4.28	24.5	0.28	720.4	8.14
2011 ^p	369.7	4.18	2.5	0.03	321.4	3.63	17.6	0.20	711.2	8.04

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 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 State Energy Office, based on Wisconsin Department of Natural Resources, Annual Survey of Point Source Emissions, unpublished (1972-2011); 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

**WOOD
FUEL
USED FOR
ELECTRICITY
2.33%**

Wood energy used for electricity in Wisconsin decreased by 2.33 percent in 2011 when NSP decreased 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 at the back of this book.

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.

1970-2011

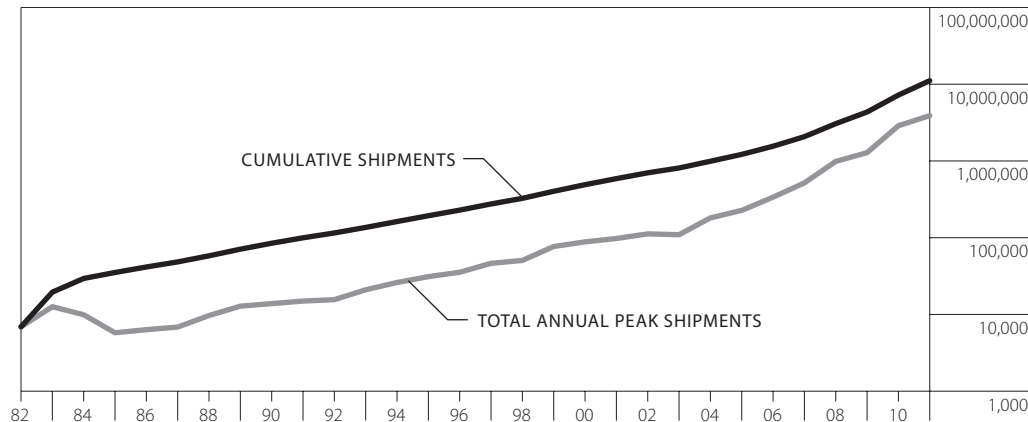
Year	Tons	Billions of Btu
1970-1975	0	0
1980	76,282	740
1985	155,717	1,666
1990	299,464	3,112
1995	327,201	3,506
1996	339,803	3,837
1997	304,618	3,326
1998	334,231	3,871
1999	330,491	3,765
2000	296,739	3,430
2001	301,580	3,484
2002	283,774	3,260
2003	267,446	3,154
2004	242,973	2,877
2005	253,638	2,961
2006	288,907	3,482
2007	315,811	3,437
2008	342,684	3,735
2009	362,471	3,868
2010	380,600	4,333
2011	371,212	4,232

Source: Wisconsin Department of Natural Resources, Annual Survey of Point Source Emissions, unpublished (1972-1994); annual reports of various Wisconsin electric generating utilities (1995-2011). <http://psc.wi.gov/apps/annreport/default>

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

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 16 percent for Crystalline Silicon and about 11 percent for Amorphous Silicon.

1982-2011 PHOTOVOLTAIC SHIPMENTS (KILOWATTS)



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						
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	226,916	1,217,861						
2006	337,268	1,555,129						
2007	517,684	2,072,813	17	14	12	8	12	35
2008	986,504	3,059,317	19	14	13	8	12	34
2009	1,282,560	4,341,877	20	14	13	8	12	38
2010	2,875,932	7,217,809		16			11	27
2011 ^p	3,896,859	11,114,668		16			11	29

^a Total shipments in the table represent shipment from outside and within the United States, and do not include export shipments to other countries.

^p Preliminary.

Source: U.S. Department of Energy, Energy Information Administration, *Annual Energy Review* [DOE/EIA-0384(2011) (September 2012)], table 10.8 (2011) www.eia.doe.gov/totalenergy/data/annual; 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", 2007-2011 (2012).

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.

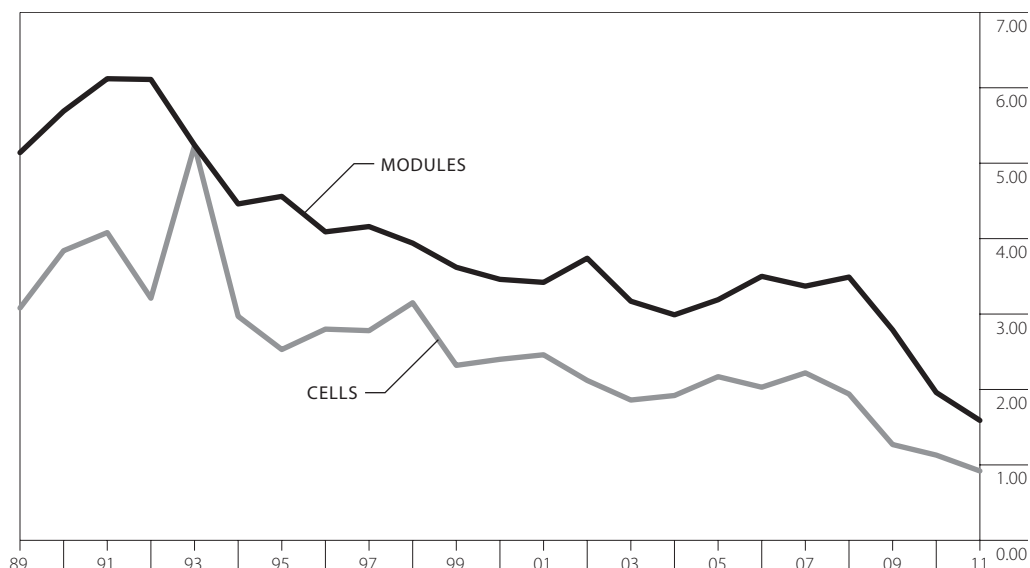
Since 1982 total shipments of PV systems have exceeded 11,000 Megawatts (MW). Since 2003 annual shipments of PV systems have been doubling every 18 months, an annual average growth of 54.4 percent. The volume of shipments is a good proxy for the growth of PV in the commercial, industrial and residential 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 2011, PV systems shipment prices fell by a factor of 3.6. 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 \$1.60/watt) is about 73 percent higher than the cost of PV cells (about \$1/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.

1989-2011 DOLLARS PER PEAK WATT



Year	Dollars per Peak Watt (nominal ^a dollars)		2011 Dollars ^b	
	Modules	Cells	Modules	Cells
1989	5.14	3.08	8.37	5.02
1990	5.69	3.84	8.93	6.02
1995	4.56	2.53	6.33	3.51
1996	4.09	2.80	5.58	3.82
1997	4.16	2.78	5.57	3.72
1998	3.94	3.15	5.22	4.17
1999	3.62	2.32	4.73	3.03
2000	3.46	2.40	4.42	3.07
2001	3.42	2.46	4.27	3.07
2002	3.74	2.12	4.60	2.61
2003	3.17	1.86	3.82	2.24
2004	2.99	1.92	3.50	2.25
2005	3.19	2.17	3.62	2.46
2006	3.50	2.03	3.84	2.23
2007	3.37	2.22	3.60	2.37
2008	3.49	1.94	3.64	2.03
2009	2.79	1.27	2.88	1.31
2010	1.96	1.13	2.00	1.15
2011 ^p	1.59	0.92	1.59	0.92

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

^b 2011 prices indicate the price adjusted for inflation.

^p Preliminary estimates.

Source: U.S. Department of Energy, Energy Information Administration, *Annual Energy Review* [DOE/EIA-0384(2011) (August 2012)], table 10.8 (2011) 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", 2007-2011 (2012).

CHAPTER 4

Energy Efficiency Indices



Energy On Wisconsin!

State Energy and UW Extension Partner to Help Communities Become More Sustainable

Wisconsin was one of only three states awarded a State Energy Extension Partnership (SEEP) competitive grant by the US Department of Energy. This grant formalized the collaboration between Wisconsin's State Energy Office and Cooperative Extension, a division of the University of Wisconsin-Extension, to engage the public, businesses, farms, tribes and youth in additional energy efficiency, renewable energy, and bio-energy education and projects through a series of meetings titled **Energy On Wisconsin!**

The SEEP grant also financed the creation of a clearinghouse website (view it here: <http://energyonwi.uwex.edu>) which provides funding updates, meeting registration links, photos, project information and inspiration as well as a forum for discussion. Though all of the funding from the Department of Energy has been expended, the partnership between the State Energy Office and UW Extension will endure, with quarterly meetings planned in all four corners of the State through 2015.

The SEEP efforts with Wisconsin's 140 Energy Independent Communities (EICs), through the Energy On Wisconsin website and meetings, succeeded in re-energizing efforts toward energy independence. Five new communities wrote a pledge to reduce their consumption and increase their use of renewables, joining the Wisconsin's EICs—towns, cities, villages, or school districts—that had previously pledged to reduce consumption of imported energy by 25% by 2025.



WILL ALLEN—ENTREPRENEUR AND OWNER OF GROWING POWER—SPEAKS TO THE MAY 2013 MEETING, "ENERGY MEANS BUSINESS".



UW EXTENSION DISTINGUISHED LECTURER SHERRIE GRUDER AT THE JEFFERSON SOLAR FARM KICKING OFF THE TOUR ON THE FIRST MEETING OF THE 2014 SERIES, FEBRUARY 26, 2014.

The State Energy Office and UW Extension remain committed to assisting Wisconsin Communities to:

- Increase energy awareness, education and outreach on energy conservation and efficiency, renewable energy sources and systems, bioenergy and sustainable energy planning and policies,
- Increase the opportunity for energy-related technical assistance for local units of government, locally-owned businesses and the State's residents, and
- Increase the likelihood of creating successful energy efficiency and renewable energy projects in the Wisconsin.

Indices of Wisconsin Energy Efficiency

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

2.3%

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 2.3 and 1.6 percent respectively.

In 2011, Wisconsin Commercial Energy Use per Employee decreased by 0.9 percent; Industrial Energy Use per \$1,000 Manufacturing Value Added decreased 3.1 percent and is 55.2 percent lower than in 1970. Agricultural Energy Use per Acre increased 19.8 percent in 2011, from 1.65 to 1.81 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.

1970-2011 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 ^r	12.1	0.90	73.4		8.4	1.1
1975 ^r	11.2	0.98	74.9		6.4	1.2
1980 ^r	10.1	1.03	75.6		5.2	1.4
1985 ^r	9.3	1.05	71.5		4.9	1.4
1990 ^r	9.0	1.07	72.8	163.1	4.6	1.2
1995 ^r	8.5	1.05	77.8	164.8	4.2	1.3
1996 ^r	8.3	1.03	78.6	164.5	4.1	1.3
1997 ^r	8.0	1.01	73.9	160.9	4.2	1.3
1998 ^r	7.6	1.00	69.4	158.2	3.9	1.2
1999 ^r	7.5	0.98	73.5	163.1	3.9	1.3
2000 ^r	7.5	0.97	75.3	161.4	3.8	1.2
2001 ^r	7.4	0.98	75.0	161.2	3.9	1.2
2002 ^r	7.3	0.98	76.3	163.0	3.9	1.3
2003 ^r	7.2	0.96	79.9	152.3	3.8	1.3
2004 ^r	7.1	0.95	77.6	147.0	4.0	1.3
2005 ^r	6.9	0.97	76.4	154.9	3.8	1.3
2006 ^r	6.6	0.95	71.6	150.7	3.6	1.5
2007 ^r	6.9	0.96	76.9	160.2	3.6	1.6
2008 ^r	7.1	0.97	78.5	162.7	4.1	1.7
2009 ^r	6.7	0.93	74.1	157.7	4.2	1.9
2010 ^r	6.6	0.93	73.1	155.5	3.9	1.6
2011 ^p	6.5	0.92	73.3	154.1	3.8	1.8

^a Manufacturing Value Added and Gross State Product in 2011 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.

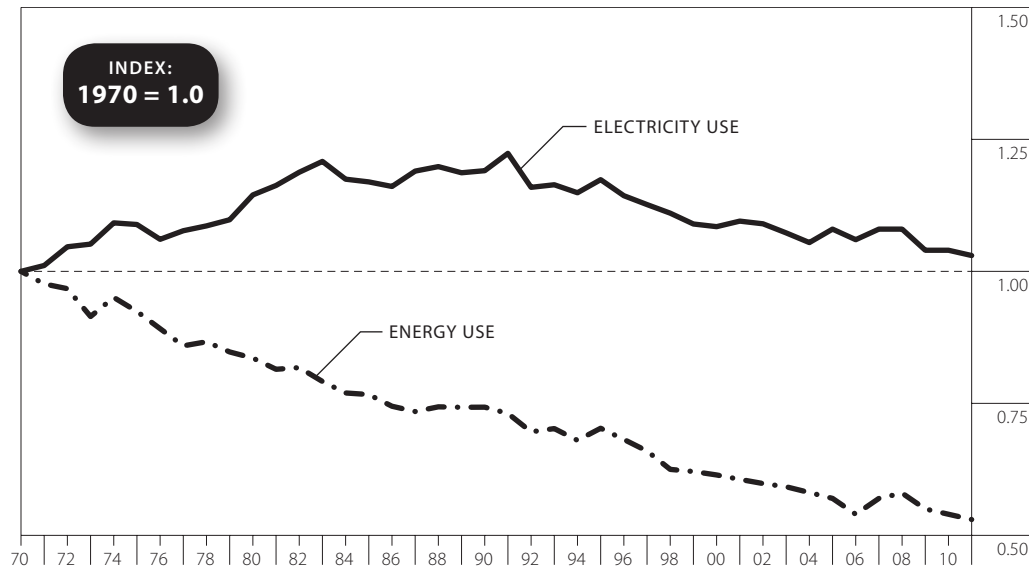
^p Preliminary data.

^r Revised.

Source: Wisconsin Department of Workforce Development employment data, <http://worknet.wisconsin.gov/worknet/dalaus.aspx?menuselection=da>; U.S. Department of Commerce, *Annual Survey and Census of Manufacturers* <http://www.census.gov/mcd/asm-as3.html> (1972-2011); Wisconsin Department of Agriculture, Trade and Consumer Protection, *Wisconsin's Agricultural Statistics, 2011*; 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

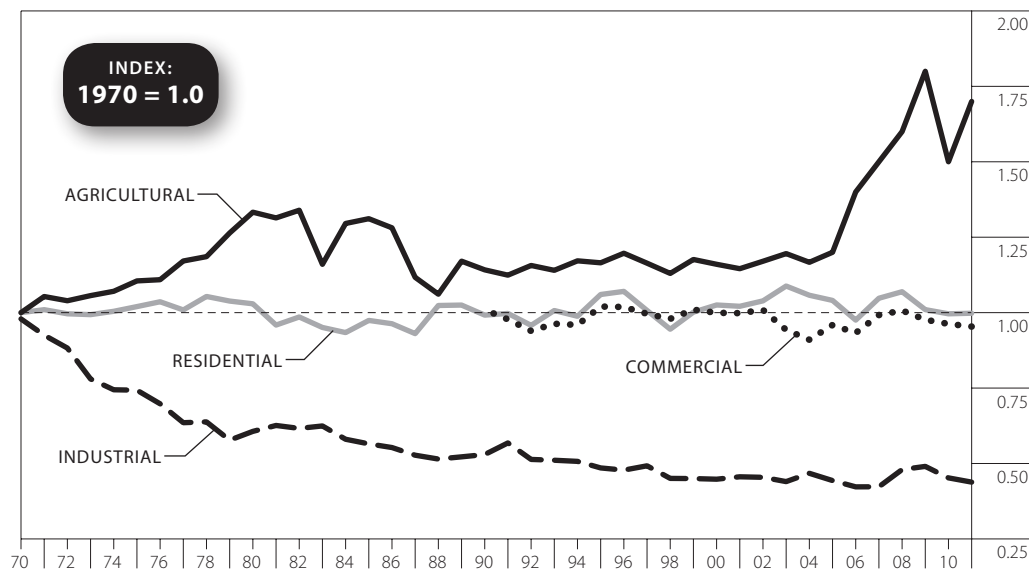
1970-2011 ENERGY AND ELECTRICITY USE PER DOLLAR OF GROSS STATE PRODUCT^a



--- WISCONSIN
ENERGY USE
PER DOLLAR OF
GROSS STATE
PRODUCT

— WISCONSIN
ELECTRICITY USE
PER DOLLAR OF
GROSS STATE
PRODUCT

1970-2011 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

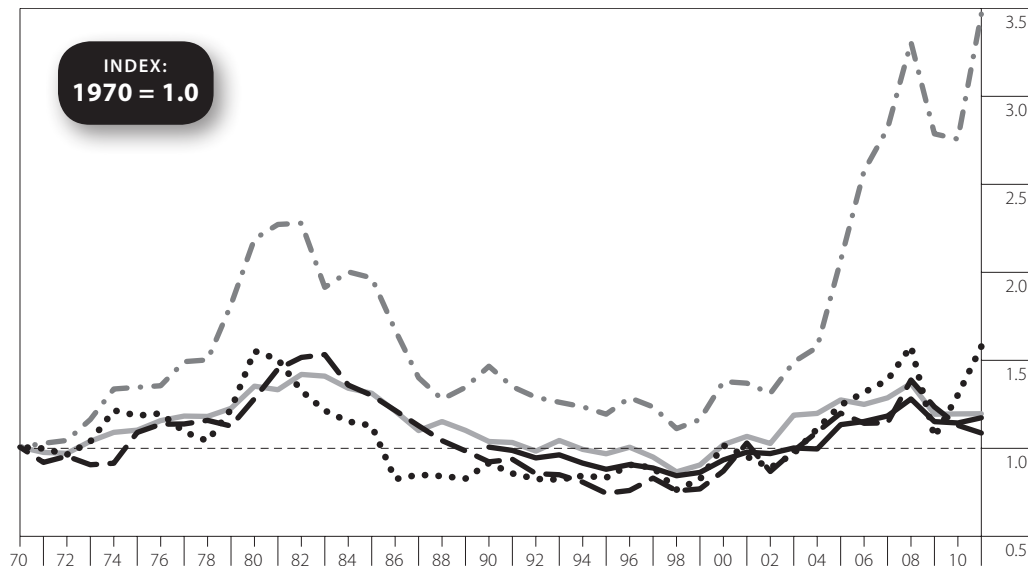
— AGRICULTURAL
ENERGY USE PER
ACRE

^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 State Energy Office.

Indices of Wisconsin Energy Expenditures, 2011 Dollars

1970-2011 2011 DOLLARS



In 2011, Wisconsin saw increases in all but one energy expenditure index. The Expenditures per Vehicle increased 21.2 percent, Commercial Expenditures per Employee increased by 2.6 percent, Agricultural Expenditures per acre increased by 25.7 percent, Residential Expenditures per household were almost flat, with a slight increase of 0.1 percent over 2010. The Industrial Expenditures per \$1,000 of Value Added decreased by 3.9 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	14		1,684	36	1,409
1975	18		1,847	39	1,661
1980	30		2,268	46	2,178
1985 ^r	27		2,200	47	1,580
1990 ^r	20	1,260	1,738	33	1,281
1995 ^r	16	1,102	1,621	27	1,164
2000 ^r	19	1,168	1,708	31	1,423
2001 ^r	19	1,224	1,787	37	1,333
2002 ^r	18	1,214	1,719	31	1,244
2003 ^r	20	1,254	1,991	36	1,358
2004 ^r	21	1,247	2,007	40	1,555
2005 ^r	28	1,421	2,136	43	1,746
2006 ^r	35	1,444	2,093	41	1,847
2007 ^r	38	1,483	2,156	41	1,946
2008 ^r	45	1,605	2,294	50	2,216
2009 ^r	38	1,443	1,999	45	1,491
2010 ^r	37	1,433	2,002	41	1,827
2011 ^p	47	1,470	2,004	39	2,214

^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

1970-2011 MILLIONS OF BTU

Year	Petroleum	Natural Gas	Coal	Renewable	Nuclear	Electric Imports ^a	Total
1970	103.6	74.1	80.4	6.2	0.4	-6.4	258.3
1975	104.0	80.7	57.4	6.4	24.3	-4.5	268.5
1980 ^r	96.6	73.1	69.0	10.4	22.7	-1.4	270.4
1982 ^r	85.3	65.8	67.6	10.7	23.5	2.3	255.2
1985 ^r	87.7	64.1	78.9	10.9	25.0	-0.4	266.2
1990 ^r	90.0	62.6	84.1	10.3	24.8	17.9	289.7
1995 ^r	91.0	74.2	90.3	9.7	23.1	24.0	312.2
1996 ^r	93.1	77.9	94.0	10.5	21.1	15.5	312.1
1997 ^r	93.4	76.5	97.5	10.1	8.1	24.9	310.5
1998 ^r	93.4	69.6	93.9	9.0	19.2	20.4	305.5
1999 ^r	96.2	71.5	95.0	9.3	23.3	18.8	314.1
2000 ^r	93.6	73.3	96.8	10.3	23.1	18.3	315.5
2001 ^r	93.1	66.5	96.4	10.0	23.0	22.5	311.5
2002 ^r	93.9	70.4	93.1	10.5	24.6	18.4	310.9
2003 ^r	93.5	71.7	95.9	10.8	24.0	15.8	311.6
2004 ^r	94.1	69.1	97.0	11.1	23.2	17.0	311.4
2005 ^r	89.5	73.7	95.2	11.2	14.6	22.3	306.4
2006 ^r	88.0	66.5	91.8	11.6	23.5	14.4	295.5
2007 ^r	88.0	71.0	91.4	12.9	24.7	21.5	309.2
2008 ^r	84.3	72.7	95.4	14.1	23.2	18.5	307.5
2009 ^r	79.3	68.8	85.3	14.2	24.1	17.3	288.6
2010 ^r	80.1	65.7	92.0	14.9	25.2	14.1	291.7
2011 ^p	78.7	69.5	86.3	15.6	21.9	17.2	288.8

PER CAPITA
RESOURCE
ENERGY
CONSUMPTION**1.0%**

Wisconsin's per capita resource energy consumption decreased 1.0 percent in 2011. However, compared to the low point in 1982, 2011 per capita energy use in Wisconsin is 13.3 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

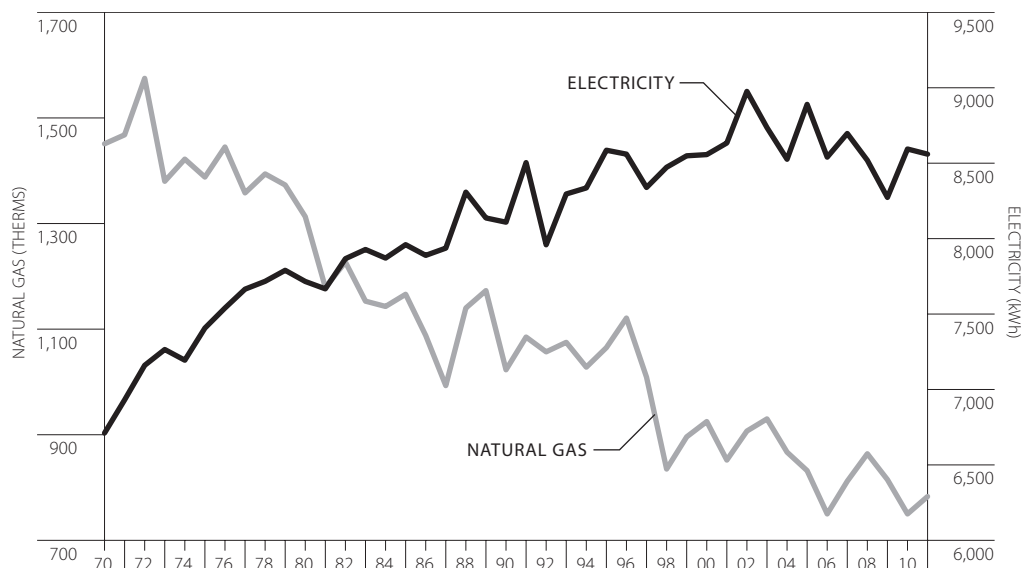
ELECTRICITY
USE PER
CUSTOMER
0.4%

NATURAL GAS
USE PER
CUSTOMER
4.4%

Electricity Use per Customer decreased 0.4 percent in 2011, while natural gas use increased 4.4 percent. The increase in natural gas relates to the relatively low price of the fuel, and an increase in Heating Degree Days (HDD) in 2011—a 6.1 percent increase over 2010. To learn more about HDDs, see the Miscellaneous chapter of this publication.

These data are from the AF2 reports submitted to the Public Service Commission of Wisconsin by gas utilities across the state. The complete datasets are published online at stateenergyoffice.wi.gov under Statistics/Tables.

1970-2011



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	966.0	1,313	1,801	7,716
1985 ^r	1,013.0	1,166	1,870	7,960
1990 ^r	1,123.6	1,023	2,017	8,109
1995 ^r	1,291.4	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 ^r	1,656.6	815	2,589	8,273
2010 ^r	1,663.6	750	2,595	8,594
2011 ^p	1,670.7	783	2,600	8,560

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

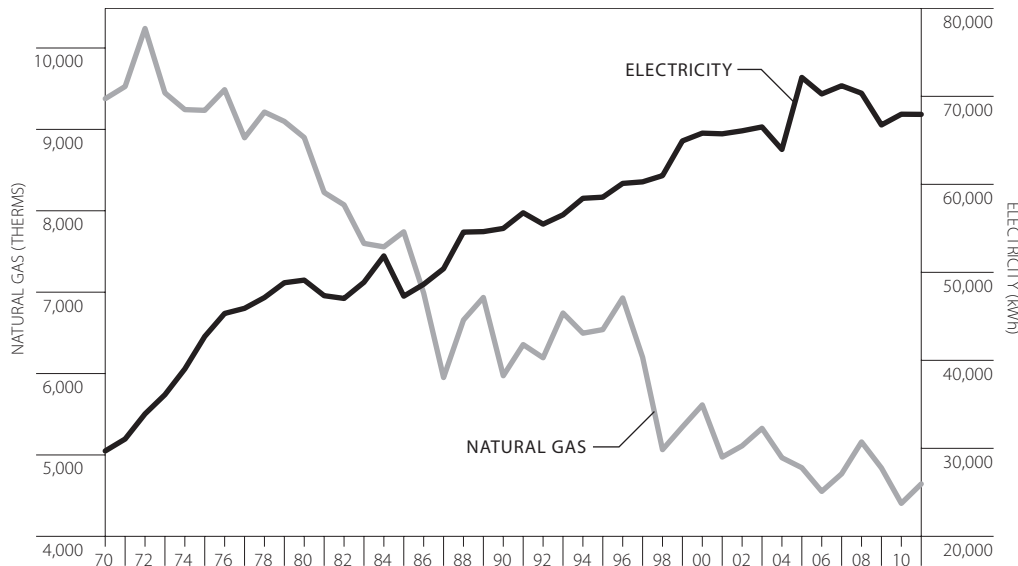
^p Preliminary estimates.

^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* (1980-2011); 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

1970-2011



ELECTRICITY
USE PER
CUSTOMER
0.03%

NATURAL GAS
USE PER
CUSTOMER
5.4%

Commercial electricity use per customer in 2011 decreased 0.03 percent, while natural gas use per customer increased 5.4 percent. The increase in natural gas relates to the relatively low price for natural gas, and a 6.1 percent increase in Heating Degree Days (HDD) in 2011—a 6.1 percent increase compared to 2010. To learn more about HDDs, see the Miscellaneous chapter in this publication.

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	76.7	8,900	193	49,115
1985 ^r	87.0	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	70,272
2007 ^r	160.6	4,768	330	71,203
2008 ^r	163.0	5,160	334	70,353
2009 ^r	163.8	4,840	337	66,748
2010 ^r	164.2	4,405	338	67,969
2011 ^p	164.8	4,644	339	67,950

^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* (1980-2011); U.S. Department of Energy, *Electric Sales and Revenues 1993-2000* [DOE/EIA-0540(2000)] (November 2001).

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.

2001-2011 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, 2007^c						
Total Saved	1,178.45		61,118,326		\$167,907,949	1,113,842
Business	689.82		48,588,762		\$94,944,633	43,281
Residential	440.95		9,247,900		\$65,615,728	1,070,213
Renewables	47.69		3,281,664		\$7,347,588	348
July 1, 2007 - December 31, 2008						
Total Saved	599.26	0.567%	26,622,537	0.434%	\$79,598,763	592,714
Business	412.28	0.557%	20,247,680	0.501%	\$49,925,700	27,658
Residential	179.99	0.568%	4,145,352	0.198%	\$27,217,319	564,660
Renewables	6.99		2,229,505		\$2,455,744	396
January 1, 2009 - December 31, 2009						
Total Saved	634.62	0.957%	29,661,512	0.759%	\$83,273,246	514,714
Business	500.79	1.091%	20,712,687	0.810%	\$58,696,839	20,517
Residential	116.89	0.573%	3,591,004	0.266%	\$18,660,979	493,780
Renewables	16.93		5,357,821		\$5,915,428	417
January 1, 2010 - December 31, 2010						
Total Saved	590.64	0.859%	23,640,236	0.633%	\$75,411,086	432,636
Business	470.99	0.993%	20,041,916	0.806%	\$56,396,192	17,672
Residential	119.65	0.562%	3,598,320	0.288%	\$19,014,894	414,964
Renewables	0.00	0.000%	0	0.000%	\$0	0
January 1, 2011 - December 31, 2011						
Total Saved	440.60	0.641%	16,707,201	0.423%	\$56,695,791	194,285
Business	346.71	0.731%	13,831,959	0.523%	\$41,183,316	12,860
Residential	93.89	0.442%	2,875,242	0.220%	\$15,512,475	181,425
Renewables	0.00	0.000%	0	0.000%	\$0	0
July 1, 2001 - December 31, 2011						
Total Saved	3443.58	0.478%	157,749,812	0.385%	\$462,886,835	2,848,191
Business	2420.59	0.483%	123,423,004	0.458%	\$301,146,680	121,988
Residential	951.38	0.433%	23,457,818	0.167%	\$146,021,395	2,725,042
Renewables	71.61		10,868,990		\$15,718,760	1,161

^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 *Evaluation Report 2011*, October 31, 2012; <https://focusonenergy.com/about/evaluation-reports>

Focus on Energy Ranked Energy Savings Measures

2001-2011 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)	259.05	10.7%	519.51	54.6%
ECM ^a Furnace			111.11	11.7%
High Bay Fluorescent	226.93	9.4%		
Hot Water ^b			29.63	3.1%
Lighting (other than listed) ^c	483.71	20.0%	141.21	14.8%
Other ^d	294.28	12.2%	54.07	5.7%
T8/T5 Fluorescent Lighting	230.97	9.5%		
Electric Total Verified kWh Savings – All Efforts	2,420.59		951.38	

Natural Gas	Business Programs		Residential Programs	
	Savings (Therm)	Percent Overall Savings	Savings (Therm)	Percent Overall Savings
Boiler Equipment/Other Heating	16,749,391	13.6%	6,627,078	28.3%
Building Shell			5,727,545	24.4%
Clothes Washer			1,152,285	4.9%
ECM ^a Furnace			2,710,934	11.6%
Energy Recovery ^e	19,551,023	15.8%		
Hot Water ^b			3,457,372	14.7%
HVAC	15,065,499	12.2%		
Process ^f	19,725,048	16.0%		
Other ^g	11,035,484	8.9%	2,459,951	10.2%
Natural Gas Total Verified kWh Savings – All Efforts	123,423,004		23,457,818	

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 *Evaluation Report 2011*, October 31, 2012;
<https://focusonenergy.com/about/evaluation-reports>

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

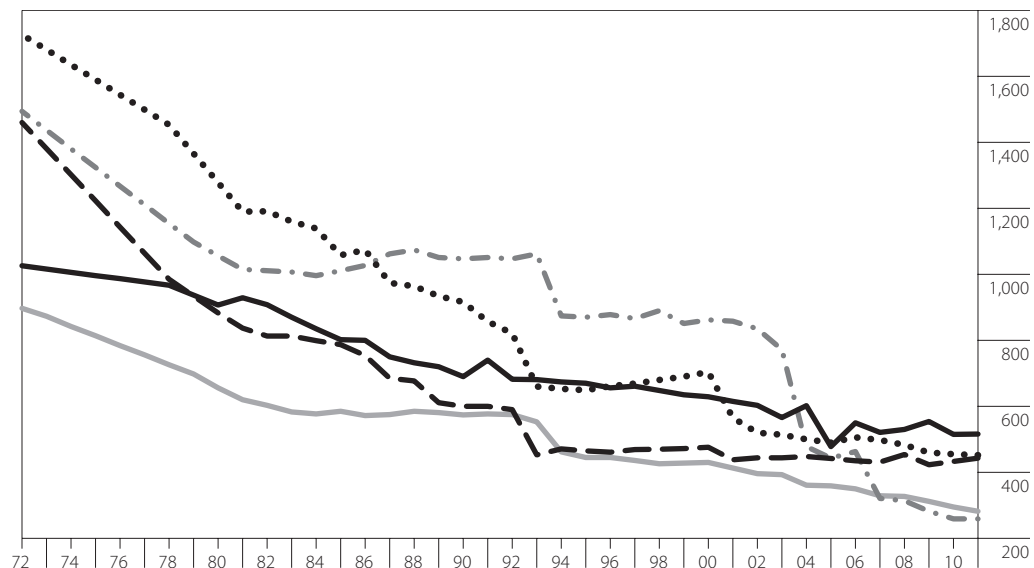
DISHWASHER

Since 1980, energy usage of new household appliances sold in the U.S. has decreased from 43.1 percent (room air conditioners) to 75.5 percent (washing machines), 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 6.9 percent for freezers to 70.0 percent for washing machines. Appliance data makes it easier to understand residential energy use trends.

1972-2011 AVERAGE kWh PER YEAR



^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.

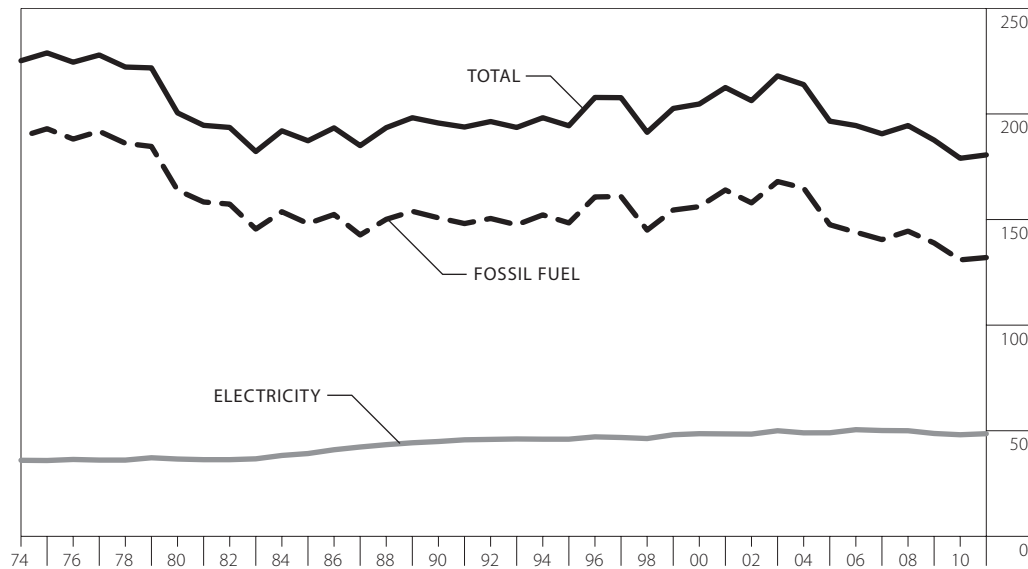
^p Preliminary estimates.

^r Revised.

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

Energy Use in State Owned Buildings

1974-2011 THOUSANDS OF BTU PER GROSS SQUARE FOOT PER YEAR



**TOTAL
ENERGY USE
PER GSF
1.9%
IN 2011**

In 2011, total energy use per gross square foot (GSF), adjusted for weather, decreased 1.9 percent from 2010.

Since 1974, overall use per GSF in state owned buildings fell 19.8 percent. Electricity use has increased 35.1 percent per GSF between 1974 and 2011, while fossil fuel use decreased 30.2 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 2011 are for the period July 1, 2010 to June 20, 2011.

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 ^r	157.9	48.4	206.3		58.0
2003 ^r	168.0	50.0	218.0		59.0
2004 ^r	164.9	49.0	213.9		59.4
2005 ^{a,r}	147.5	49.0	196.6	196.6	67.4
2006 ^r	144.0	50.5	194.5	196.4	67.9
2007 ^r	140.5	50.1	190.6	190.1	69.3
2008 ^r	144.5	50.0	194.5	187.0	70.7
2009 ^r	138.9	48.7	187.6	179.6	71.4
2010 ^r	130.9	48.1	179.0	177.7	71.2
2011 ^p	132.0	48.6	180.6	174.3	72.0

^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* Unpublished.

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

**NUMBER
OF UNITS
WEATHERIZED**
1.2%

The number of units weatherized^a in 2011 decreased by 1.2 percent from 2010. This is due in part to the cessation of additional 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^a 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.

1980-2011

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	8,645	0	8,645
2009	10,534	0	10,534
2010	15,392	0	15,392
2011 ^p	15,211	0	15,211
Total	246,497	81,227	327,724

^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 2011, and unpublished data (2011).

Reported Building Activity Affected by Wisconsin Energy Codes

1979-2011

Year	New One and Two Family Units ^b	New Manufactured Dwelling Units ^{c,g}	Manufactured Homes (HUD Certified) ^{f,h}	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	6,911		207	3,565	2,680	13,363
2010 ^h	6,529			3,596	2,694	12,819
2011 ^p	5,099			3,693	2,541	11,333

BUILDINGS
CERTIFIED
IN 2011
DECREASED

11.6%

More than 11,000 buildings were certified in 2011 as meeting Wisconsin's energy efficiency building codes^a, an 11.6 percent decrease from 2010. The number of buildings certified peaked in 2005 with 35,192.

The codes, developed and enforced by the Wisconsin Department of Safety and Professional Services 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.

^h From 2010 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.

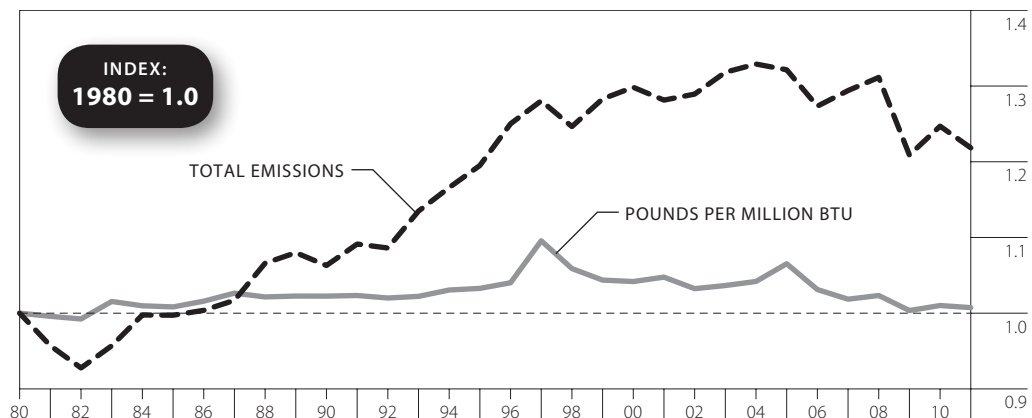
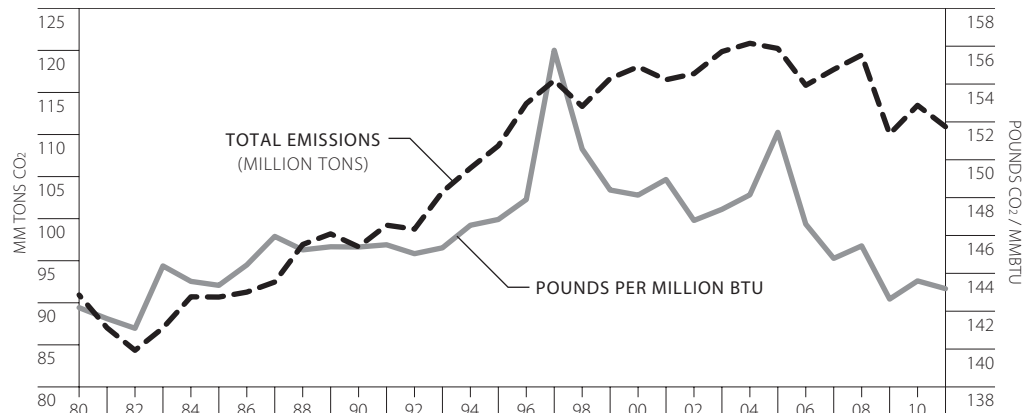
Source: Department of Safety and Professional Services, internal data files.

Wisconsin Carbon Dioxide Emissions from Energy Use

CO₂
EMISSIONS
1.9%

Wisconsin's CO₂ emissions from energy (pounds per MMBtu) decreased 1.9 percent in 2011. Since 1990, total CO₂ emissions, in millions of tons, have increased 14.8 percent, but 2011 levels reflect a decrease of 7.8 percent from 2010.

1980-2011 MILLIONS OF TONS AND POUNDS PER MILLION BTU^a



Year	Tons CO ₂ (Millions)	Pounds CO ₂ Per MMBtu
1980	90.9	142.2
1985	90.7	143.4
1990	96.7	145.4
1995	108.7	146.8
2000	118.1	148.1
2005	120.2	151.5
2006	115.8	146.6
2007	117.7	144.8
2008	119.5	145.5
2009	110.1	142.7
2010	113.5	143.6
2011 ^p	110.9	143.2

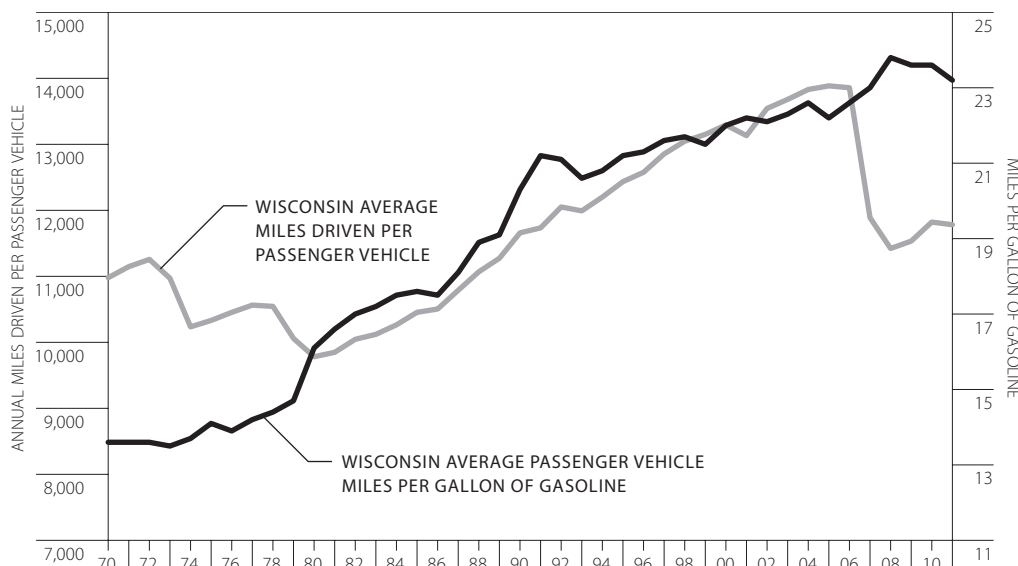
^a Does not include electric imports.

^p Preliminary estimates.

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

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

1970-2011



**AVERAGE
NUMBER OF
MILES DRIVEN
ANNUALLY
0.3%**

The average number of miles driven annually per vehicle in Wisconsin decreased 0.3 percent in 2011. It is 20.5 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 70.6 percent more fuel efficient in 2011 than in 1970.

Data have been modified beginning in 2007 to include additional types of vehicles because of increased use of larger vehicles by residential households.

Year	Average Annual Miles Per Passenger Vehicle ^{a,b}		Average Passenger Vehicle 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
2005	13,886	12,510	22.2	22.1
2006	13,858	12,485	22.6	22.5
2007 ^r	11,888	10,710	23.0	22.9
2008 ^r	11,422	10,290	23.8	23.7
2009 ^r	11,534	10,391	23.6	23.5
2010 ^r	11,822	10,650	23.6	23.5
2011 ^p	11,782	10,614	23.2	23.1

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

^b Light duty vehicles with a short wheel base are passenger vehicles including passenger cars, light trucks, vans and sport utility vehicles, all with a wheel base of less than 122 inches.

^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 (2013/03)] (March 2013) <http://www.eia.gov/totalenergy/data/monthly>.

CHAPTER 5

United States Energy Use

Diesel Truck Idling Reduction Program

Saving Money and Reducing Fuel Use

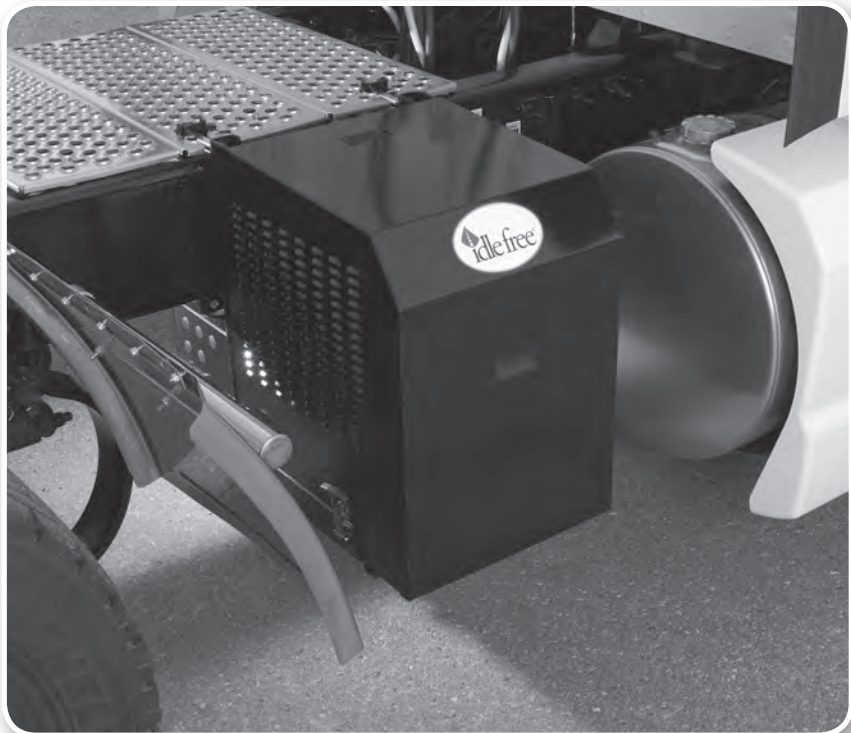
Wisconsin motor carriers are working with the state to reduce emissions and save fuel through reducing diesel truck idling. The highly successful Diesel Truck Idling Reduction Program provides cost-sharing for the purchase and installation of idling reduction units (IRU).

IRUs provide alternative power, heat or air conditioning to the truck so the engine does not have to idle when the truck is parked. The units provide a significant reduction in fuel consumption and air pollution emissions.

The grant program has provided funding for 2,143 IRUs, saving more than one million gallons of fuel annually and significantly reducing diesel emissions such as particulate matter (PM), hydrocarbons (HC), carbon monoxide (CO) and carbon dioxide (CO₂).

Qualified participants are eligible for reimbursement of up to 50 percent of the cost of their selected idling reduction equipment and its installation. Units include but are not limited to: auxiliary power units (APU), battery-powered (BP) units, diesel-fired heaters (DFHs), and energy recovery systems.

The program has received the Midwest Clean Diesel Initiative Leadership Award for demonstrating outstanding leadership by making significant, measurable improvements in air quality through the development and implementation of clean diesel actions.

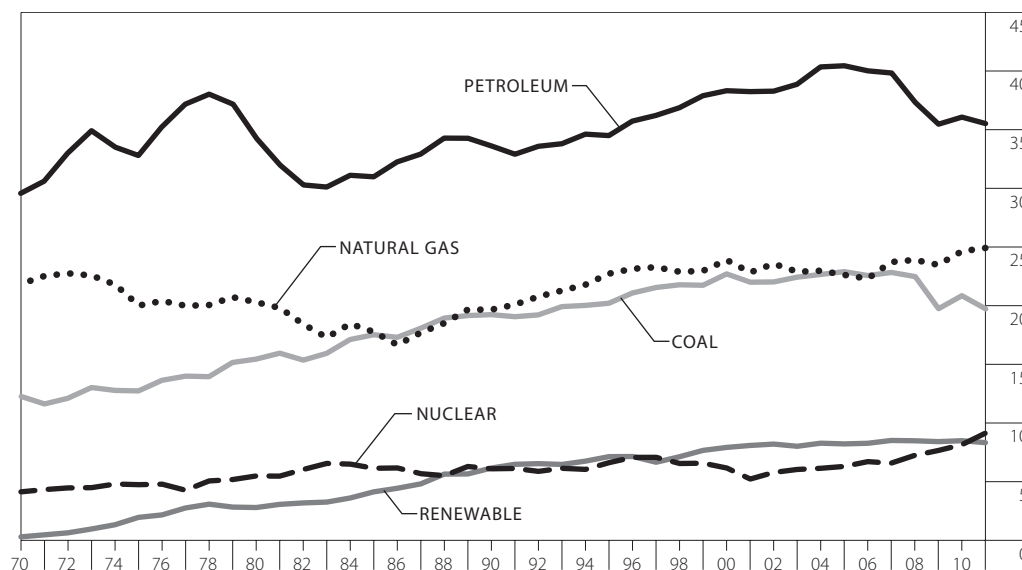


AN IDLE FREE BRAND IDLE REDUCTION UNIT INSTALLED ON A TRUCK. IDLE FREE, A WISCONSIN-BASED IRU MANUFACTURER, WAS A PARTICIPATING VENDOR THROUGH THE IDLING REDUCTION GRANT PROGRAM ADMINISTERED BY THE STATE ENERGY OFFICE.

For more information, please go to: www.stateenergyoffice.wi.gov/dieselgrantprogram. You may also email jean.beckwith@wisconsin.gov or phone 608-261-2517 for more information.

United States Resource Energy Consumption, by Type of Fuel

1970-2011 QUADRILLIONS OF BTU



1970-2011 QUADRILLIONS OF BTU AND PERCENT OF TOTAL

Year	Petroleum		Natural Gas		Coal		Nuclear		Renewable ^a		Total ^b
1970	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	6.5%	72.0
1980 ^r	34.2	43.8%	20.2	25.9%	15.4	19.7%	2.7	3.5%	5.4	7.0%	78.1
1985 ^r	30.9	40.5%	17.7	23.2%	17.5	22.9%	4.1	5.3%	6.1	8.0%	76.4
1990 ^r	33.6	39.7%	19.6	23.2%	19.2	22.7%	6.1	7.2%	6.0	7.1%	84.5
1995 ^r	34.4	37.8%	22.7	24.9%	20.2	22.1%	7.1	7.8%	6.6	7.2%	91.0
2000 ^r	38.3	38.7%	23.8	24.1%	22.6	22.9%	7.9	8.0%	6.1	6.2%	98.8
2005 ^r	40.4	40.3%	22.6	22.5%	22.8	22.8%	8.2	8.1%	6.2	6.2%	100.3
2006 ^r	40.0	40.1%	22.2	22.3%	22.5	22.6%	8.2	8.2%	6.6	6.7%	99.6
2007 ^r	39.8	39.3%	23.7	23.4%	22.8	22.5%	8.5	8.3%	6.5	6.4%	101.3
2008 ^r	37.3	37.6%	23.8	24.0%	22.4	22.6%	8.4	8.5%	7.2	7.2%	99.3
2009 ^r	35.4	37.4%	23.4	24.8%	19.7	20.8%	8.4	8.8%	7.6	8.0%	94.6
2010	36.0	36.8%	24.3	25.1%	20.8	21.2%	8.4	8.6%	8.1	8.3%	97.7
2011 ^p	35.3	36.4%	24.8	25.5%	19.7	20.2%	8.3	8.5%	9.1	9.3%	97.3

^a Includes net imports of electricity.

^b Totals vary slightly from US resource consumption totals elsewhere in this publication.

^p Preliminary.

^r Revised.

Source: U.S. Department of Energy, Energy Information Administration, *Monthly Energy Review*, Table 1.3 [DOE/EIA-0035 (2012/05)] (May 2012).
<http://www.eia.gov/totalenergy/data/monthly/> Complete Historical Data at: <http://www.eia.gov/totalenergy/data/annual/>

U.S. ENERGY
CONSUMPTION
0.4%

In 2011, total energy consumption in the United States decreased 0.4 percent.

PETROLEUM
2.0%
COAL
5.7%
NUCLEAR
2.1%

There were decreases for petroleum (2.0 percent), coal (5.7 percent), and nuclear (2.1 percent).

RENEWABLES
12.9%
NATURAL GAS
2.4%

Only renewable fuels and natural gas saw an increase in consumption of 12.9 percent and 2.4 percent, respectively.

United States Resource Energy Consumption, by Economic Sector

INDUSTRIAL
0.9%

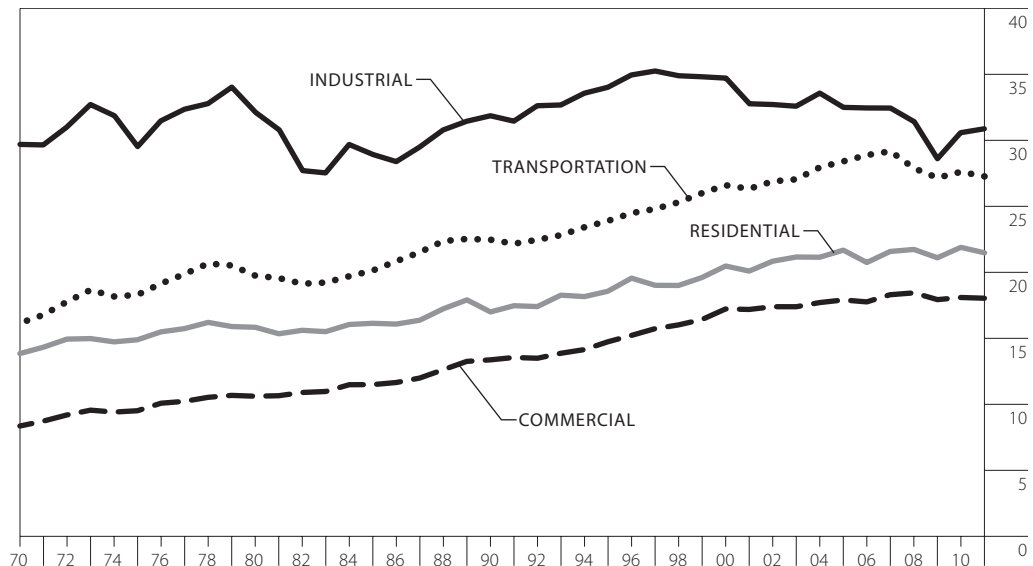
COMMERCIAL
0.3%

RESIDENTIAL
1.1%

TRANSPORTATION
1.4%

During 2011, all sectors except industrial saw a decrease in consumption. The industrial sector saw an increase (0.9 percent), while the commercial sector saw a slight decrease (0.3 percent). The residential and transportation sectors saw decreases of 1.1 percent and 1.4 percent respectively.

1970-2011 QUADRILLIONS OF BTU



1970-2011 QUADRILLIONS OF BTU AND PERCENT OF TOTAL

Year	Residential ^a		Commercial ^a		Industrial		Transportation		Total
1970	13.8	20.3%	8.3	12.2%	29.6	43.7%	16.1	23.7%	67.8
1975	14.8	20.6%	9.5	13.2%	29.4	40.9%	18.2	25.4%	72.0
1980	15.8	20.2%	10.6	13.5%	32.0	41.0%	19.7	25.2%	78.1
1985	16.0	21.0%	11.5	15.0%	28.8	37.7%	20.1	26.3%	76.4
1990 ^r	16.9	20.1%	13.3	15.8%	31.8	37.7%	22.4	26.5%	84.5
1995	18.5	20.3%	14.7	16.1%	34.0	37.3%	23.8	26.2%	91.0
2000 ^r	20.4	20.7%	17.2	17.4%	34.7	35.1%	26.5	26.9%	98.8
2005 ^r	21.6	21.6%	17.9	17.8%	32.4	32.4%	28.4	28.3%	100.3
2006 ^r	20.7	20.8%	17.7	17.8%	32.4	32.5%	28.8	28.9%	99.6
2007 ^r	21.5	21.3%	18.3	18.0%	32.4	32.0%	29.1	28.7%	101.3
2008 ^r	21.6	21.8%	18.4	18.5%	31.3	31.5%	28.0	28.2%	99.3
2009 ^r	21.1	22.3%	17.9	18.9%	28.5	30.2%	27.1	28.6%	94.6
2010 ^r	21.9	22.4%	18.1	18.5%	30.3	31.0%	27.5	28.1%	97.7
2011 ^p	21.6	22.2%	18.0	18.5%	30.6	31.4%	27.1	27.8%	97.3

^a 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 2.1 [DOE/EIA-0035 (2012/05)] (May 2012).
<http://www.eia.gov/totalenergy/data/monthly/> Complete Historical Data at: <http://www.eia.gov/totalenergy/data/annual/>

Sources of U.S. Crude Oil and Petroleum Products

1975-2011 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	17,056	10,170	8,597	1,573	6,980	544	6,909	4,300	40.5%	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	19,498	6,734	4,950	1,784	4,268	1,802	12,915	5,954	66.2%	46.1%	72.3%
2009 ^r	18,771	7,270	5,361	1,910	4,715	2,024	11,691	4,776	62.3%	40.9%	68.6%
2010 ^p	19,180	7,550	5,476	2,074	4,874	2,353	11,793	4,906	61.5%	41.6%	68.3%
2011 ^p	18,835	7,844	5,662	2,183	5,090	2,924	11,360	4,534	60.3%	39.9%	66.7%

^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*, Table 3.1, 3.3a and 3.3b [DOE/EIA-0035 (2012/05)] (May 2012). <http://www.eia.gov/totalenergy/data/monthly/> Complete Historical Data at: <http://www.eia.gov/totalenergy/data/annual/>

U.S.
PETROLEUM USE
1.8%

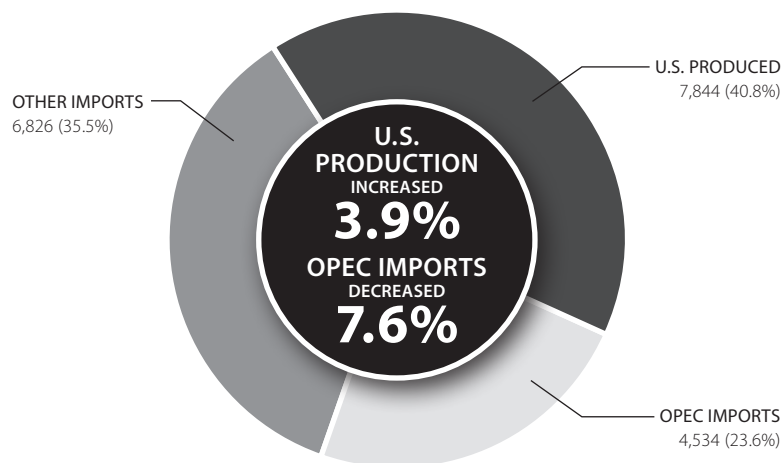
In 2011, U.S. petroleum use decreased 1.8 percent. U.S. imports of crude oil and petroleum products decreased 3.7 percent, and imports from OPEC decreased 7.6 percent.

Since 1985, U.S. consumption of petroleum products has increased almost 19.8 percent. During this same period, U.S. crude oil production has decreased 36.9 percent (lower 48 production fell 28.8 percent). This resulted in a 124.2 percent increase in imports since 1985, with a corresponding 147.8 percent increase in imports from the Organization of Petroleum Exporting Countries (OPEC).

2011 U.S. Petroleum Use Domestically Produced and Imported

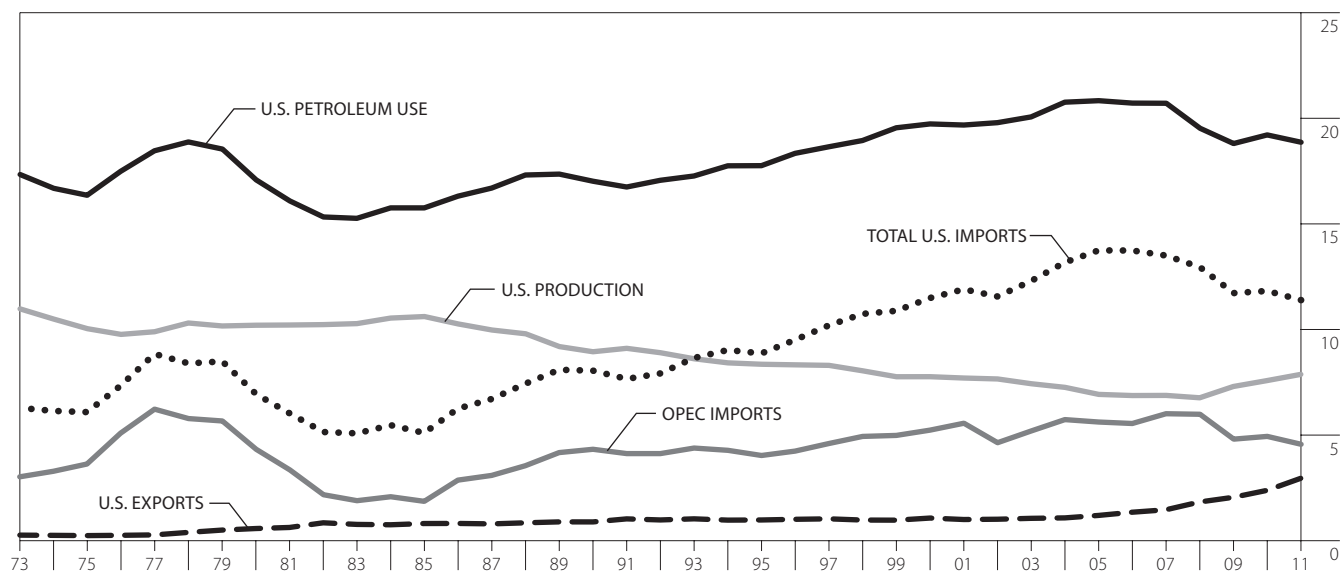
In 2011, U.S. petroleum production^a increased 3.9 percent. OPEC imports decreased 7.6 percent.

2011 THOUSANDS OF BARRELS PER DAY



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

1973-2011 MILLIONS OF BARRELS PER DAY

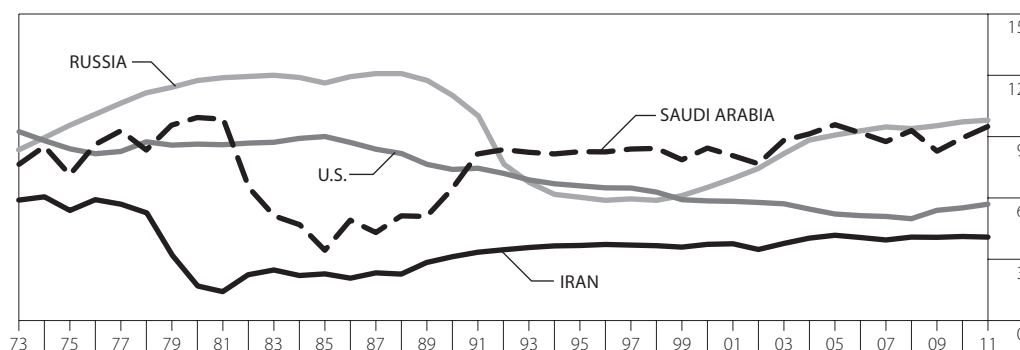
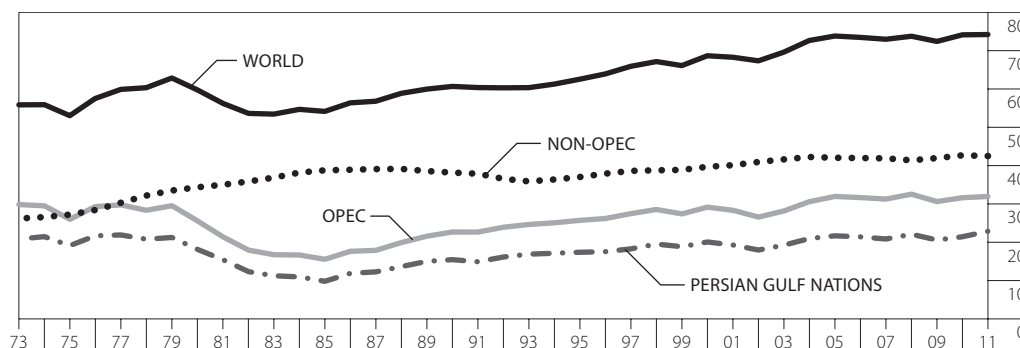


^a Includes crude oil, natural gas plant liquids and a small amount of other hydrocarbons and alcohol.

Source: Table "Sources of US Crude Oil and Petroleum Products" in this publication.

World Crude Oil Production

1973-2011 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 ^r	59.56	34.17	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 ^r	62.38	36.85	25.54	17.21	6.56	8.23	3.64	6.00
2000 ^r	68.49	39.52	28.98	19.89	5.82	8.40	3.70	6.48
2005 ^r	73.64	41.87	31.77	21.50	5.18	9.55	4.14	9.04
2010 ^r	73.95	42.51	31.44	21.26	5.48	8.90	4.08	9.69
2011 ^p	74.03	42.32	31.77	22.69	5.66	9.46	4.05	9.77

^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*, Table 11.1a and 11.1b [DOE/EIA-0035 (2012/05)] (May 2012). <http://www.eia.gov/totalenergy/data/monthly/> Complete Historical Data at: <http://www.eia.gov/totalenergy/data/annual/>

**WORLD
CRUDE OIL
0.1%**

In 2011, world production of crude oil was 74.03 million barrels per day, an increase of 0.1 percent from a year ago^d. The Organization of Petroleum Exporting Countries (OPEC) produced 42.9 percent of the world's crude oil in 2011.

The top four producers of crude oil in 2011 were Russia (13.2 percent), Saudi Arabia (12.8 percent), the U.S. (7.6 percent) and Iran (5.5 percent).

United States Natural Gas Production, Imports, Consumption and Storage

CONSUMPTION
2.5%

In 2011, U.S. natural gas consumption increased 2.5 percent.

PRODUCTION
7.8%

Domestic natural gas production increased 7.8 percent.

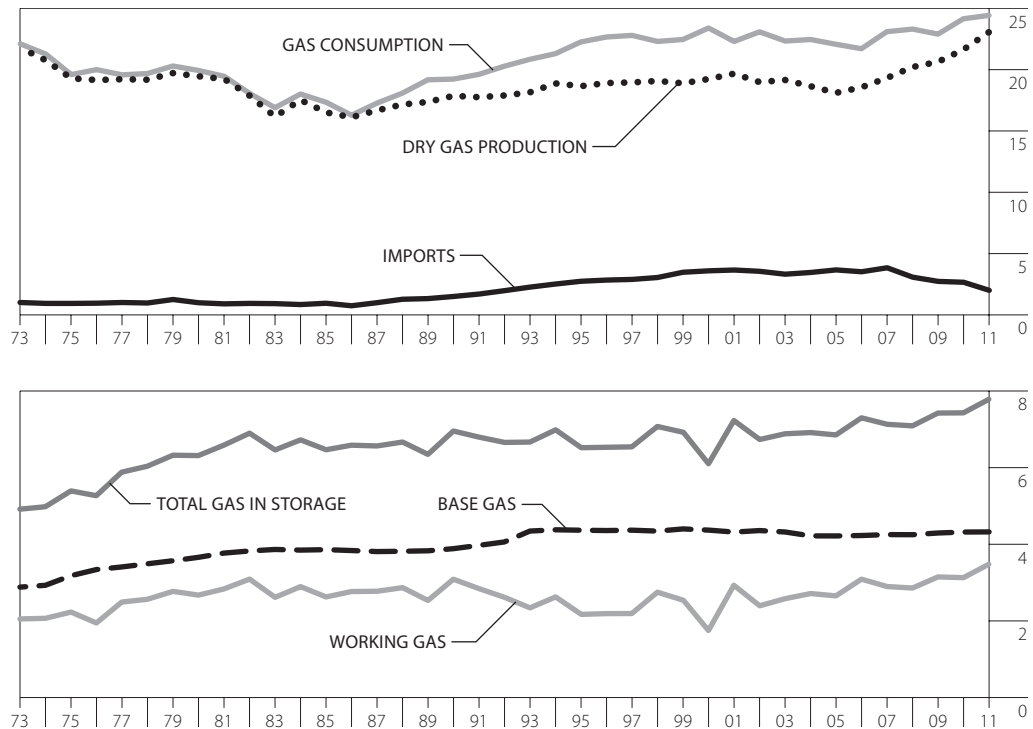
NET IMPORTS
25.2%

Net imports, primarily from Canada, decreased 25.2 percent.

GAS IN STORAGE
11.3%

Working gas^c in storage increased 11.3 percent.

1973-2011 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	21.7	1.0	22.0	2.864	2.034	4.898
1975	19.2	0.9	19.5	3.162	2.212	5.374
1980	19.4	0.9	19.9	3.642	2.655	6.297
1985	16.5	0.9	17.3	3.842	2.607	6.449
1990	17.8	1.4	19.2	3.868	3.068	6.936
1995	18.6	2.7	22.2	4.349	2.153	6.503
2000	19.2	3.5	23.3	4.352	1.719	6.071
2005	18.1	3.6	22.0	4.200	2.635	6.835
2010 ^r	21.3	2.6	23.8	4.301	3.111	7.412
2011 ^p	23.0	1.9	24.4	4.305	3.462	7.767

^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.

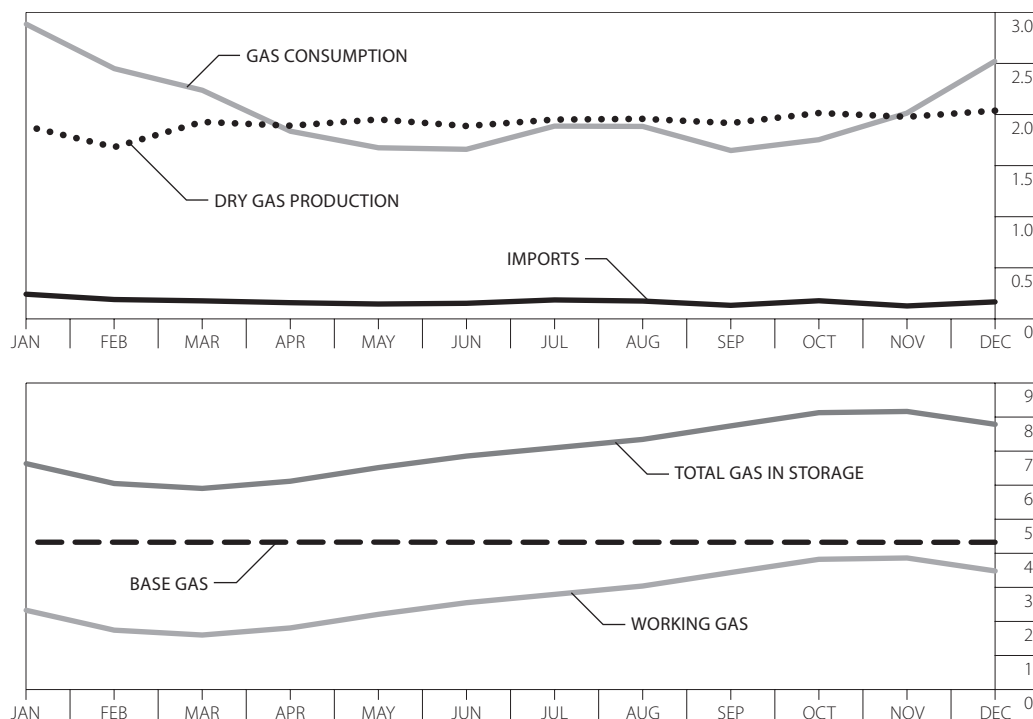
^p Preliminary.

^r Revised.

Source: U.S. Department of Energy, Energy Information Administration, *Monthly Energy Review*, Table 4.1 and 4.4 [DOE/EIA-0035 (2012/05)] (May 2012).
<http://www.eia.gov/totalenergy/data/monthly/> Complete Historical Data at: <http://www.eia.gov/totalenergy/data/annual/>

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

2011 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.

2011	U.S. Dry Natural Gas Production ^a	Net Imports	Consumption	Natural Gas in Underground Storage – Month End		
				Base Gas ^b	Working Gas ^c	Total ^d
January	1.880	0.235	2.878	4.306	2.308	6.614
February	1.674	0.183	2.443	4.306	1.724	6.030
March	1.921	0.170	2.231	4.304	1.581	5.885
April	1.884	0.152	1.830	4.307	1.789	6.096
May	1.945	0.139	1.668	4.308	2.188	6.496
June	1.881	0.146	1.653	4.305	2.530	6.835
July	1.944	0.179	1.880	4.304	2.774	7.078
August	1.951	0.168	1.877	4.304	3.020	7.324
September	1.910	0.126	1.641	4.305	3.416	7.721
October	2.008	0.171	1.747	4.305	3.804	8.109
November	1.971	0.120	2.007	4.302	3.843	8.145
December	2.031	0.160	2.515	4.305	3.462	7.767
Total^d	23.000	1.949	24.370	Average 4.305	2.703	7.008

^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*, Table 4.1 and 4.4 [DOE/EIA-0035 (2012/05)] (May 2012).
<http://www.eia.gov/totalenergy/data/monthly/> Complete Historical Data at: <http://www.eia.gov/totalenergy/data/annual/>

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

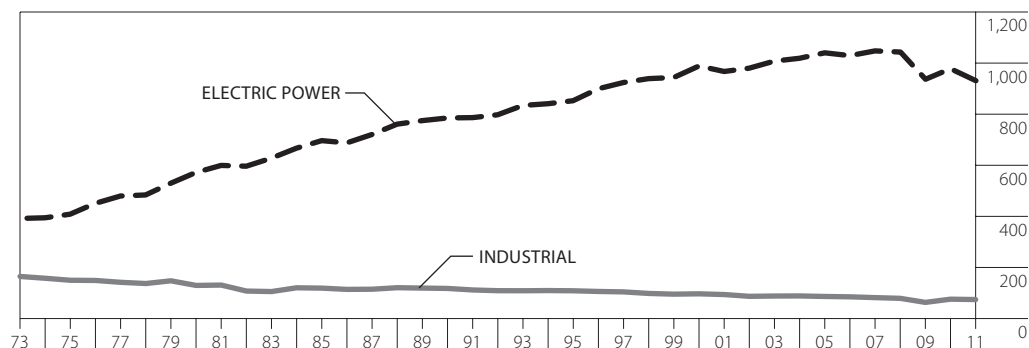
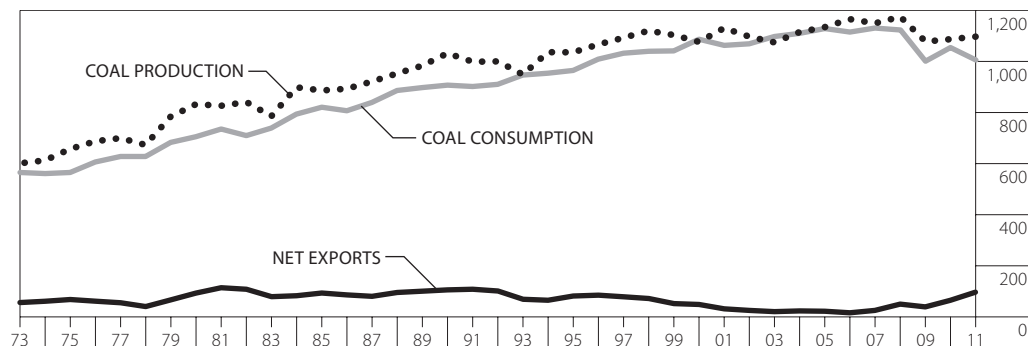
DOMESTIC PRODUCTION EXCEEDS DEMAND

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. 92.6% OF COAL GENERATES ELECTRIC POWER

Of the coal used in the U.S., 92.6 percent goes to generating electric power, but 87.2 percent of Wisconsin's utility electricity is generated with coal. The Industrial sector uses 7.2 percent, with the residential and commercial sectors combined using 0.3 percent of total domestic consumption.

1973-2011 MILLIONS OF TONS



Year	Coal Production	Net Exports	Consumption	Coal Use by Sector		
				Res. & Com. ^a	Industrial	Electric Power
1973 ^r	598.6	53.5	562.6	11.1	162.1	389.2
1975 ^r	654.6	65.4	562.6	9.4	147.2	406.0
1980 ^r	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 ^r	1,073.6	46.0	1,084.1	4.1	94.1	985.8
2005 ^r	1,131.5	19.5	1,126.0	4.7	83.8	1,037.5
2006 ^r	1,162.7	13.4	1,112.3	3.2	82.4	1,026.6
2007 ^r	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 ^r	1,074.9	36.5	997.5	3.2	60.6	933.6
2010 ^r	1,084.4	62.4	1,051.3	3.1	73.2	975.1
2011 ^p	1,094.3	94.2	1,003.1	2.8	71.7	928.6

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

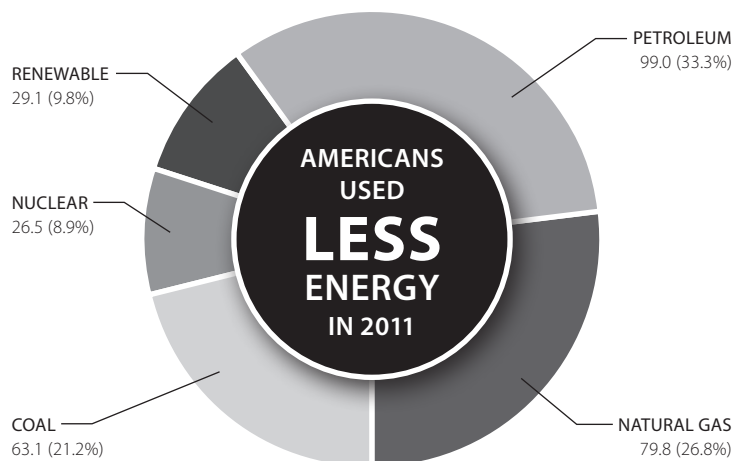
^p Preliminary.

^r Revised.

Source: U.S. Department of Energy, Energy Information Administration, *Monthly Energy Review*, Table 6.1 and 6.2 [DOE/EIA-0035 (2012/05)] (May 2012).
<http://www.eia.gov/totalenergy/data/monthly/> Complete Historical Data at: <http://www.eia.gov/totalenergy/data/annual/>

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

2011 MILLIONS OF BTU AND PERCENT OF TOTAL



U.S. PER CAPITA
ENERGY
CONSUMPTION

1.2%

In 2011, U.S. per capita energy consumption decreased 1.2 percent.

1970-2011 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	29.4%	58.6	18.6%	8.8	2.8%	21.7	6.9%	314.7
1980 ^r	128.0	39.9%	89.1	27.8%	67.9	21.2%	12.1	3.8%	23.9	7.4%	320.9
1985 ^r	112.8	37.2%	74.4	24.5%	73.5	24.2%	17.1	5.6%	25.6	8.4%	303.4
1990 ^r	113.9	35.8%	78.5	24.7%	76.8	24.2%	24.5	7.7%	24.2	7.6%	317.9
1995 ^r	109.9	34.2%	85.1	26.5%	75.4	23.4%	26.6	8.3%	24.6	7.7%	321.7
2000 ^r	116.0	35.2%	84.4	25.6%	80.0	24.2%	27.9	8.4%	21.6	6.6%	330.0
2001 ^r	114.3	36.0%	79.9	25.2%	76.9	24.2%	28.2	8.9%	18.1	5.7%	317.4
2002 ^r	113.3	35.5%	81.7	25.6%	76.2	23.8%	28.3	8.9%	19.9	6.2%	319.4
2003 ^r	113.8	35.8%	78.7	24.8%	76.9	24.2%	27.4	8.6%	20.6	6.5%	317.5
2004 ^r	116.4	36.4%	78.3	24.4%	76.7	24.0%	28.1	8.8%	20.8	6.5%	320.3
2005 ^r	116.1	36.5%	76.4	24.0%	77.1	24.2%	27.6	8.7%	21.1	6.6%	318.3
2006 ^r	113.4	36.2%	74.5	23.8%	75.2	24.0%	27.5	8.8%	22.3	7.1%	312.9
2007 ^r	112.4	35.6%	78.6	24.8%	75.5	23.9%	28.1	8.9%	21.7	6.8%	316.2
2008 ^r	105.3	34.1%	78.4	25.4%	73.6	23.9%	27.7	9.0%	23.6	7.7%	308.6
2009 ^r	100.1	34.2%	76.3	26.1%	64.2	21.9%	27.2	9.3%	24.8	8.5%	292.7
2010	100.9	33.5%	79.4	26.4%	67.2	22.3%	27.3	9.1%	26.2	8.7%	301.0
2011 ^p	99.0	33.3%	79.8	26.8%	63.1	21.2%	26.5	8.9%	29.1	9.8%	297.6

^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.

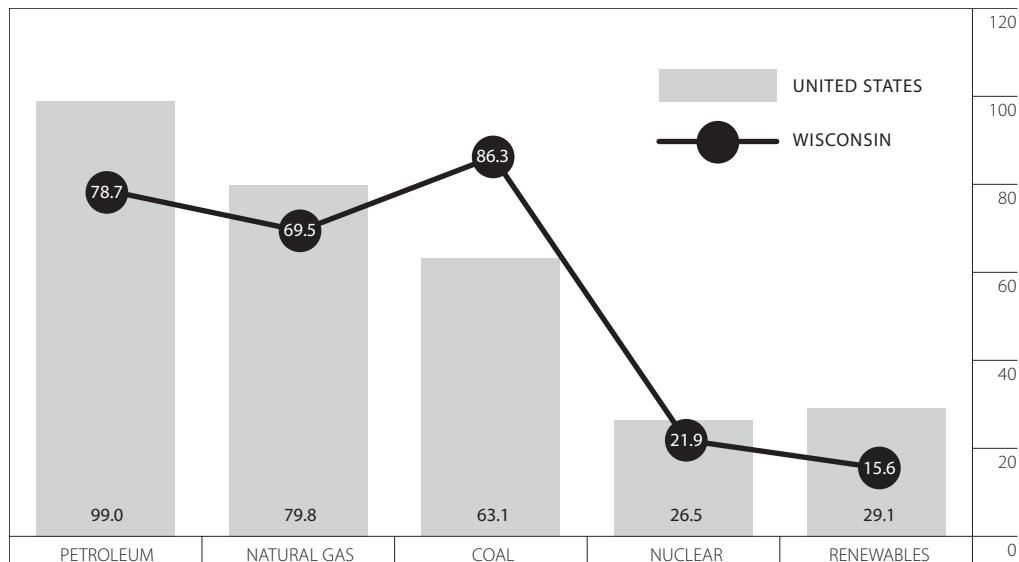
Source: U.S. Department of Energy, Energy Information Administration, *Monthly Energy Review* [DOE/EIA-0035 (2012/03)] (March 2012) Table 3.6. <http://www.eia.doe.gov/emeu/mer>. Annual data in *Annual Energy Review*, Tables 1.3 and 5.12 [DOE/EIA-0384 (2011)] (March 2012) <http://www.eia.doe.gov/emeu/aer>. US Census Bureau, Population Division, Release 3/2012, *Table 1: Preliminary Annual Estimate of the Resident Population of the United States*. <http://www.census.gov/popest/eval-estimates/eval-est2010.html>

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

IN 2011
WISCONSIN
USED
97.2%
AS MUCH ENERGY
PER CAPITA
AS THE
NATIONAL
AVERAGE

In 2011, Wisconsin used 97.2 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.

2011 PER CAPITA RESOURCE ENERGY CONSUMPTION – MILLIONS OF BTU



1970-2011 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	69.7	134.5	32.5	31.1	82.5
1975	78.1	87.3	98.0	276.7	29.7	85.3
1980	75.4	82.1	101.6	188.7	43.5	84.3
1985	77.7	86.2	107.4	145.9	42.8	87.8
1990	79.0	79.8	109.5	101.3	42.4	91.1
1995	82.8	87.2	119.7	86.9	39.2	97.0
2000	80.7	86.9	121.0	82.8	47.5	95.6
2001	81.5	83.3	125.4	81.5	55.1	98.1
2002	82.9	86.1	122.3	86.9	52.7	97.3
2003	82.1	91.1	124.6	87.5	52.2	98.2
2004	80.8	88.2	126.4	82.5	53.6	97.2
2005	77.1	96.6	123.4	53.0	53.0	96.3
2006	77.6	89.2	122.0	85.4	51.9	94.5
2007	78.3	90.4	121.0	88.0	59.4	97.8
2008	80.1	92.8	129.6	83.5	59.7	99.9
2009	79.2	90.1	132.9	88.5	57.1	98.8
2010	79.3	82.7	136.8	92.5	57.1	97.0
2011 ^p	79.5	87.1	136.7	82.6	53.5	97.2

^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.

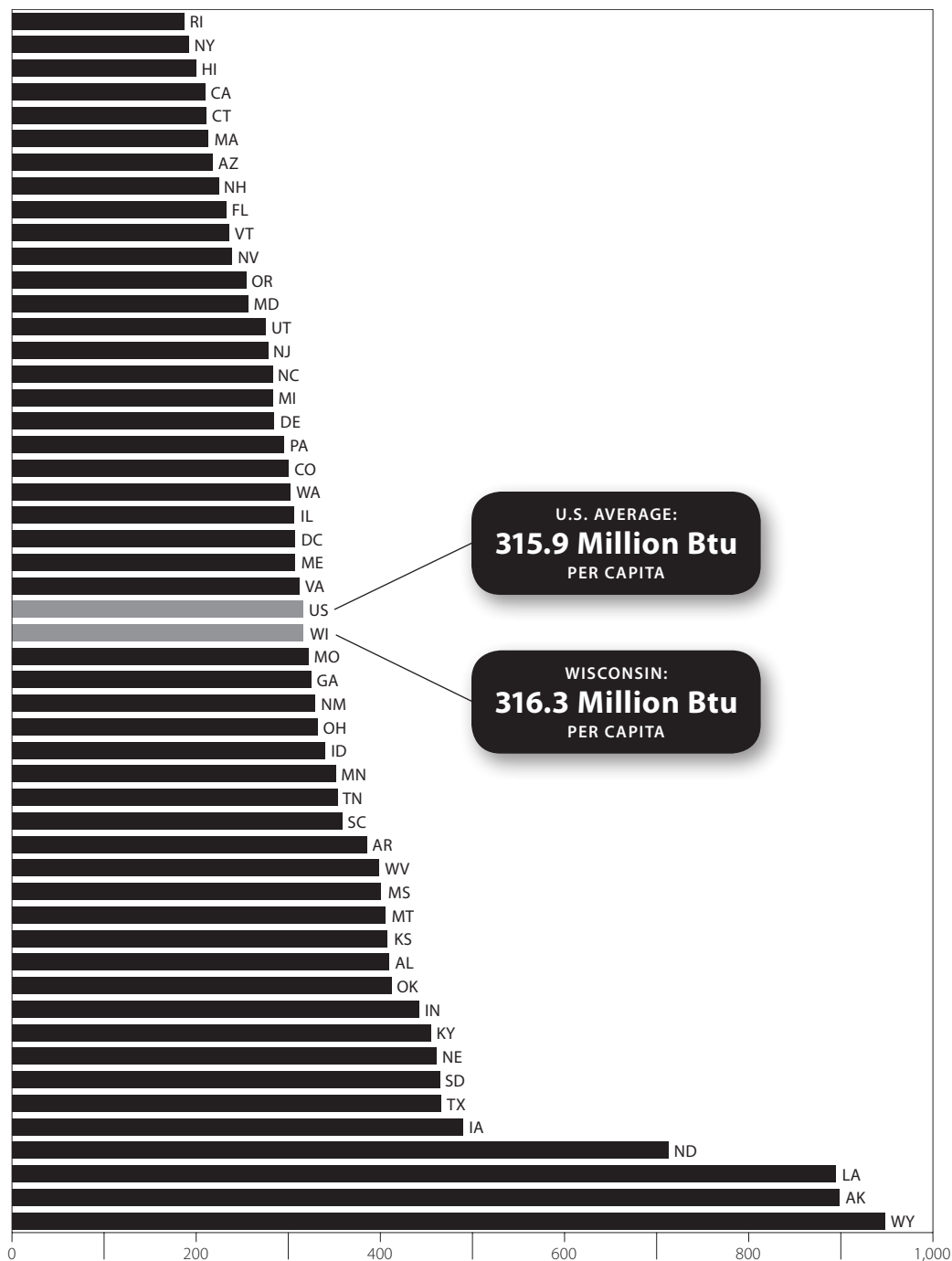
^p Preliminary estimates.

^r Revised.

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

2010 MILLIONS OF BTU PER CAPITA



In 2010, when non-energy uses of petroleum are included (such as road oil, asphalt and lubricants), Wisconsin was the 26th largest state user in the nation, including the District of Columbia, in per capita energy consumption^a. At 316.3 million Btu per capita, Wisconsin's consumption was 100.1 percent of the U.S. consumption at 315.9 million Btu per capita. This is a decrease of 0.10 percent from 2009 when Wisconsin's per capita consumption was 100.2 percent of the U.S. per capita consumption.

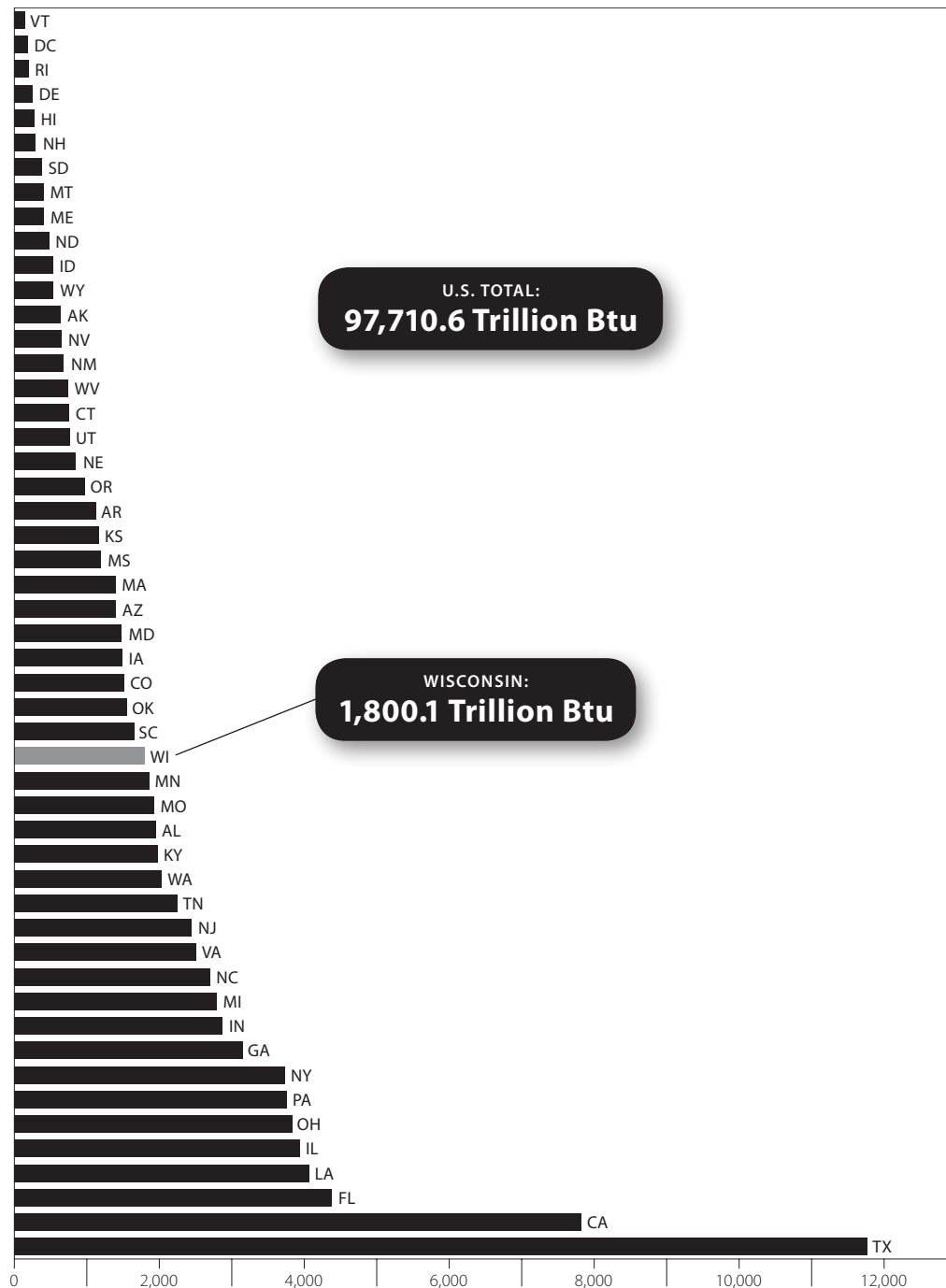
^a Data reported in this table may differ from other tables because of different sources.

Source: U.S. Department of Energy, Energy Information Administration, *State Energy Data 2010: Consumption*, Table C11.
http://www.eia.doe.gov/emeu/states/_seds.html

U.S. Resource Energy Consumption, by State

In 2010, when non-energy uses of petroleum are included (such as road oil, asphalt and lubricants), Wisconsin used 1.8 percent of total energy consumed in the United States^a. This is the same as 2009 when Wisconsin used 1.8 percent of the total U.S. energy consumption.

2010 TRILLIONS OF BTU

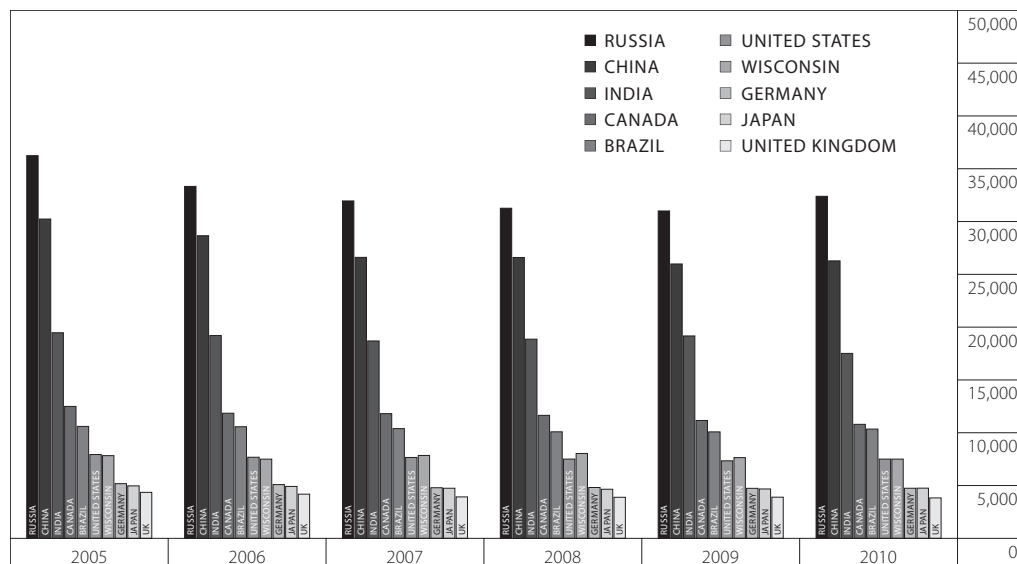


^a Data reported in this table may differ from other tables because of different sources.

Source: U.S. Department of Energy, Energy Information Administration, *State Energy Data 2010: Consumption*, Table C10.
http://www.eia.doe.gov/emeu/states/_seds.html

Primary Energy Intensity, by Country and Region

2005-2010 BTU PER 2005 U.S. DOLLARS



	2005	2006	2007	2008	2009	2010
State						
Wisconsin	7,831	7,500	7,848	8,036	7,645	7,503
Country						
Canada	12,492	11,849	11,807	11,646	11,162	10,796
United States	7,935	7,679	7,659	7,505	7,340	7,505
Brazil	10,601	10,567	10,391	10,087	10,081	10,346
France	5,294	5,180	4,981	5,019	4,862	5,001
Germany	5,177	5,088	4,792	4,815	4,736	4,744
Italy	4,550	4,417	4,289	4,320	4,249	4,380
United Kingdom	4,355	4,184	3,924	3,888	3,898	3,827
Russia	36,238	33,326	31,950	31,260	31,001	32,390
China	30,236	28,656	26,607	26,596	25,982	26,274
India	19,468	19,204	18,691	18,860	19,166	17,513
Japan	4,970	4,914	4,744	4,649	4,675	4,752
Region						
North America	8,285	8,030	7,989	7,841	7,674	7,788
Central and South America	11,817	11,733	11,183	11,109	10,980	11,053
Europe	5,723	5,574	5,369	5,334	5,266	5,347
Eurasia	40,532	36,994	35,287	34,306	33,187	33,679
Middle East	21,152	20,543	19,424	20,064	21,172	20,203
Africa	14,547	13,830	13,528	13,757	13,352	12,843
Asia and Oceania	13,402	13,330	13,051	13,397	13,779	13,996
World	10,021	9,825	9,654	9,751	9,803	9,992

Source: U.S. Department of Energy, Energy Information Administration, International Energy Statistics, (2011)
<http://www.eia.gov/cfapps/ipdbproject/IEDIndex3.cfm>

WORLD WIDE
AVERAGE
10.0
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 below 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 worldwide average is 10.0 kBtu/\$GDP.

The United States and Wisconsin are more efficient than the world at 7.5 kBtu/\$GDP.

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 19.2 percent.

Developing nations such as Russia (5.7 percent), China (19.8 percent) and India (4.3 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.

2010 QUADRILLION BTUs AND BILLIONS OF 2005 U.S. DOLLARS

	2010		Gross Domestic Product ^a		Primary Energy Intensity
	Quadrillion Btu	Percent of Wold Total	Billions of 2005 U. S. Dollars	Percent of Wold Total	Btu per 2005 U. S. Dollars
Country					
Brazil	11.30	2.2%	1,092	2.1%	10,346
Canada	13.00	2.5%	1,204	2.4%	10,796
China	100.88	19.8%	3,840	7.5%	26,274
France	11.03	2.2%	2,206	4.3%	5,001
Germany	13.94	2.7%	2,938	5.8%	4,744
India	21.92	4.3%	1,252	2.4%	17,513
Italy	7.63	1.5%	1,742	3.4%	4,380
Japan	21.77	4.3%	4,581	9.0%	4,752
Russia	29.32	5.7%	905	1.8%	32,390
United Kingdom	8.91	1.7%	2,328	4.6%	3,827
United States	98.04	19.2%	13,063	25.6%	7,505
Region					
Africa	16.33	3.2%	1,271	2.5%	12,843
Asia and Oceania	193.62	37.9%	13,834	27.1%	13,996
Central and South America	26.87	5.3%	2,431	4.8%	11,053
Eurasia	42.84	8.4%	1,272	2.5%	33,679
Europe	83.82	16.4%	15,675	30.7%	5,347
Middle East	28.73	5.6%	1,422	2.8%	20,203
North America	118.35	23.2%	15,197	29.7%	7,788
World	510.55		51,098		9,992

^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, (2011)
<http://www.eia.gov/cfapps/ipdbproject/IEDIndex3.cfm>.

CHAPTER 6

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

Wisconsin is a National Leader in Alternative Fueled Vehicles



Wisconsin has a long history of support for efforts around alternative fueled vehicles and the development of the supporting infrastructure. The portfolio of alternative fuels used for transportation in the state includes: ethanol, blended with gasoline to produce either E10 or E85; biodiesel; natural gas, which can be compressed (CNG), liquefied (LNG) or biogas (bioCNG); propane; and electricity.

In 2009, the US Department of Energy awarded Wisconsin \$15 million for the Clean Transportation Program—a statewide effort to

increase the deployment of alternative fueled vehicles. This effort helped to fund municipalities, state agencies and private business to purchase vehicles and install re-fueling stations. Overall, 377 vehicles were purchased with 22 public and private refueling sites, displacing more than 2.26 million gallons of conventional fossil-fuel gasoline and diesel.

Currently, Wisconsin is focusing alternative fuel efforts on compressed natural gas (CNG) and compressed renewable natural gas (bioCNG). Low prices of natural gas across the country have spurred Wisconsin-based fleets to incorporate CNG vehicles, seeing significant savings in fuel costs and reductions in emissions.

In addition to displacing imported fossil fuels and reducing emissions, alternative fuels provide economic benefit to the United States through the consumption of domestically-produced fuels such as ethanol and natural gas.



Focus on CNG

Wisconsin is home to 51 public and private CNG refueling stations, with one new station opening every three weeks, on average.

In calendar year 2012, Wisconsinites consumed 1,421,804 gasoline gallon equivalents (GGEs) for transportation. In 2013, this number increased by 156% to 3,646,398 GGEs.

Wisconsin has invested a total of \$8,863,340 on CNG for transportation in federal energy program funding for 177 vehicles (\$3,677,598) and 14 refueling stations (\$5,185,742). Of the CNG refueling stations, two are bioCNG. While conventional CNG is a fossil fuel, bioCNG is sourced from a biodigester, a waste water treatment facility, or landfill. The Dane County landfill and the the Janesville waste water treatment plant provide bioCNG refueling.

Wisconsin Energy Prices

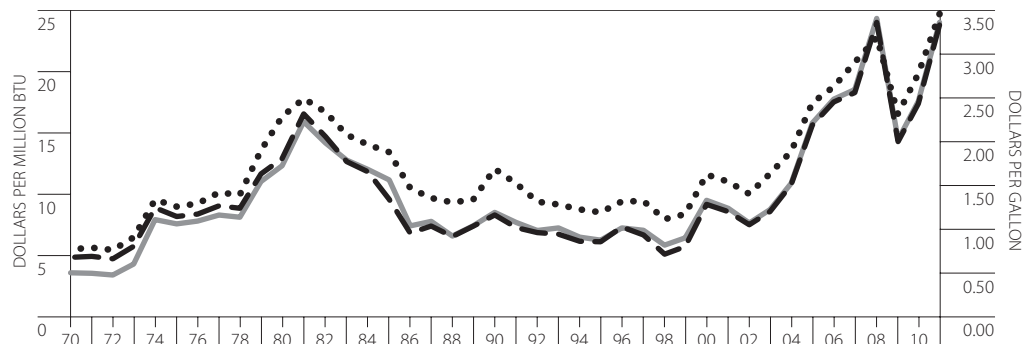
.....
RESIDENTIAL

COMMERCIAL

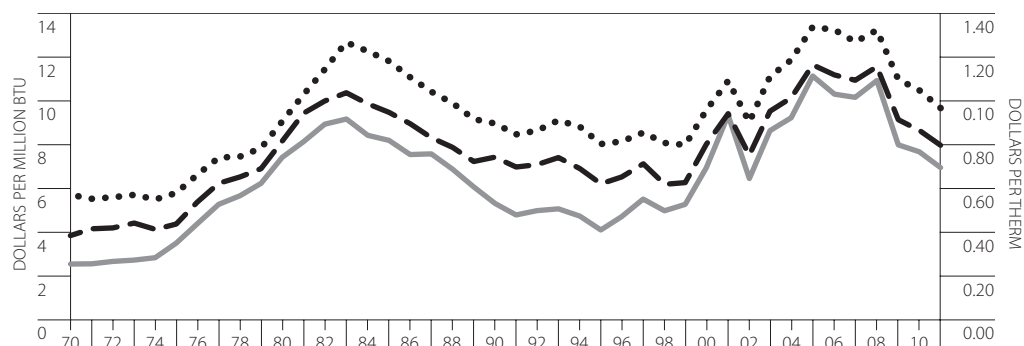
—————
INDUSTRIAL

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 2011 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 adjusted.

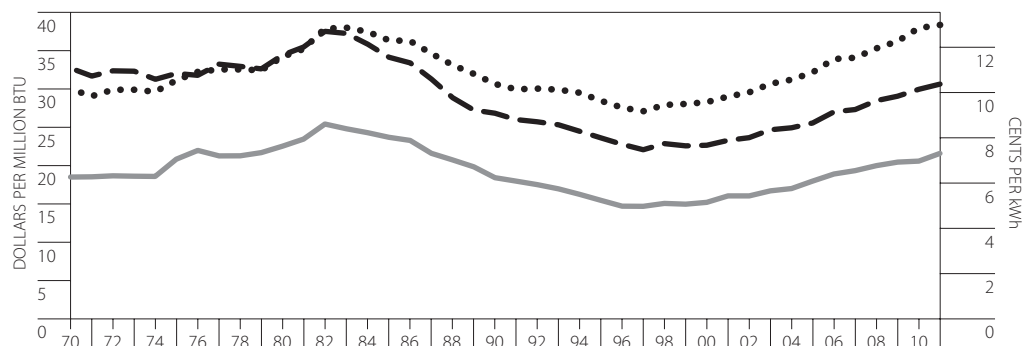
1970-2011 DISTILLATE PRICES (2011 DOLLARS)



1970-2011 NATURAL GAS PRICES (2011 DOLLARS)



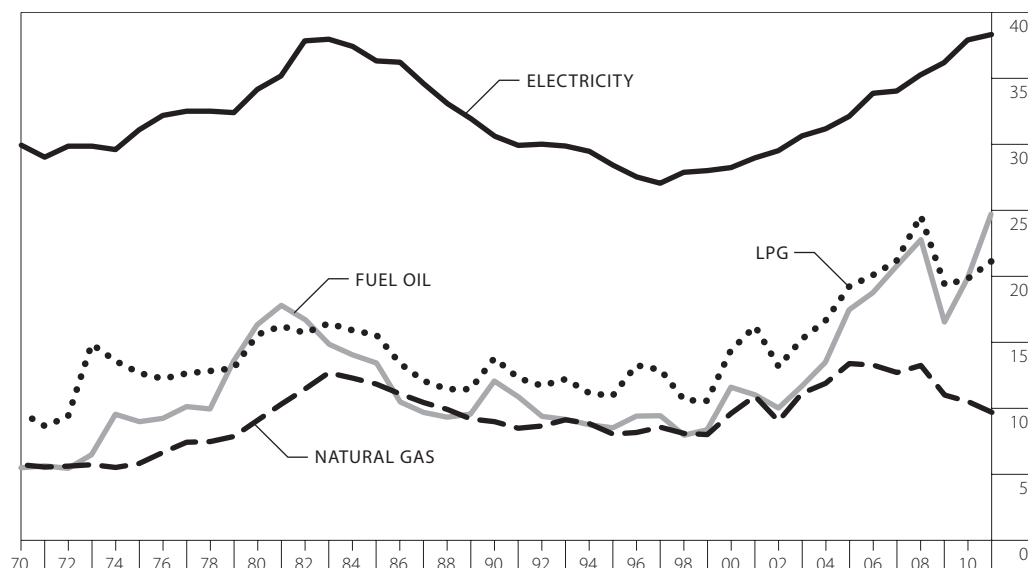
1970-2011 ELECTRICITY PRICES (2011 DOLLARS)



Source: Wisconsin State Energy Office.

Wisconsin Residential Energy Prices, by Type of Fuel

1970-2011 DOLLARS PER MILLION BTU (2011 DOLLARS)



REAL PRICE
IN 2011 DOLLARS

FUEL OIL

24.6%

LPG

6.7%

ELECTRICITY

1.1%

In 2011, the real prices (2011 dollars) of residential energy fuels increased for fuel oil and liquefied petroleum gas (LPG) by 24.6 and 6.7 percent respectively. Electricity prices increased by 1.1 percent.

1970-2011 DOLLARS PER MILLION BTU

Year	Current Dollars				2011 Dollars ^a			
	Fuel Oil	LPG	Natural Gas	Electricity	Fuel Oil	LPG	Natural Gas	Electricity
1970	1.17	2.07	1.22	6.42	5.45	9.64	5.68	29.89
1975	2.65	3.74	1.71	9.20	8.94	12.62	5.77	31.05
1980	6.87	6.55	3.81	14.39	16.30	15.54	9.04	34.12
1985	7.28	8.43	6.41	19.72	13.39	15.51	11.79	36.27
1990	7.65	8.75	5.70	19.48	12.00	13.73	8.94	30.57
1995	6.10	7.84	5.76	20.42	8.47	10.89	8.00	28.37
2000	9.03	11.22	7.48	22.06	11.54	14.34	9.56	28.19
2005	15.37	16.92	11.77	28.30	17.43	19.18	13.34	32.08
2006	17.04	18.26	12.04	30.79	18.72	20.05	13.22	33.82
2007	19.43	19.80	11.86	31.85	20.73	21.13	12.66	33.99
2008	21.73	23.43	12.63	33.72	22.68	24.46	13.19	35.21
2009	15.87	18.67	10.61	34.98	16.40	19.29	10.96	36.14
2010 ^r	19.40	19.36	10.24	37.06	19.81	19.77	10.46	37.86
2011 ^p	24.69	21.09	9.65	38.27	24.69	21.09	9.65	38.27

^a 2011 dollar values computed with Gross National Product Implicit Price Deflator. See the last page in this chapter with the 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 State Energy Office, periodic telephone surveys of fuel oil and LP gas distributors and natural gas and electricity price monitoring reports (2001-2011); American Gas Association, *Gas Facts* (1971-2001); Edison Electric Institute, *Statistical Year Book* (1971-2003); Public Service Commission of Wisconsin, PSC AF 2, Docket 05-GF-159 (2001-2011); U.S. Department of Energy/Energy Information Administration, *Natural Gas Annual* [DOE/EIA-0131(12)] (March 2012).

REAL PRICE
IN 2011 DOLLARS

NATURAL GAS

7.7%

Natural gas decreased by 7.7 percent. The last four columns in the table show the prices after adjusting for inflation.

In 2011 dollars, natural gas prices have decreased by 27.7 percent over the 2005 peak price of \$13.34/MMBtu. The 2011 electric price continue a trend of increasing prices since 1997.

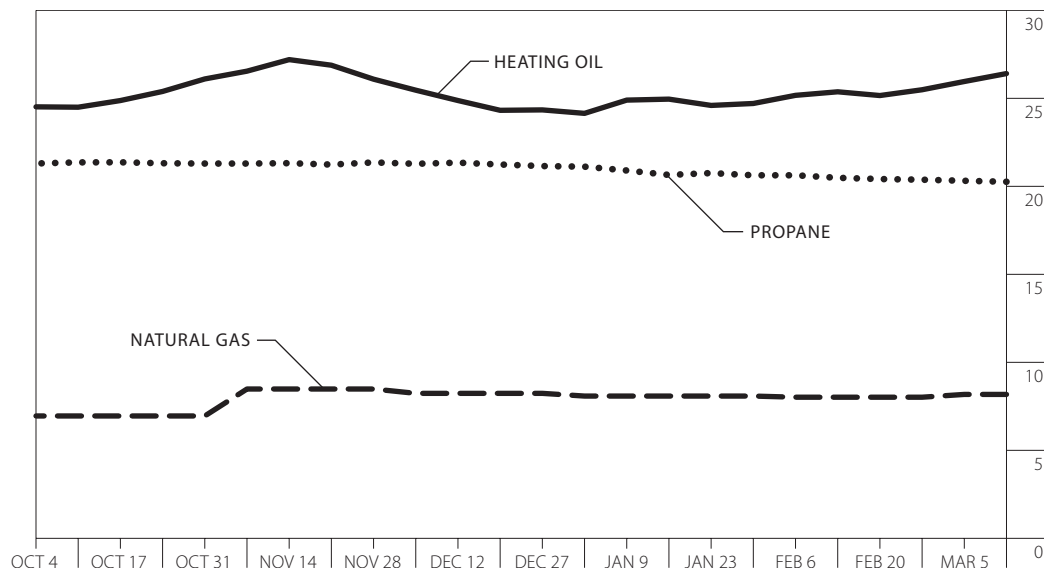
Wisconsin Residential Energy Prices, by Type of Fuel, Winter Heating Season

For the 2011-2012 winter heating season, propane prices peaked at the beginning of the heating season in October, while heating oil and natural gas prices peaked one month later in November.

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).

2011-2012 DOLLARS PER MILLION BTU



2011-2012 DOLLARS PER GALLON AND DOLLARS PER MILLION BTU

Date 2011-2012	Heating Oil ^a		Propane ^b		Natural Gas
	\$/Gallon	\$/MMBtu	\$/Gallon	\$/MMBtu	\$/MMBtu
Oct. 4, 2011	3.40	24.52	2.03	21.30	6.95
Oct. 17, 2011	3.45	24.87	2.04	21.37	6.95
Oct. 31, 2011	3.62	26.10	2.03	21.29	6.95
Nov. 14, 2011	3.77	27.20	2.04	21.32	8.48
Nov. 28, 2011	3.62	26.09	2.04	21.36	8.48
Dec. 12, 2011	3.45	24.88	2.04	21.34	8.24
Dec. 27, 2011	3.38	24.34	2.02	21.15	8.24
Jan. 9, 2012	3.45	24.90	2.00	20.90	8.08
Jan. 23, 2012	3.41	24.60	1.98	20.75	8.08
Feb. 6, 2012	3.49	25.17	1.97	20.63	8.02
Feb. 20, 2012	3.49	25.16	1.95	20.41	8.02
Mar. 5, 2012	3.60	25.96	1.94	20.32	8.18
Average Price for the Heating Season	3.51	25.33	2.00	20.97	7.94

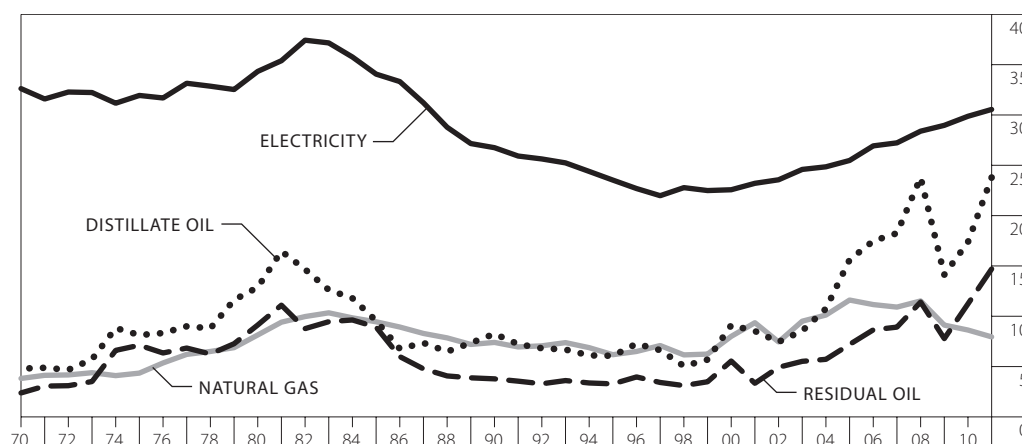
^a Heating Oil contains 0.138690 MMBtu/gallon.

^b Propane contains 0.095475 MMBtu/gallon.

Source: Telephone survey of energy retailers conducted by the Wisconsin State Energy Office throughout the winter heating season, starting October 4, 2011 and ending March 12, 2012; Wisconsin Natural Gas utility websites and public pricing information (2009-2012).

Wisconsin Commercial Energy Prices, by Type of Fuel

1970-2011 DOLLARS PER MILLION BTU (2011 DOLLARS)



1970-2011 DOLLARS PER MILLION BTU

Year	Current Dollars				2011 Dollars ^a			
	Distillate Oil ^c	Residual Oil ^{b,c}	Natural Gas	Electricity	Distillate Oil ^c	Residual Oil ^{b,c}	Natural Gas	Electricity
1970	1.03	0.51	0.82	7.00	4.80	2.38	3.82	32.62
1975	2.41	2.11	1.29	9.46	8.13	7.12	4.35	31.94
1980	5.43	3.85	3.43	14.47	12.88	9.13	8.14	34.33
1982	7.17	4.29	4.88	18.31	14.66	8.77	9.97	37.43
1985	5.19	4.85	5.14	18.52	9.55	8.92	9.45	34.06
1990	5.26	2.41	4.72	17.05	8.25	3.78	7.40	26.75
1995	4.37	2.36	4.45	16.94	6.07	3.28	6.18	23.53
2000	7.13	4.34	6.26	17.67	9.11	5.55	8.00	22.57
2005	13.77	6.35	10.24	22.47	15.61	7.20	11.61	25.48
2010 ^e	17.01	11.00	8.45	29.24	17.37	11.23	8.63	29.87
2011 ^{p,e}	23.79	14.70	7.95	30.55	23.79	14.70	7.95	30.55

^a 2011 dollar values computed with Gross National Product Implicit Price Deflator. See the last page in this chapter with the table on price indices.

^b Beginning in 2009, the residual fuel oil 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).

^c Beginning in 2011, the distillate oil price is estimated based on the refiner retail price in Wisconsin. The price for residual oil is estimated based on refiner retail prices for the United States. The reports previously used by the Wisconsin SEO were suspended as part of EIA's response to the U.S. budget sequester.

^e Estimate.

^p Preliminary estimates.

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(12)] (March 2012); *Natural Gas Monthly*, (1994-2012) [DOE/EIA-0130(2012/03)] (March 2012); *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 No. 2 Distillate Retail Sales by Refiners* (2011); *U.S. Residual Fuel Oil Sales by Refiners* (2011).

**REAL PRICE
IN 2011 DOLLARS**

DISTILLATE OIL

37.0%

RESIDUAL OIL

30.9%

ELECTRICITY

2.3%

In 2011, the real price of all fuels (in 2011 dollars) except natural gas increased: distillate oil (37.0 percent), residual oil (30.9 percent) and electricity (2.3 percent).

**REAL PRICE
IN 2011 DOLLARS**

NATURAL GAS

7.9%

The real price of natural gas decreased by 7.9 percent. Electricity, the major energy expense in the commercial sector, is 18.4 percent lower than its 1982 peak price, adjusted for inflation.

Wisconsin Industrial Energy Prices, by Type of Fuel

REAL PRICE
IN 2011 DOLLARS

COAL
0.9%
DISTILLATE OIL
36.7%
RESIDUAL OIL
30.9%
ELECTRICITY
4.9%

In 2011, the real prices of all industrial fuels, except natural gas, increased. Coal increased by 0.9 percent, distillate oil by 36.7 percent, residual oil by 30.9 percent, and electricity by 4.9 percent, over 2010.

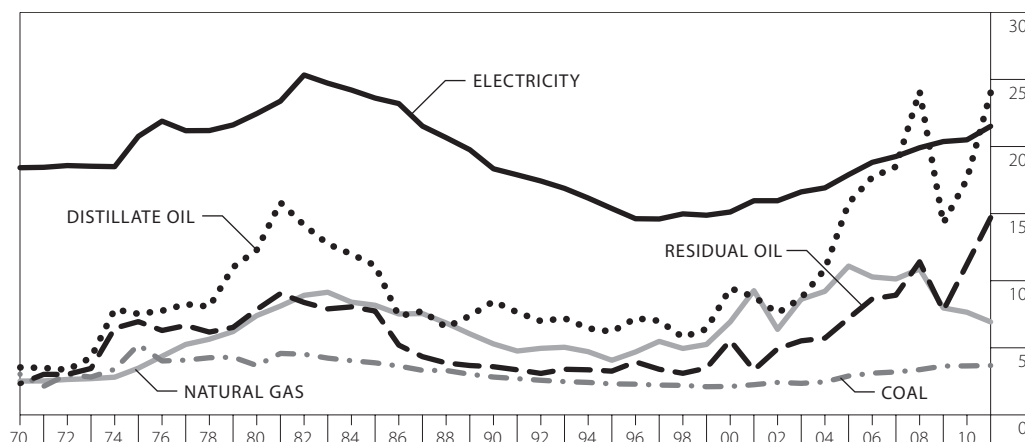
REAL PRICE
IN 2011 DOLLARS

NATURAL GAS
9.4%

The price for natural gas dropped by 9.4 percent.

The real price of coal and electricity are 19.6 and 15.1 percent lower than their respective 1981 and 1982 price peaks, adjusted for inflation.

1970-2011 DOLLARS PER MILLION BTU (2011 DOLLARS)



1970-2011 DOLLARS PER MILLION BTU

Year	Current Dollars					2011 Dollars ^a				
	Distillate Oil ^c	Residual Oil ^{b,c}	Natural Gas	Coal	Electricity	Distillate Oil ^c	Residual Oil ^{b,c}	Natural Gas	Coal	Electricity
1970	0.76	0.50	0.54	0.65	3.96	3.54	2.33	2.52	3.03	18.42
1975	2.23	2.06	1.03	1.55	6.15	7.53	6.95	3.48	5.23	20.76
1980	5.18	3.31	3.12	1.55	9.46	12.29	7.85	7.40	3.68	22.45
1981	7.30	4.17	3.74	2.11	10.78	15.83	9.04	8.11	4.58	23.38
1982	6.92	4.10	4.36	2.21	12.39	14.14	8.38	8.91	4.52	25.33
1985	6.05	4.21	4.44	2.11	12.83	11.13	7.74	8.17	3.88	23.61
1990	5.39	2.29	3.37	1.80	11.69	8.46	3.59	5.29	2.82	18.34
1995	4.46	2.35	2.93	1.66	11.08	6.20	3.26	4.07	2.31	15.38
2000	7.39	4.34	5.42	1.66	11.84	9.44	5.55	6.93	2.12	15.12
2005	13.92	6.35	9.78	2.56	15.79	15.78	7.20	11.09	2.90	17.90
2010 ^e	17.20	11.00	7.49	3.57	20.07	17.57	11.23	7.65	3.65	20.50
2011 ^{p,e}	24.01	14.70	6.93	3.68	21.51	24.01	14.70	6.93	3.68	21.51

^a 2011 dollar values computed with Gross National Product Implicit Price Deflator. See the last page in this chapter with the table on price indices.

^b Beginning in 2009, the residual fuel oil 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).

^c Beginning in 2011, the distillate oil price is estimated based on the refiner retail price in Wisconsin. The price for residual oil is estimated based on refiner retail prices for the United States. The reports previously used by the Wisconsin SEO were suspended as part of EIA's response to the U.S. budget sequester.

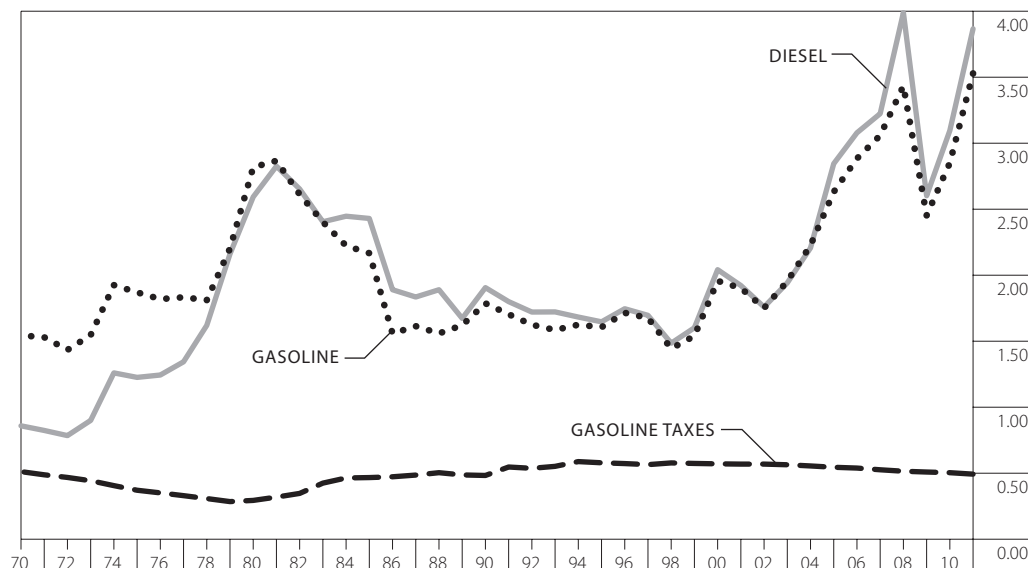
^e Estimate.

^p Preliminary estimates.

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*, (1994-2012) [DOE/EIA-0131(12)] (March 2012); and *Natural Gas Monthly*, (1994-2009) [DOE/EIA-0130(2012/03)] (March 2012); *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 No. 2 Distillate Retail Sales by Refiners* (2011); *U.S. Residual Fuel Oil Sales by Refiners* (2011).

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

1970-2011 DOLLARS PER GALLON (2011 DOLLARS)



1970-2011 DOLLARS PER GALLON

Year	Current Dollars				2011 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		0.185	0.110	1.544	0.859	0.512
1975	0.554		0.363	0.110	1.870	1.226	0.371
1980	1.188		1.093	0.124	2.818	2.593	0.294
1985	1.178		1.321	0.254	2.167	2.430	0.467
1990	1.139		1.215	0.308	1.787	1.906	0.483
1995	1.156	1.181	1.186	0.417	1.606	1.647	0.579
2000	1.532	1.556	1.598	0.447	1.957	2.042	0.571
2005	2.321	2.338	2.510	0.481	2.631	2.845	0.545
2006	2.626	2.639	2.804	0.491	2.884	3.079	0.539
2007	2.867	2.849	3.021	0.493	3.059	3.224	0.526
2008	3.289	3.085	3.821	0.493	3.434	3.989	0.515
2009	2.374	2.384	2.518	0.493	2.453	2.602	0.509
2010	2.791	2.784	3.032	0.493	2.851	3.096	0.504
2011	3.529	3.517	3.867	0.493	3.529	3.867	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 2011, this fee was 3 cents per gallon.

^d Nonattainment Areas are a designation of the federal Environmental Protection Agency. See <http://www.epa.gov/oaqps001/greenbk/anc1.html> for additional information.

Source: Wisconsin Division of the American Automobile Association, *Fuel Gauge Report* (1993-2011).

REAL PRICE
IN 2011 DOLLARS
GASOLINE
23.8%
FROM 2010

The real price of gasoline in 2011 was 23.8 percent higher than in 2010.

Real gasoline prices in 2011 were the highest on record since data for this book were compiled in 1970. The real price of diesel fuel increased by 24.9 percent since 2010.

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 Gasoline Prices Relative to the United States and the Midwest

**IN 2011
WISCONSIN
GAS PRICES
WERE
0.62%
HIGHER THAN
THE MIDWEST
AVERAGE,
AND
0.72%
HIGHER THAN
THE U.S.
NATIONAL
AVERAGE**

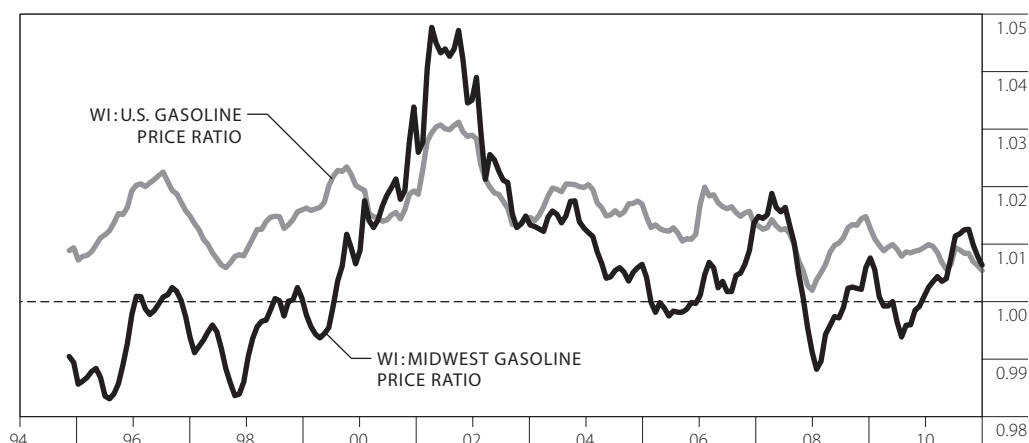
Since 2000, the retail price of conventional gasoline in Wisconsin averages 1.1 percent higher than the national average, and 1.5 percent higher than the Midwest^a.

The difference in cost between Wisconsin and the U.S., and Wisconsin and the Midwest, is highly dependent on the variable cost of gasoline.

These price averages do not include local or national taxes.

This graph shows the relationship of Wisconsin gasoline prices to the U.S. average gasoline prices, and also to gasoline prices in the Midwest. A value above 1 means that the Wisconsin price is more than the U.S. or the Midwest average price, and value below 1 means that the Wisconsin price is less than the U.S. or Midwest average price. A value of 1 means that the Wisconsin price is equal to the national or Midwest average price. These data are presented in a 12-point moving average.

1994-2011 RATIO OF WI TO U.S., AND TO MIDWEST, CONVENTIONAL RETAIL GAS PRICES



1994-2011 RETAIL SALES OF CONVENTIONAL GASOLINE, DOLLARS PER GALLON^b

Year	U.S.	Midwest ^a	Wisconsin
1994	0.722	0.709	0.715
1995	0.748	0.729	0.740
2000	1.066	1.072	1.088
2001	0.992	1.009	1.039
2002	0.922	0.926	0.943
2003	1.107	1.103	1.124
2004	1.389	1.374	1.395
2005	1.803	1.779	1.799
2006	2.083	2.058	2.096
2007	2.310	2.317	2.349
2008	2.746	2.711	2.716
2009	1.858	1.846	1.865
2010	2.287	2.270	2.293
2011	3.015	3.019	3.039

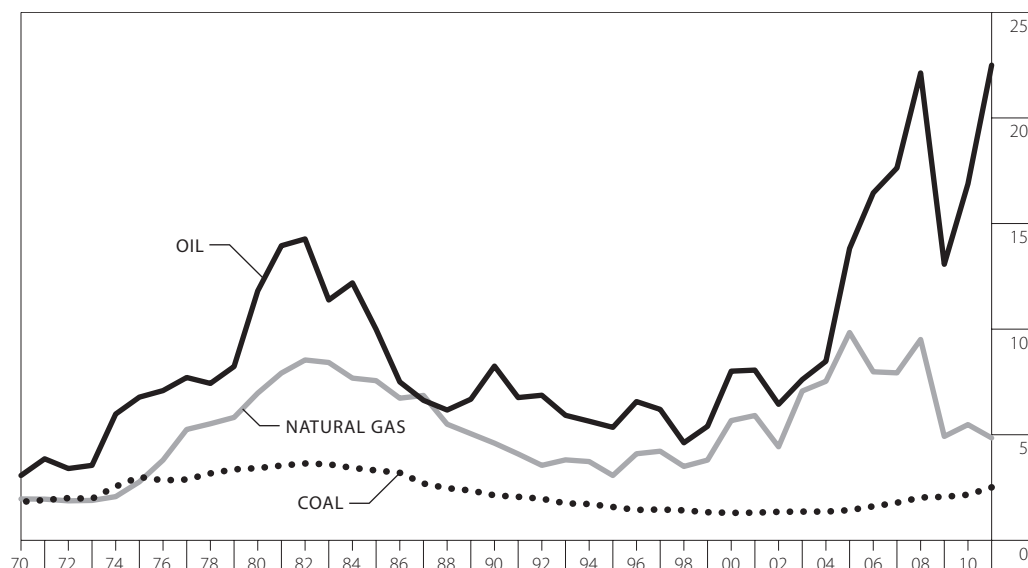
^a Midwestern states in this dataset include all states in the PADD 2 district: Illinois, Indiana, Iowa, Kansas, Kentucky, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, Oklahoma, South Dakota, Tennessee, and Wisconsin.

^b Figures in the table represent averages calculated from monthly prices. The graph plots monthly data. The background dataset is available on request.

Source: Energy Information Administration, *Gasoline Prices by Formulation, Grade, Sales Type* (1994-2010), http://www.eia.gov/dnav/pet/pet_pri_allimg_a_EPM0U_PTA_dpgal_m.htm; Energy Information Administration, *Gasoline and Diesel Fuel Update* (2011) <http://www.eia.gov/petroleum/gasdiesel/>.

Wisconsin Electric Utility Average Costs of Fuel

1970-2011 DOLLARS PER MILLION BTU (2011 DOLLARS)



1970-2011 DOLLARS PER MILLION BTU

Year	Current Dollars ^{b,c}			2011 Dollars ^a		
	Oil	Natural Gas	Coal	Oil	Natural Gas	Coal
1970	0.66	0.42	0.39	3.07	1.96	1.82
1975	2.01	0.82	0.89	6.78	2.77	3.00
1980	4.98	2.94	1.44	11.81	6.97	3.42
1982	6.98	4.18	1.78	14.27	8.54	3.64
1985	5.43	4.11	1.80	9.99	7.56	3.31
1990	5.26	2.93	1.36	8.25	4.60	2.13
1995	3.85	2.21	1.14	5.35	3.07	1.58
2000	6.27	4.44	1.02	8.01	5.67	1.30
2005	12.19	8.68	1.26	13.82	9.84	1.43
2006	14.98	7.27	1.47	16.45	7.98	1.61
2007	16.52	7.43	1.67	17.63	7.93	1.78
2008	21.20	9.11	1.94	22.13	9.51	2.03
2009 ^r	12.65	4.76	1.99	13.07	4.92	2.06
2010	16.53	5.37	2.11	16.88	5.48	2.16
2011 ^p	22.50	4.85	2.51	22.50	4.85	2.51

^a 2011 dollar values computed with Gross National Product Implicit Price Deflator. See the last page in this chapter with the 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(2012/02) (February 2012)] www.eia.gov/cneaf/electricity/epm/epm_sum.html

**REAL
COST
IN 2011
DOLLARS**

COAL

16.5%

OIL

33.3%

**REAL
COST
IN 2011
DOLLARS**

NATURAL GAS

11.6%

In 2011, the real cost (2011 dollars) of coal used as electric utility fuel increased 16.5 percent. The utility cost of natural gas decreased 11.6 percent. Oil prices increased 33.3 percent. Adjusted for inflation, coal prices are 31.0 percent down from their peak in 1982. Natural gas prices peaked in 2005. Oil prices peaked in 2011. Coal remains the lowest cost electric utility fossil fuel.

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

WISCONSIN UTILITY COAL HAS

65%

LESS SULFUR AND
COSTS

3.6%

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

Wisconsin utility coal has 65 percent less sulfur and costs 3.6 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 2011, the average Wisconsin coal cost, in cents per million Btu, increased 15.2 percent, while sulphur content increased 13.5 percent.

2011

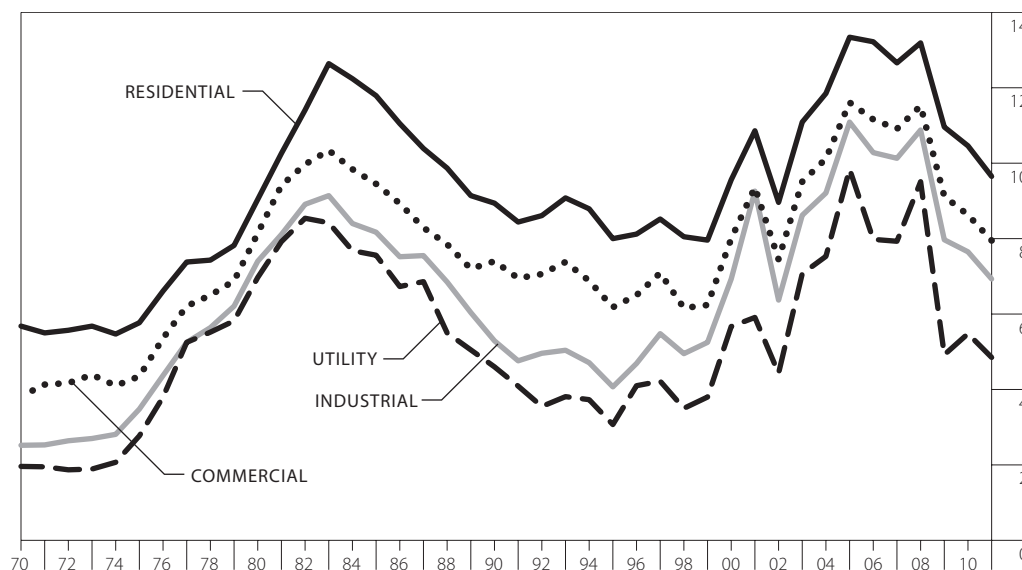
Plant	Consumption Thousand Tons	Average Btu Per Pound	Average Cents Per Million Btu	Average Dollars Per Ton	Average Percent Sulfur ^a
Dairyland Power Cooperative	1,854	8,697	271.6	47.24	0.57%
Alma - Madgett	1,311	8,714	263.2	45.87	0.53%
Genoa 3	543	8,657	291.9	50.54	0.65%
Manitowoc Public Utilities	109	13,485	168.3	45.38	1.41%
Manitowoc	109	13,485	168.3	45.38	1.41%
Northern States Power Co.	37	8,432	304.7	51.39	0.20%
Bay Front	37	8,432	304.7	51.39	0.20%
Wisconsin Electric Power Co.	10,254	9,407	264.0	49.67	0.52%
Elm Road	1,436	13,006	329.6	85.74	0.02%
Oak Creek	2,919	8,741	259.4	45.35	0.21%
Pleasant Prairie	4,089	8,353	206.9	34.56	0.32%
Presque Isle	1,402	9,519	256.3	48.80	0.26%
Valley	408	11,687	462.1	108.01	0.46%
Wisconsin Power and Light Co.	7,588	8,572	209.4	35.89	0.30%
Columbia	4,361	8,480	176.1	29.86	0.31%
Edgewater	2,658	8,483	253.1	42.94	0.29%
Nelson Dewey	569	9,690	254.1	49.24	0.33%
Wisconsin Public Service Corp.	3,966	8,659	276.5	47.88	0.27%
Pulliam	578	8,389	290.1	48.67	0.33%
Weston	3,388	8,705	274.3	47.75	0.26%
Wisconsin	23,807	8,978	249.4	44.78	0.42%
United States	688,436	9,897	240.7	47.65	1.20%

^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/annlreport/default.aspx>; Dairyland Power Cooperative, Rural Utility Service (RUS) report for 2011 (April 2012).

Wisconsin Natural Gas Prices, by Economic Sector

1970-2011 DOLLARS PER MILLION BTU (2011 DOLLARS)



**IN 2011
NATURAL GAS
PRICES
DECREASED IN
ALL
SECTORS**

In 2011, natural gas prices decreased in all sectors. On average, the price decreased 6.9 percent.

1970-2011 DOLLARS PER MILLION BTU

Year	Current Dollars					2011 Dollars				
	Residential	Commercial	Industrial	Utility	Average	Residential	Commercial	Industrial	Utility	Average
1970	1.22	0.82	0.54	0.42	0.79	5.68	3.82	2.52	1.96	3.68
1975	1.71	1.29	1.03	0.82	1.30	5.77	4.35	3.48	2.77	4.39
1980	3.81	3.43	3.12	2.94	3.43	9.04	8.14	7.40	6.97	8.14
1985	6.41	5.14	4.44	4.11	5.37	11.79	9.45	8.17	7.56	9.88
1990	5.70	4.72	3.37	2.93	4.55	8.94	7.40	5.29	4.60	7.14
1995	5.76	4.45	2.93	2.21	4.30	8.00	6.18	4.07	3.07	5.97
2000	7.48	6.26	5.42	4.44	6.27	9.56	8.00	6.93	5.67	8.01
2001	8.69	7.49	7.41	4.73	7.71	10.86	9.36	9.26	5.91	9.63
2002	7.29	6.06	5.18	3.60	6.07	8.96	7.45	6.37	4.43	7.46
2003	9.21	7.90	7.16	5.87	8.00	11.09	9.51	8.62	7.07	9.63
2004	10.12	8.64	7.86	6.43	8.76	11.85	10.12	9.21	7.53	10.26
2005	11.77	10.24	9.78	8.68	10.37	13.34	11.61	11.09	9.84	11.76
2006	12.04	10.16	9.36	7.27	10.19	13.22	11.16	10.28	7.98	11.19
2007	11.86	10.22	9.49	7.43	10.17	12.66	10.91	10.13	7.93	10.85
2008	12.63	11.03	10.42	9.11	11.22	13.19	11.52	10.88	9.51	11.71
2009 ^r	10.61	8.83	7.71	4.76	8.69	10.96	9.12	7.97	4.92	8.98
2010	10.24	8.45	7.49	5.37	8.40	10.46	8.63	7.65	5.48	8.58
2011 ^p	9.65	7.95	6.93	4.85	7.82	9.65	7.95	6.93	4.85	7.82

^p Preliminary estimates.

^r Revised.

Source: Sector-specific pages in this chapter of this publication

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

AVERAGE
PRICE OF
NATURAL GAS
6.7%

The prices of utility gas for all customer classes decreased in 2011. The average price of natural gas in 2011 decreased by 6.7 percent from 2010. 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.

1970-2011 DOLLARS PER MILLION BTU

Year	Residential		Commercial and Industrial			Average
	General	Space Heating	Firm	Interruptible	Space Heating	
1970	1.55	1.22	0.73	0.49	0.92	0.81
1975	2.13	1.71	1.16	1.00	1.40	1.31
1980	4.34	3.81	3.22	3.07	3.49	3.44
1985	7.53	6.41	4.98	4.23	5.28	5.36
1990	6.78	5.70	4.28	3.00	4.49	4.85
1995	7.01	5.76	4.14	2.47	4.63	4.72
1996	7.00	5.96	4.26	3.30	4.75	5.08
1997	7.47	6.36	4.68	3.63	5.17	5.56
1998	7.48	6.08	4.16	3.15	4.74	5.25
1999	7.61	6.10	4.93	2.84	4.71	5.33
2000	8.86	7.48	7.32	4.63	6.05	6.78
2001	10.01	8.69	7.11	5.17	7.27	7.86
2002	8.79	7.29	6.19	3.91	5.92	6.50
2003	10.09	9.14	8.00	5.59	7.75	8.37
2004	11.20	10.03	8.80	6.94	8.56	9.27
2005	13.34	11.77	11.24	8.92	10.18	10.83
2006	13.71	12.04	10.44	8.17	10.09	10.97
2007	13.57	11.86	9.64	7.96	10.12	10.86
2008	14.35	12.63	10.69	9.27	10.95	11.76
2009	11.94	10.55	7.90	5.87	8.78	9.64
2010	11.85	10.20	7.98	5.69	8.32	9.24
2011 ^p	11.07	9.52	7.61	5.47	7.70	8.62

^p Preliminary estimates.

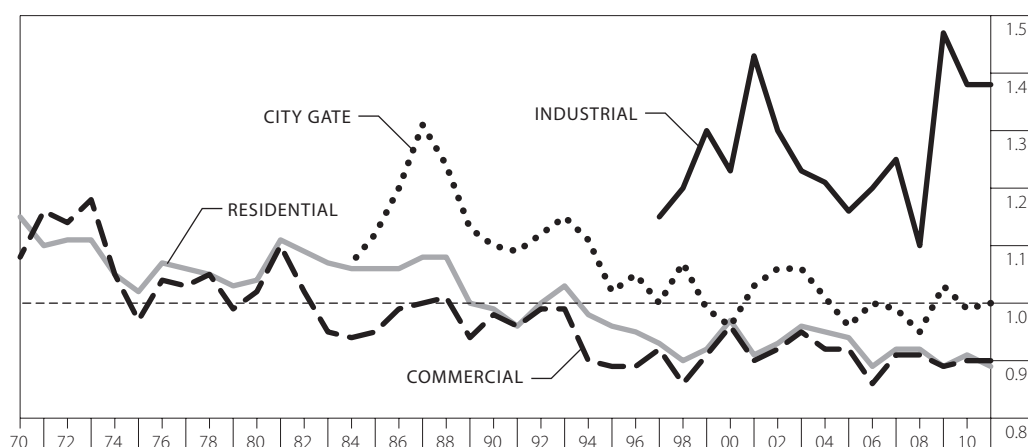
Source: Public Service Commission of Wisconsin, Accounts and Finance Division, *Statistics of Wisconsin Public Utilities*, Bulletin #8 (1971-1993), and from the PSC-AF 2, Docket 05-GF-159 (1994-2011).

Wisconsin Natural Gas Prices Relative to United States Natural Gas Prices, by Sector

The price of natural gas in Wisconsin is lower than the U.S. average price in the Residential and Commercial sectors, but it was 37.96 percent higher than the U.S. average in the Industrial sector in 2011.

The table shows the Wisconsin and United States prices by sector, while the graph shows the relationship (ratio) between these prices (Wisconsin:US). A value above 1 means that the WI price is more than the U.S. average price, and value below 1 means that the WI price is less than the U.S. average price. A value of 1 means that the WI price is equal to the national average price.

1970-2011 RATIO OF WI TO U.S. NATURAL GAS PRICES



1970-2011 WI AND U.S. NATURAL GAS PRICES (DOLLARS PER THOUSAND CUBIC FEET)

Year	WI Natural Gas Price (Dollars Per 1000 Cubic Feet)				U.S. Natural Gas Price (Dollars Per 1000 Cubic Feet)			
	City Gate	Residential	Commercial	Industrial	City Gate	Residential	Commercial	Industrial
1970		1.25	0.83			1.09	0.77	0.37
1975		1.75	1.31			1.71	1.35	0.96
1980		3.83	3.46			3.68	3.39	2.56
1985	4.19	6.47	5.20		3.75	6.12	5.50	3.95
1990	3.34	5.74	4.75		3.03	5.80	4.83	2.93
1995	2.83	5.82	4.50		2.78	6.06	5.05	2.71
2000	4.42	7.55	6.32	5.47	4.62	7.76	6.59	4.45
2005	8.35	11.93	10.38	9.91	8.67	12.70	11.34	8.56
2006	8.57	12.17	10.27	9.46	8.61	13.73	12.00	7.87
2007	8.04	12.02	10.36	9.62	8.16	13.08	11.34	7.68
2008	8.71	12.81	11.18	10.57	9.18	13.89	12.23	9.65
2009	6.70	10.76	8.95	7.82	6.48	12.14	10.06	5.33
2010	6.14	10.34	8.53	7.56	6.18	11.39	9.47	5.49
2011	5.65	9.77	8.03	7.05	5.63	11.03	8.92	5.11

The City Gate is the point where the natural gas pipeline connects with the utility, and represents the price paid by the utility. In 2011, it was the same as the national average. Wisconsin's industrial natural gas prices are 38 percent higher than the national average. Smaller sized industrial customers pay the industrial rate, while larger industrial customers purchase natural gas—as transport gas—directly from the natural gas pipeline companies with a pass-through charge from the utilities.

Commercial customers, such as schools, business and governmental facilities, pay 10 percent less than the national average, while Wisconsin's residential customers using natural gas for appliances and space heating pay 89 percent of the national average. The rates paid by customers vary from month-to-month and can be found on the State Energy Office website.

Source: Energy Information Administration, *Monthly Energy Review*, Table 6.8, (1970-2011), <http://www.eia.gov/totalenergy/data/monthly/#prices>;
Energy Information Administration, Natural Gas Prices by state (1970-2011), http://www.eia.gov/dnav/ng/ng_pri_sum_dcu_SWI_a.htm

Wisconsin Electricity Prices, by Economic Sector

IN 2011
ELECTRICITY
INCREASED IN
ALL
SECTORS

Electricity prices increased across all sectors in 2011.

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.

1970-2011 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	11.56	7.67	10.90	8.84	11.51	9.28	6.51	9.00
2009 ^r	11.92	8.03	11.04	9.24	11.94	9.57	6.73	9.38
2010	12.67	8.30	12.10	9.66	12.65	9.98	6.85	9.78
2011 ^p	13.06	8.76	12.41	10.09	13.06	10.43	7.34	10.23

^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); PSC-AF 1, Docket 05-GF-159 (1994-2011); 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 (2012/02)] (February 2012). http://www.eia.doe.gov/cneaf/electricity/epm/epm_sum.html

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

2011 ELECTRICITY (CENTS PER kWh)

State	Average	Residential	Commercial	Industrial
Wisconsin	10.23	13.06	10.43	7.34
Illinois	9.01	11.81	8.64	6.46
Indiana	8.04	10.06	8.74	6.25
Iowa	7.59	10.50	7.90	5.21
Michigan	10.37	13.12	10.32	7.36
Minnesota	8.68	10.97	8.58	6.51
Ohio	9.05	11.44	9.60	6.21
U.S. Average	9.99	11.80	10.32	6.89

2011 NATURAL GAS (DOLLARS PER 1,000 CUBIC FEET)

State	City Gate ^a	Residential	Commercial	Industrial
Wisconsin	5.65	9.77	8.04	7.01
Illinois	5.09	8.60	8.12	6.69
Indiana	4.99	9.43	7.98	NA
Iowa	NA	9.54	7.58	5.67
Michigan	6.18	10.42	9.13	8.27
Minnesota	5.04	8.60	7.37	5.62
Ohio	NA	10.89	8.55	8.75
U.S. Average	5.62	10.80	8.86	5.02

WISCONSIN'S
AVERAGE
ELECTRICITY PRICE
WAS
2.4%
GREATER THAN THE
NATIONAL
AVERAGE
BUT
2nd
HIGHEST
IN THE MIDWEST

In 2011, Wisconsin's average electricity price was 2.4 percent greater than the national average but the second highest in the Midwest. Wisconsin's commercial and industrial electricity prices were higher than the national averages for the same sectors by 1.1 and 6.5 percent respectively.

Ohio and Michigan lead the Midwest with the highest natural gas prices across all three economic sectors.

^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 (2012/02)] (February 2012) http://www.eia.doe.gov/pub/oil_gas/natural_gas/data_publications/natural_gas_monthly/historical/2010/2010_02/ngm_2010_02.html

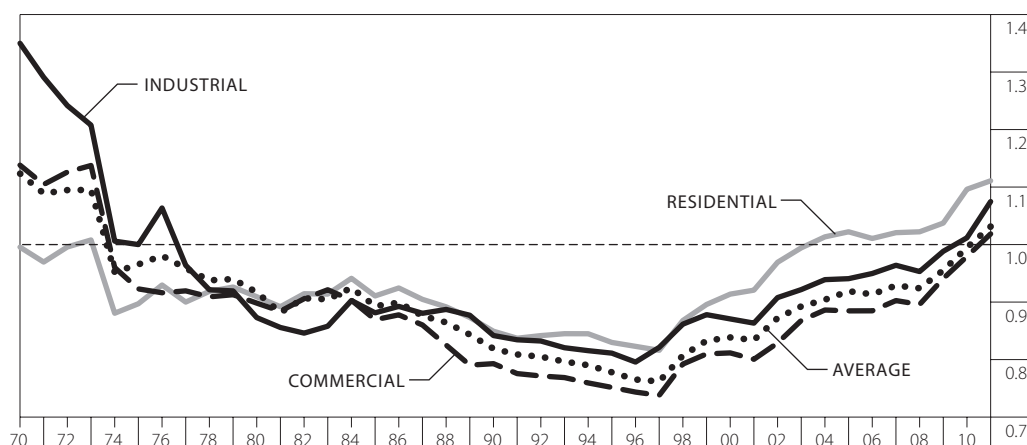
Wisconsin Electricity Prices Relative to United States Electricity Prices, by Sector

The price of electricity in Wisconsin continues to rise, and is now more than the U.S. average price for electricity in all sectors (Residential, Commercial, and Industrial). In 1997, Wisconsin's prices were the farthest below the U.S. average. Since then, electric prices for all sectors have moved closer to the U.S. average. In 2004, the price of electricity in the Residential sector exceeded the national average. In 2011, residential sector prices were 11.1 percent above the national residential sector price.

In 2011, Wisconsin Commercial sector prices exceeded the national commercial price by 1.9 percent; the Industrial sector paid 7.5 percent more than the national industrial average in 2011. Overall, on average, Wisconsin customers paid 3.1 percent more for electricity in 2011 than the national customer.

This graph shows the relationship (ratio) between Wisconsin electric prices and U.S. average electric prices, by sector. A value above 1 means that the WI price is more than the U.S. average price, and value below 1 means that the WI price is less than the U.S. average price. A value of 1 means that the WI price is equal to the national average price.

1970-2011 RATIO OF WI TO U.S. ELECTRICITY PRICES



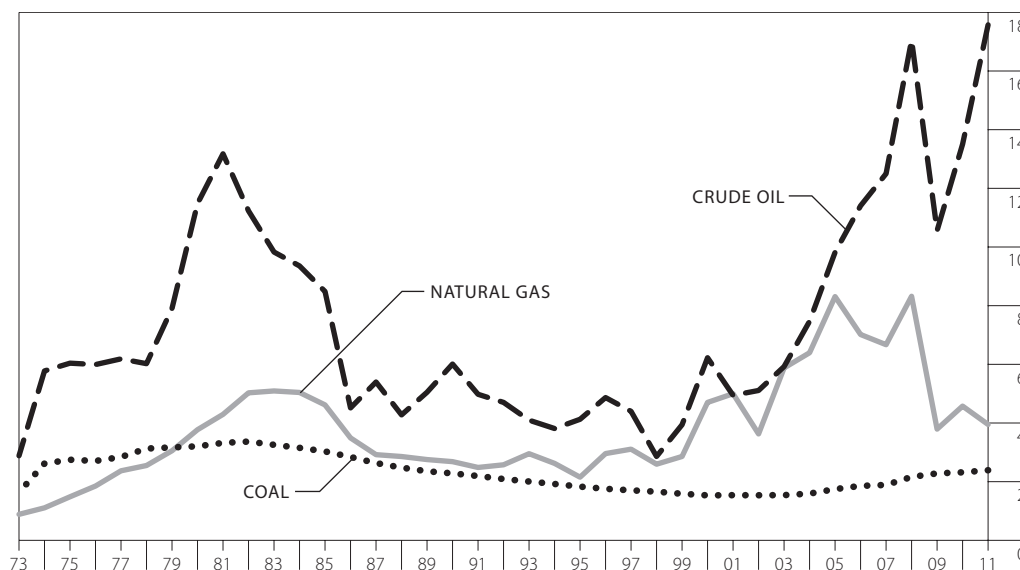
1970-2011 WI AND U.S. ELECTRICITY PRICES (CENTS PER kWh)

Year	WI Electricity Prices (Cents Per kWh)				U.S. Electricity Prices (Cents Per kWh)			
	Residential	Commercial	Industrial	Average (All Sectors)	Residential	Commercial	Industrial	Average (All Sectors)
1970	2.19	2.39	1.35	1.91	2.20	2.10	1.00	1.70
1975	3.14	3.23	2.10	2.80	3.50	3.50	2.10	2.90
1980	4.91	4.94	3.23	4.31	5.40	5.50	3.70	4.70
1985	6.73	6.32	4.38	5.75	7.39	7.27	4.97	6.44
1990	6.65	5.82	3.99	5.38	7.83	7.34	4.74	6.57
1995	6.97	5.78	3.78	5.36	8.40	7.69	4.66	6.89
2000	7.53	6.03	4.04	5.71	8.24	7.43	4.64	6.81
2005	9.66	7.67	5.39	7.48	9.45	8.67	5.73	8.14
2006	10.51	8.37	5.85	8.13	10.40	9.46	6.16	8.90
2007	10.87	8.71	6.16	8.48	10.65	9.65	6.39	9.13
2008	11.51	9.28	6.51	9.00	11.26	10.36	6.83	9.74
2009	11.94	9.57	6.73	9.38	11.51	10.17	6.81	9.82
2010	12.65	9.98	6.85	9.78	11.54	10.19	6.77	9.83
2011	13.02	10.42	7.33	10.21	11.72	10.23	6.82	9.90

Source: Edison Electric Institute, *Statistical Yearbook* (1971-1996); Energy Information Administration, *Average Retail Prices of Electricity*, Table 8.10 (1997-2011) www.eia.gov/totalenergy/data/monthly/#prices; Energy Information Administration, *Average Retail Prices of Electricity, by State* (1970-2011) www.eia.gov/electricity/data/browser/#/topic/.

U.S. Energy Prices

1973-2011 DOLLARS PER MILLION BTU (2010 DOLLARS)



1973-2011 DOLLARS PER MILLION BTU

Year	Current Dollars				2011 Dollars		
	Crude Oil Refiners Cost ^a \$/Barrel	Crude Oil Refiners Cost ^d \$/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	2.88	0.89	1.63
1975	10.38	1.79	0.44	0.81	6.04	1.48	2.75
1980	28.07	4.84	1.59	1.35	11.48	3.77	3.20
1985	26.75	4.61	2.51	1.65	8.48	4.62	3.03
1990	22.22	3.83	1.71	1.46	6.01	2.68	2.28
1995	17.23	2.97	1.55	1.32	4.13	2.15	1.83
2000	28.26	4.87	3.68	1.20	6.23	4.70	1.53
2005	50.24	8.66	7.33	1.54	9.82	8.31	1.75
2010	76.69	13.22	4.48	2.27	13.50	4.58	2.32
2011 ^p	101.93	17.57	3.95	2.39	17.57	3.95	2.39

^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.

^d Assumes 5.8 MMBtu/Barrel.

^p Preliminary estimates.

Source: U.S. Department of Energy, Energy Information Administration, *Monthly Energy Review* Tables 9.1, 9.10 and 9.11 [DOE/EIA-0035(2012/05)] (May 2012); <http://www.eia.gov/totalenergy/data/monthly/>

**REAL
COST
IN 2011
DOLLARS**

CRUDE OIL
30.1%
COAL
3.5%

**REAL
COST
IN 2011
DOLLARS**

NATURAL GAS
13.7%

In 2011, the real cost (2011 dollars) of crude oil increased 30.1 percent and decreased 13.7 percent for natural gas. The cost of coal increased by 3.5 percent.

**COST OF
CRUDE OIL
182.3%**
SINCE 2000

Since 2000, the cost of crude oil has increased by 182.3 percent.

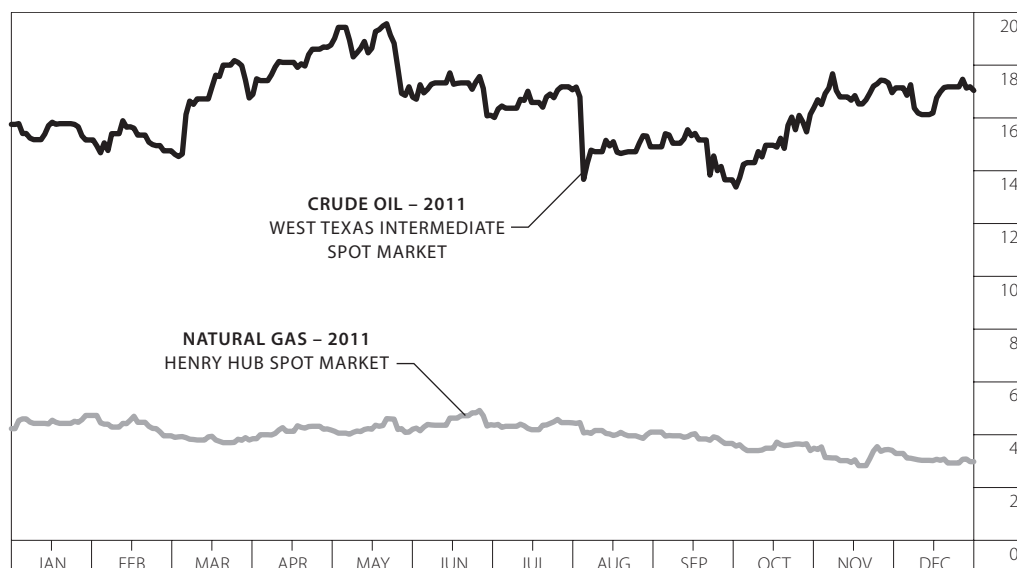
U.S. Spot Market Prices of Crude Oil & Natural Gas

WEST TEXAS
INTERMEDIATE
19.9%

HENRY HUB
8.5%

In 2011, the average West Texas Intermediate crude oil spot market price increased 19.9 percent, while the Henry Hub^b spot market price of natural gas decreased 8.5 percent.

2011 DOLLARS PER MILLION BTU (2011 DOLLARS)^a



2008-2011 DOLLARS PER MILLION BTU

Month	Crude Oil West Texas Intermediate				Natural Gas Henry Hub			
	2008	2009	2010	2011	2008	2009	2010	2011
Jan.	16.03	7.19	13.62	15.44	7.99	5.24	5.81	4.47
Feb.	16.44	6.74	13.21	15.53	8.54	4.51	5.12	4.11
Mar.	18.18	8.27	13.96	17.77	9.42	3.96	4.33	3.98
Apr.	19.41	8.56	14.52	18.89	10.18	3.49	4.03	4.20
May	21.62	10.18	12.88	17.53	11.27	3.83	4.10	4.34
Jun.	23.09	12.01	12.97	16.91	12.69	3.80	4.76	4.60
Jul.	23.01	11.06	13.12	16.77	11.09	3.38	4.61	4.37
Aug.	20.12	12.25	13.04	14.78	8.26	3.14	4.20	4.03
Sep.	17.91	11.97	12.95	14.89	7.63	2.99	3.93	3.93
Oct.	13.22	13.05	14.11	14.76	6.74	4.01	3.48	3.55
Nov.	9.90	13.48	14.49	16.75	6.68	3.70	3.75	3.18
Dec.	7.14	12.82	15.40	16.93	5.86	5.30	4.22	3.12
Average \$/MMBtu	17.17	10.63	13.69	16.41	8.86	3.95	4.36	3.99
Average \$/Barrel	99.60	61.66	79.39	95.18				

^a Graph is plotted with daily 2011 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 (2011); Henry Hub data also from http://www.neo.ne.gov/statshhtml/124_20081203.htm (2008); Bloomberg.com Energy Prices (2008-2011).

National Indices of Price Inflation

1970-2011 ANNUAL RATE OF INFLATION

Year	Gross Domestic Product ^{a,r}		Producer Price Index ^b		Personal Consumption Expenditures ^{c,r}		Consumer Price Index ^d	
1970	24.34	5.3%	36.9	3.7%	23.67	4.7%	38.8	5.7%
1975	33.59	9.4%	58.4	9.2%	32.18	8.4%	53.8	9.1%
1980	47.79	9.1%	89.8	14.1%	46.64	10.7%	82.4	13.5%
1985	61.63	3.0%	103.2	-0.5%	59.88	3.3%	107.6	3.6%
1990	72.26	3.9%	116.3	3.7%	72.18	4.6%	130.7	5.4%
1995	81.61	2.1%	124.7	3.6%	82.08	2.2%	152.4	2.8%
1996	83.16	1.9%	127.7	2.4%	83.86	2.2%	156.9	3.0%
1997	84.63	1.8%	127.6	-0.1%	85.43	1.9%	160.5	2.3%
1998	85.58	1.1%	124.4	-2.5%	86.25	1.0%	163.0	1.6%
1999	86.84	1.5%	125.5	0.9%	87.64	1.6%	166.6	2.2%
2000	88.72	2.2%	132.7	5.7%	89.82	2.5%	172.2	3.4%
2001	90.73	2.3%	134.2	1.1%	91.53	1.9%	177.1	2.8%
2002	92.20	1.6%	131.1	-2.3%	92.78	1.4%	179.9	1.6%
2003	94.14	2.1%	138.1	5.3%	94.66	2.0%	184.0	2.3%
2004	96.79	2.8%	146.7	6.2%	97.12	2.6%	188.9	2.7%
2005	100.00	3.3%	157.4	7.3%	100.00	3.0%	195.3	3.4%
2006	103.23	3.2%	164.7	4.6%	102.72	2.7%	201.6	3.2%
2007	106.23	2.9%	172.6	4.8%	105.50	2.7%	207.3	2.8%
2008	108.58	2.2%	189.6	9.8%	108.94	3.3%	215.3	3.9%
2009	109.73	1.1%	172.9	-8.8%	109.17	0.2%	214.5	-0.4%
2010	110.99	1.1%	184.7	6.8%	111.11	1.8%	218.1	1.7%
2011 ^p	113.36	2.1%	201.0	8.8%	113.85	2.5%	224.9	3.1%

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.

The broadest measure of price inflation is the Gross Domestic Product (GDP) price index. In 2011, the GDP index increased 2.1 percent compared to the 21 year average from 1990 to 2011 of 2.2 percent.

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); Bureau of Labor Statistics, (March 2010), <http://data.bls.gov/cgi-bin/surveymost?cu>.

CHAPTER 7

Wisconsin Expenditures for Energy

Microgrid Provides Setting for Study of Integrating Renewable Energy Sources on the Power Grid

As the number of distributed generation systems—such as commercial and residential solar electric and wind energy—grow across the state and the country, Wisconsin researchers are working to answer questions about safe, seamless and efficient interconnection of these systems into the grid.

For researchers at the Center for Renewable Energy Systems (CRES), the high-bay microgrid lab combines real and simulated power sources capable of reproducing the inherent technical challenges associated with intermittent energy sources.

“We want to be able to create all of the different operating conditions that are associated with renewable energy sources, including high- and low-wind days, bright sunlight and overcast skies, to develop improved techniques that will enable microgrids to adapt more naturally to these fluctuations,” says Tom Jahns, Grainger Professor of Power Electronics and Electrical Machines.

Located at the Wisconsin Energy Institute building on the UW-Madison campus, the high-bay lab is a successful example of partnerships between private industry and public universities. Funded through donations, private funding and the Wisconsin State Energy Office, the CRES is a partnership combining the knowledge and skills of the extensive community of energy, power and control researchers with world-class laboratories including UW-Milwaukee, UW-Madison, Marquette University and the Milwaukee School of Engineering.

The Wisconsin Energy Institute is home to a wide variety of clean energy research—from biofuels to batteries—and home to the Great Lakes Bioenergy Research Center. Across the broad spectrum of energy issues, the WEI is fostering collaboration across disciplines and forging relationships between public and private entities to address large scale energy questions.



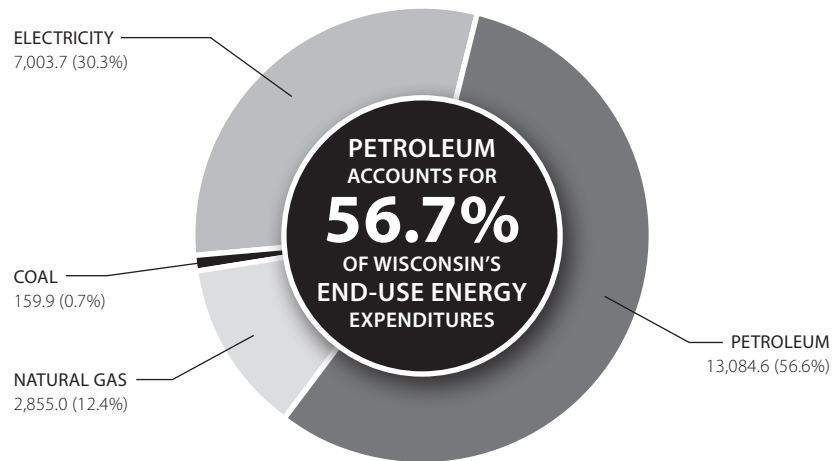
PHOTO BY MATTHEW WISNIEWSKI/WISCONSIN ENERGY INSTITUTE.

Microgrids are distributed generation systems that are designed to operate as self-contained local electrical power grids with a combination of sources and loads. They can operate equally well when they are connected to or disconnected from the utility grid, often incorporating on-site renewable energy sources such as wind turbines and solar panels as well as electrical energy storage systems.

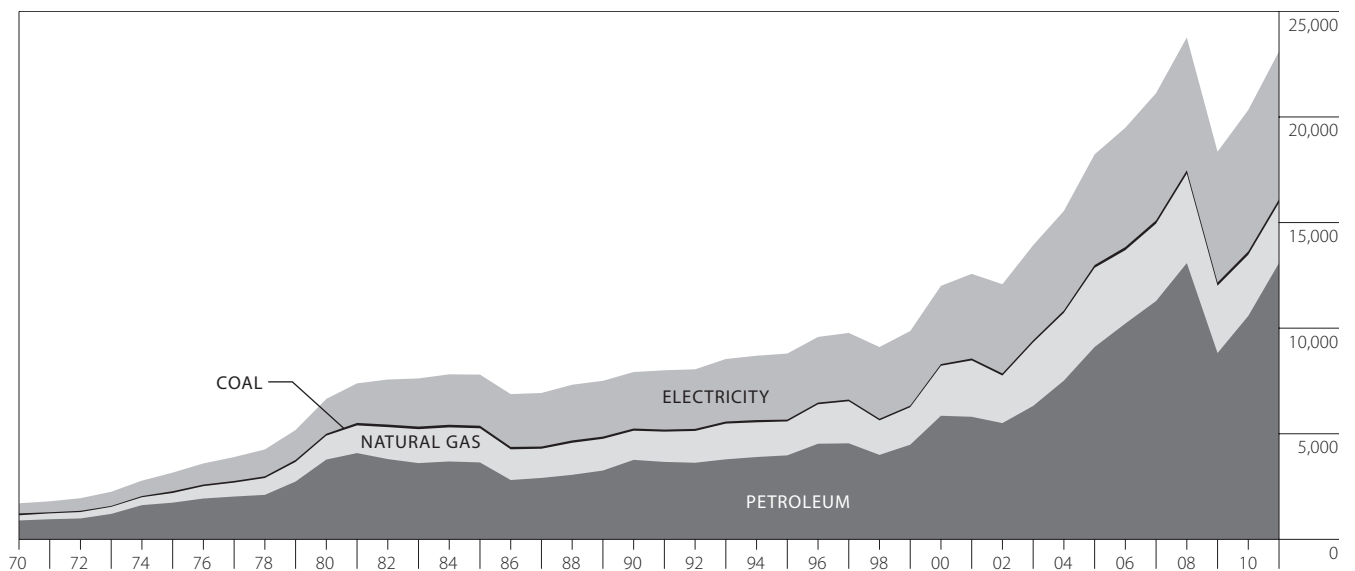
Microgrids can provide highly reliable power for commercial buildings, residential neighborhoods and factories, with flexible capabilities that include the ability to export excess power to the grid and operate independently as “islands” when utility blackouts occur.

Wisconsin End-Use Energy Expenditures, by Type of Fuel

2011 MILLIONS OF DOLLARS AND PERCENT OF TOTAL



1970-2011 MILLIONS OF DOLLARS



Source: Wisconsin State Energy Office.

Wisconsin End-Use Energy Expenditures, by Type of Fuel

WISCONSIN'S
**OVERALL
ENERGY BILL
13.6%**

In 2011, Wisconsin's overall energy bill increased 13.6 percent—from \$20.3 billion in 2010 to \$23.1 billion.

This increase of \$2.8 billion brings Wisconsin's energy expenditures close to 2008 levels.

Expenditures increased for all fuels except natural gas, which decreased by \$43.8 million (1.5 percent). Petroleum went up by \$2.5 billion (23.7 percent), coal by \$1.6 million (1.0 percent), and electricity \$307.2 million (4.6 percent). Since 2000, Wisconsin's total energy expenditures increased by \$11 billion (92.5 percent).

Natural gas expenditures for transportation and agriculture are reported for the first time in this edition of the book.

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.

1970-2011 MILLIONS OF DOLLARS AND PERCENT OF TOTAL

Year	Petroleum		Natural Gas		Coal		Electricity		Total
1970	894.3	52.4%	244.6	14.3%	90.1	5.3%	477.6	28.0%	1,706.6
1975	1,734.8	54.9%	457.1	14.5%	86.2	2.7%	879.3	27.8%	3,157.3
1980 ^r	3,777.5	56.8%	1,133.8	17.1%	89.0	1.3%	1,648.0	24.8%	6,648.3
1985 ^r	3,639.9	46.7%	1,616.8	20.7%	121.6	1.6%	2,420.9	31.0%	7,799.3
1990 ^r	3,761.6	47.5%	1,381.9	17.4%	102.9	1.3%	2,674.5	33.8%	7,920.9
1995 ^r	3,977.3	45.2%	1,606.6	18.3%	85.6	1.0%	3,127.5	35.6%	8,797.0
1996 ^r	4,527.7	47.2%	1,867.5	19.5%	81.3	0.8%	3,108.1	32.4%	9,584.6
1997 ^r	4,546.9	46.5%	1,992.1	20.4%	80.3	0.8%	3,155.2	32.3%	9,774.6
1998 ^r	3,999.8	43.9%	1,632.4	17.9%	78.3	0.9%	3,395.6	37.3%	9,106.1
1999 ^r	4,481.7	45.4%	1,776.4	18.0%	74.3	0.8%	3,530.2	35.8%	9,862.6
2000 ^r	5,852.2	48.8%	2,366.3	19.7%	80.1	0.7%	3,705.5	30.9%	12,004.1
2001 ^r	5,803.6	46.2%	2,669.3	21.2%	90.9	0.7%	4,007.5	31.9%	12,571.3
2002 ^r	5,504.8	45.6%	2,250.7	18.6%	101.5	0.8%	4,222.1	35.0%	12,079.1
2003 ^r	6,318.2	45.4%	3,007.9	21.6%	98.8	0.7%	4,502.4	32.3%	13,927.2
2004 ^r	7,516.8	48.3%	3,211.7	20.7%	109.2	0.7%	4,712.5	30.3%	15,550.1
2005 ^r	9,107.5	50.0%	3,751.3	20.5%	128.3	0.7%	5,241.7	28.8%	18,228.8
2006 ^r	10,219.3	52.5%	3,475.1	17.8%	146.2	0.8%	5,650.4	29.0%	19,491.0
2007 ^r	11,285.0	53.4%	3,665.6	17.3%	151.7	0.7%	6,025.1	28.5%	21,127.4
2008 ^r	13,079.5	55.1%	4,237.6	17.7%	155.8	0.7%	6,291.9	26.5%	23,764.8
2009 ^r	8,822.6	48.1%	3,187.9	17.3%	151.7	0.8%	6,192.6	33.8%	18,354.7
2010 ^r	10,577.6	52.1%	2,898.8	14.2%	158.3	0.8%	6,696.7	33.0%	20,331.4
2011 ^p	13,084.6	56.7%	2,855.0	12.3%	159.9	0.7%	7,003.7	30.3%	23,103.3

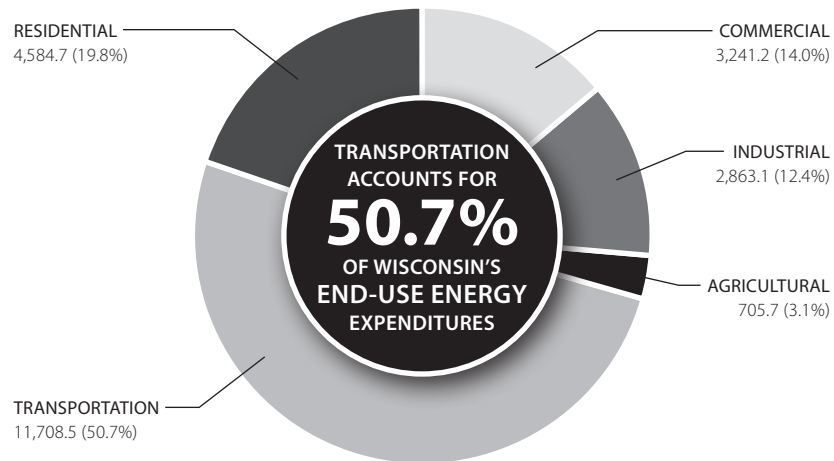
^p Preliminary estimates.

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

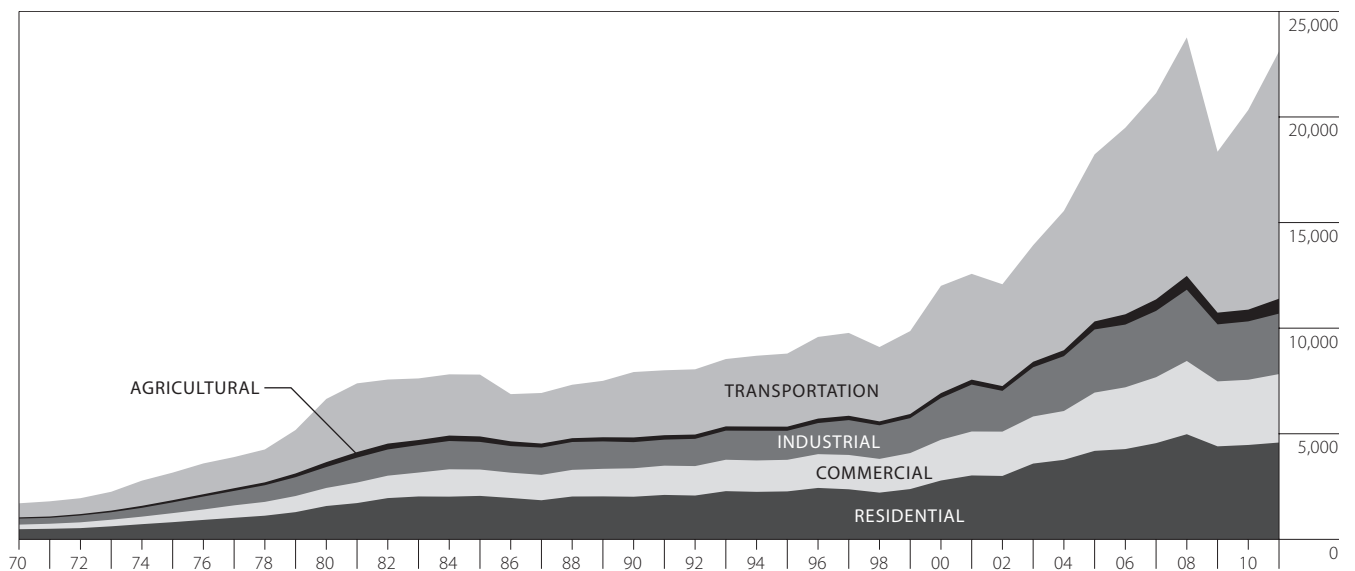
Source: Compiled from tables in this publication for Wisconsin petroleum, natural gas, coal and electricity use and prices, by economic sector.

Wisconsin End-Use Energy Expenditures, by Economic Sector

2011 MILLIONS OF DOLLARS AND PERCENT OF TOTAL



1970-2011 MILLIONS OF DOLLARS



Source: Wisconsin State Energy Office.

Wisconsin End-Use Energy Expenditures, by Economic Sector

WISCONSIN'S
END-USE
ENERGY
EXPENDITURES
INCREASED
IN ALL
SECTORS

In 2011, energy expenditures increased in all sectors, with total expenditures increasing \$2.8 billion or 13.6 percent.

Expenditures in the residential sector saw an increase of \$115.3 million (2.6 percent) over 2010, while the commercial sector increased by \$153.5 million (5.0 percent), the industrial sector by \$99.4 million (3.6 percent), the agricultural sector by \$148.8 million (26.7 percent), and the transportation sector by \$2.3 billion (23.9 percent).

Natural gas expenditures for transportation and agriculture are reported for the first time in this edition of the book.

1970-2011 MILLIONS OF DOLLARS AND PERCENT OF TOTAL

Year	Residential		Commercial		Industrial		Agricultural		Transportation		Total
1970 ^r	480.5	28.2%	217.9	12.8%	285.2	16.7%	58.7	3.4%	664.3	38.9%	1,706.6
1975	813.7	25.8%	428.4	13.6%	509.4	16.1%	104.2	3.3%	1,301.7	41.2%	3,157.3
1980	1,579.5	23.8%	855.2	12.9%	990.3	14.9%	232.7	3.5%	2,990.6	45.0%	6,648.3
1985 ^r	2,057.6	26.4%	1,249.3	16.0%	1,307.7	16.8%	259.5	3.3%	2,925.1	37.5%	7,799.3
1990 ^r	2,018.8	25.5%	1,346.8	17.0%	1,237.3	15.6%	222.6	2.8%	3,095.3	39.1%	7,920.9
1995 ^r	2,271.0	25.8%	1,495.6	17.0%	1,375.1	15.6%	195.2	2.2%	3,460.0	39.3%	8,797.0
1996 ^r	2,435.0	25.4%	1,600.2	16.7%	1,471.3	15.4%	212.0	2.2%	3,866.1	40.3%	9,584.6
1997 ^r	2,370.9	24.3%	1,625.9	16.6%	1,649.2	16.9%	205.7	2.1%	3,922.8	40.1%	9,774.6
1998 ^r	2,212.6	24.3%	1,597.0	17.5%	1,591.2	17.5%	184.9	2.0%	3,520.4	38.7%	9,106.1
1999 ^r	2,381.5	24.1%	1,705.5	17.3%	1,653.9	16.8%	195.2	2.0%	3,926.4	39.8%	9,862.6
2000 ^r	2,786.4	23.2%	1,930.1	16.1%	1,975.5	16.5%	233.7	1.9%	5,078.4	42.3%	12,004.1
2001 ^r	3,026.0	24.1%	2,081.3	16.6%	2,220.1	17.7%	234.4	1.9%	5,009.6	39.8%	12,571.3
2002 ^r	3,002.5	24.9%	2,098.7	17.4%	1,928.9	16.0%	226.5	1.9%	4,822.4	39.9%	12,079.1
2003 ^r	3,588.4	25.8%	2,230.5	16.0%	2,329.2	16.7%	261.4	1.9%	5,517.9	39.6%	13,927.2
2004 ^r	3,765.7	24.2%	2,311.6	14.9%	2,597.5	16.7%	282.1	1.8%	6,593.3	42.4%	15,550.1
2005 ^r	4,189.8	23.0%	2,760.1	15.2%	2,988.8	16.4%	379.9	2.0%	7,910.3	43.4%	18,228.8
2006 ^r	4,274.9	21.9%	2,924.1	15.0%	2,970.6	15.2%	487.2	2.4%	8,834.2	45.4%	19,491.0
2007 ^r	4,555.8	21.6%	3,122.9	14.8%	3,138.4	14.9%	544.5	2.5%	9,765.8	46.2%	21,127.4
2008 ^r	4,977.8	21.0%	3,468.5	14.6%	3,373.5	14.2%	653.1	2.6%	11,291.9	47.6%	23,764.8
2009 ^r	4,403.9	24.0%	3,076.2	16.8%	2,698.7	14.7%	555.5	2.9%	7,620.5	41.6%	18,354.7
2010 ^r	4,469.5	22.0%	3,087.8	15.2%	2,763.8	13.6%	556.9	2.7%	9,453.5	46.5%	20,331.5
2011 ^p	4,584.7	19.8%	3,241.2	14.0%	2,863.1	12.4%	705.7	3.1%	11,708.5	50.7%	23,103.3

^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.

This page estimates the amount of money spent on energy in Wisconsin that leaves the state. In 2011, \$15.9 billion left the state, comprising 68.7 percent of Wisconsin's \$23.1 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 generated by renewable sources.

1970-2011 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	900.1	765.1	257.6	219.0	177.1	168.2	-47.7	-47.7	1,104.7
1975	1,753.3	1,490.3	473.3	402.3	273.5	259.8	-50.5	-50.5	2,101.9
1980	3,802.3	3,231.9	1,175.3	999.0	476.9	453.1	-24.6	-24.6	4,659.4
1985 ^p	3,649.5	3,102.1	1,622.6	1,379.2	693.4	658.8	-9.2	-9.2	5,130.9
1990 ^r	3,768.3	3,203.1	1,388.9	1,180.6	585.4	556.1	417.4	417.4	5,357.1
1995 ^r	3,980.5	3,383.4	1,628.9	1,384.6	555.8	528.0	583.4	583.4	5,879.4
1996 ^r	4,532.2	3,852.4	1,889.8	1,606.3	546.4	519.1	372.4	372.4	6,350.2
1997 ^r	4,554.1	3,871.0	2,042.5	1,736.2	583.9	554.7	602.1	602.1	6,763.9
1998 ^r	4,006.1	3,405.2	1,697.3	1,442.7	558.6	530.7	518.6	518.6	5,897.2
1999 ^r	4,489.9	3,816.4	1,838.9	1,563.1	543.1	516.0	489.0	489.0	6,384.5
2000 ^r	5,862.1	4,982.8	2,461.3	2,092.1	560.9	532.8	495.9	495.9	8,103.6
2001 ^r	5,817.5	4,944.9	2,776.2	2,359.8	586.1	556.8	654.2	654.2	8,515.7
2002 ^r	5,512.7	4,685.8	2,325.2	1,976.4	604.3	574.1	557.9	557.9	7,794.2
2003 ^r	6,329.4	5,380.0	3,150.5	2,678.0	637.3	605.4	510.7	510.7	9,174.0
2004 ^r	7,529.8	6,400.4	3,349.3	2,846.9	672.2	638.6	572.1	572.1	10,458.0
2005 ^r	9,130.6	7,761.0	4,266.7	3,626.7	735.3	698.5	825.1	825.1	12,911.3
2006 ^r	10,242.5	8,706.1	3,798.3	3,228.6	828.4	787.0	582.6	582.6	13,304.3
2007 ^r	11,316.1	9,618.7	4,073.6	3,462.5	928.9	882.5	910.0	910.0	14,873.7
2008 ^r	13,102.1	11,136.8	4,617.6	3,924.9	1,111.5	1,055.9	834.2	834.2	16,951.8
2009 ^r	8,829.7	7,505.3	3,385.8	2,877.9	1,030.0	978.5	817.9	817.9	12,179.6
2010 ^r	10,586.0	8,998.1	3,130.0	2,660.5	1,168.3	1,109.9	693.0	693.0	13,461.6
2011 ^p	13,095.7	11,131.4	3,089.2	2,625.9	1,284.5	1,220.2	888.3	888.3	15,865.8

^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 Expenditures for Residential Energy, by Type of Fuel

WISCONSIN'S
**OVERALL
RESIDENTIAL
ENERGY
EXPENDITURES**
2.6%

In 2011, overall residential energy expenditures increased by 2.6 percent (\$115.3 million) over 2010. Expenditures increased for petroleum (7.6 percent) and electricity (3.4 percent), while decreasing for natural gas (1.1 percent).

1970-2011 MILLIONS OF DOLLARS AND PERCENT OF TOTAL

Year	Petroleum		Natural Gas		Coal		Electricity		Total ^a
1970	142.6	29.7%	130.5	27.2%	15.5	3.2%	191.9	39.9%	480.5
1975	250.5	30.8%	209.4	25.7%	11.8	1.5%	342.0	42.0%	813.7
1980	483.8	30.6%	472.4	29.9%	9.0	0.6%	614.4	38.9%	1,579.5
1985 ^r	412.0	20.0%	749.6	36.4%	3.8	0.2%	892.2	43.4%	2,057.6
1990 ^r	383.7	19.0%	653.6	32.4%	1.3	0.1%	980.2	48.6%	2,018.8
1995 ^r	290.2	12.8%	792.0	34.9%	1.1	0.0%	1,187.7	52.3%	2,271.0
1996 ^r	364.5	15.0%	892.9	36.7%	1.0	0.0%	1,176.5	48.3%	2,435.0
1997 ^r	331.5	14.0%	873.3	36.8%	1.0	0.0%	1,165.1	49.1%	2,370.9
1998 ^r	242.7	11.0%	712.7	32.2%	0.9	0.0%	1,256.3	56.8%	2,212.6
1999 ^r	281.4	11.8%	787.7	33.1%	0.8	0.0%	1,311.6	55.1%	2,381.5
2000 ^r	394.7	14.2%	1,020.6	36.6%	0.7	0.0%	1,370.4	49.2%	2,786.4
2001 ^r	426.6	14.1%	1,098.5	36.3%	0.7	0.0%	1,500.2	49.6%	3,026.0
2002 ^r	355.9	11.9%	1,007.4	33.6%	0.7	0.0%	1,638.5	54.6%	3,002.5
2003 ^r	416.6	11.6%	1,318.9	36.8%	0.6	0.0%	1,852.3	51.6%	3,588.4
2004 ^r	472.1	12.5%	1,377.5	36.6%	0.6	0.0%	1,915.6	50.9%	3,765.7
2005 ^r	558.9	13.3%	1,564.5	37.3%	0.6	0.0%	2,065.8	49.3%	4,189.8
2006 ^r	628.2	14.7%	1,467.6	34.3%	0.5	0.0%	2,178.6	51.0%	4,274.9
2007 ^r	646.0	14.2%	1,577.3	34.6%	0.4	0.0%	2,332.0	51.2%	4,555.8
2008 ^r	762.0	15.3%	1,800.3	36.2%	0.0	0.0%	2,415.5	48.5%	4,977.8
2009 ^r	528.5	12.0%	1,432.8	32.5%	0.0	0.0%	2,442.7	55.5%	4,403.9
2010 ^r	493.8	11.0%	1,278.3	28.6%	0.0	0.0%	2,697.4	60.4%	4,469.5
2011 ^p	531.5	11.6%	1,264.1	27.6%	0.0	0.0%	2,789.1	60.8%	4,584.7

^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

1970-2011 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	70.8	16.5%	73.5	17.2%	11.0	2.6%	273.0	63.7%	428.4
1980	82.4	9.6%	210.6	24.6%	6.8	0.8%	555.4	64.9%	855.2
1985 ^r	124.7	10.0%	307.4	24.6%	9.3	0.7%	807.9	64.7%	1,249.3
1990 ^r	103.5	7.7%	315.1	23.4%	8.2	0.6%	920.0	68.3%	1,346.8
1995 ^r	64.5	4.3%	382.1	25.5%	6.2	0.4%	1,042.8	69.7%	1,495.6
1996 ^r	83.0	5.2%	453.6	28.3%	7.8	0.5%	1,055.8	66.0%	1,600.2
1997 ^r	85.8	5.3%	475.1	29.2%	7.7	0.5%	1,057.3	65.0%	1,625.9
1998 ^r	71.3	4.5%	382.8	24.0%	7.9	0.5%	1,134.9	71.1%	1,597.0
1999 ^r	79.7	4.7%	395.9	23.2%	8.0	0.5%	1,221.9	71.6%	1,705.5
2000 ^r	117.2	6.1%	514.0	26.6%	8.0	0.4%	1,290.8	66.9%	1,930.1
2001 ^r	125.7	6.0%	576.6	27.7%	8.6	0.4%	1,370.3	65.8%	2,081.3
2002 ^r	107.2	5.1%	524.9	25.0%	8.8	0.4%	1,457.8	69.5%	2,098.7
2003 ^r	127.5	5.7%	695.8	31.2%	9.2	0.4%	1,397.9	62.7%	2,230.5
2004 ^r	139.6	6.0%	717.5	31.0%	10.0	0.4%	1,444.5	62.5%	2,311.6
2005 ^r	182.8	6.6%	880.1	31.9%	12.2	0.4%	1,684.9	61.0%	2,760.1
2006 ^r	174.0	5.9%	875.6	29.9%	13.6	0.5%	1,860.8	63.6%	2,924.1
2007 ^r	194.4	6.2%	910.8	29.2%	11.6	0.4%	2,006.1	64.2%	3,122.9
2008 ^r	281.0	8.1%	1,046.2	30.2%	8.9	0.3%	2,132.4	61.5%	3,468.5
2009 ^r	167.7	5.5%	796.6	25.9%	6.9	0.2%	2,104.9	68.4%	3,076.2
2010 ^r	145.2	4.7%	687.9	22.3%	7.9	0.3%	2,246.9	72.8%	3,087.8
2011 ^p	198.0	6.1%	680.5	21.0%	7.0	0.2%	2,355.6	72.7%	3,241.2

WISCONSIN
EXPENDITURES
FOR
COMMERCIAL
ENERGY
5.0%

Commercial energy expenditures increased 5.0 percent (\$153.5 million) in 2011.

Commercial energy expenditures are dominated (72.7 percent) by electricity used for lighting, cooling, ventilation and office equipment.

^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 Industrial Energy, by Type of Fuel

WISCONSIN
EXPENDITURES
FOR
INDUSTRIAL
ENERGY
3.6%

In 2011, industrial energy expenditures increased 3.6 percent (\$99.4 million). Industrial energy use is dominated by electricity (60.0 percent) and natural gas (31.1 percent). Expenditures for all fuels except natural gas increased: petroleum, 15.9 percent; electricity, 6.9 percent; and coal, 1.6 percent. Natural gas saw a decrease of 3.1 percent from 2010.

1970-2011 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	46.7	9.2%	174.2	34.2%	63.4	12.4%	225.1	44.2%	509.4
1980	64.1	6.5%	450.8	45.5%	73.2	7.4%	402.1	40.6%	990.3
1985 ^r	28.8	2.2%	559.9	42.8%	108.5	8.3%	610.6	46.7%	1,307.7
1990 ^r	52.2	4.2%	413.2	33.4%	93.5	7.6%	678.5	54.8%	1,237.3
1995 ^r	59.5	4.3%	432.5	31.5%	78.3	5.7%	804.8	58.5%	1,375.1
1996 ^r	92.0	6.3%	521.0	35.4%	72.5	4.9%	785.8	53.4%	1,471.3
1997 ^r	89.3	5.4%	643.7	39.0%	71.7	4.3%	844.6	51.2%	1,649.2
1998 ^r	72.4	4.5%	536.8	33.7%	69.5	4.4%	912.5	57.3%	1,591.2
1999 ^r	90.7	5.5%	592.8	35.8%	65.5	4.0%	905.0	54.7%	1,653.9
2000 ^r	122.0	6.2%	831.7	42.1%	71.3	3.6%	950.5	48.1%	1,975.5
2001 ^r	105.6	4.8%	994.3	44.8%	81.6	3.7%	1,038.7	46.8%	2,220.1
2002 ^r	93.8	4.9%	718.3	37.2%	92.0	4.8%	1,024.8	53.1%	1,928.9
2003 ^r	106.1	4.6%	993.1	42.6%	88.9	3.8%	1,141.0	49.0%	2,329.2
2004 ^r	138.4	5.3%	1,116.7	43.0%	98.6	3.8%	1,243.7	47.9%	2,597.5
2005 ^r	212.0	7.1%	1,293.6	43.3%	115.5	3.9%	1,367.8	45.8%	2,988.8
2006 ^r	238.9	8.0%	1,120.4	37.7%	132.0	4.4%	1,479.2	49.8%	2,970.6
2007 ^r	266.4	8.5%	1,165.4	37.1%	139.7	4.5%	1,566.9	49.9%	3,138.4
2008 ^r	269.9	8.0%	1,350.5	40.0%	147.0	4.4%	1,606.1	47.6%	3,373.5
2009 ^r	111.2	4.1%	935.9	34.7%	144.8	5.4%	1,506.8	55.8%	2,698.7
2010 ^r	88.4	3.2%	918.4	33.2%	150.5	5.4%	1,606.5	58.1%	2,763.8
2011 ^p	102.5	3.6%	889.7	31.1%	152.9	5.3%	1,718.1	60.0%	2,863.1

^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

1970-2011 MILLIONS OF DOLLARS AND PERCENT OF TOTAL

Year	Motor Gasoline	Diesel Fuel ^a	LPG	Other Fuel ^b	Total Petroleum		Electricity		Natural Gas ^d		Total ^c
1970	19.1	9.8	5.2		34.1	58.1%	24.6	41.9%			58.7
1975	30.1	24.1	10.8		65.1	62.5%	39.1	37.5%			104.2
1980	39.0	94.8	22.9		156.7	67.3%	76.0	32.7%			232.7
1985 ^r	22.4	99.0	27.8		149.3	57.5%	110.3	42.5%			259.5
1990 ^r	11.5	93.7	21.7		126.9	57.0%	95.7	43.0%			222.6
1995 ^r	8.0	71.9	23.1		103.0	52.8%	92.2	47.2%			195.2
1996 ^r	8.0	80.0	34.0		122.0	57.5%	90.0	42.5%			212.0
1997 ^r	7.6	79.6	30.4		117.5	57.1%	88.2	42.9%			205.7
1998 ^r	6.5	68.1	18.4		93.0	50.3%	91.9	49.7%			184.9
1999 ^r	7.2	75.1	21.2		103.5	53.0%	91.7	47.0%			195.2
2000 ^r	8.8	103.9	27.2		139.9	59.9%	93.8	40.1%			233.7
2001 ^r	8.6	98.5	28.9		136.1	58.1%	98.3	41.9%			234.4
2002 ^r	8.3	92.8	24.3		125.5	55.4%	101.0	44.6%			226.5
2003 ^r	9.7	112.9	27.5		150.2	57.5%	111.2	42.5%			261.4
2004 ^r	10.9	129.8	32.6		173.4	61.5%	108.7	38.5%			282.1
2005 ^r	72.6	130.7	36.5	4.0	243.8	64.2%	123.2	32.4%	12.9	3.4%	379.9
2006 ^r	68.1	224.0	47.1	5.1	344.3	70.7%	131.7	27.0%	11.2	2.3%	487.2
2007 ^r	84.9	269.0	53.7	5.1	412.7	75.8%	120.1	22.1%	11.7	2.1%	544.5
2008 ^r	77.6	320.4	71.2	5.8	475.0	72.7%	137.9	21.1%	40.2	6.2%	653.1
2009 ^r	70.1	247.1	67.4	10.5	395.1	71.1%	138.1	24.9%	22.3	4.0%	555.5
2010 ^r	69.2	270.6	53.0	4.3	397.3	71.3%	146.0	26.2%	13.7	2.5%	557.0
2011 ^p	77.4	417.4	45.3	4.9	545.0	77.2%	140.9	20.0%	19.8	2.8%	705.7

^a Includes fuel oil and kerosene.

^b The 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.

^d The increase in expenditures in 2008 reflects the relatively high price of natural gas in that year, as well as the inclusion of nurseries and greenhouses in the sample.

^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
26.7%

Wisconsin's agricultural energy bill is 26.7 percent more than 2010, an increase of \$148.8 million

Natural gas data, which was not available prior to 2005, is now part of the overall calculation of agricultural energy expenditures. The agriculture sector uses natural gas primarily for space heating and crop drying.

Wisconsin Expenditures for Transportation Energy, by Type of Fuel

WISCONSIN'S
TRANSPORTATION
ENERGY BILL
23.9%

Wisconsin's transportation energy bill increased 23.9 percent (\$2.3 billion dollars) in 2011. Vehicle gasoline accounts for 75.7 percent of all transportation expenditures, costing motorists \$8.9 billion.

2011 represents the first year that compressed natural gas vehicle fuel is included in the calculation of overall transportation expenditures.

Information about natural gas as a vehicle fuel, as well as a refueling station map locator, can be found on the Wisconsin State Energy Office website at stateenergyoffice.wi.gov.

1970-2011 MILLIONS OF DOLLARS AND PERCENT OF TOTAL

Year	Vehicle Gasoline ^a		Diesel Fuel		Aviation Gasoline		Jet Fuel		Middle Distillate		Natural Gas		Total
1970	626.2	94.3%	23.0	3.5%	2.4	0.4%	5.9	0.9%	6.7	1.0%			664.3
1975	1,187.1	91.2%	74.4	5.7%	4.5	0.3%	21.2	1.6%	14.5	1.1%			1,301.7
1980	2,531.3	84.6%	335.7	11.2%	8.4	0.3%	72.7	2.4%	42.5	1.4%			2,990.6
1985 ^r	2,369.2	81.0%	470.0	16.1%	5.2	0.2%	52.6	1.8%	28.1	1.0%			2,925.1
1990 ^r	2,429.2	78.5%	570.8	18.4%	5.3	0.2%	68.0	2.2%	22.0	0.7%			3,095.3
1995 ^r	2,661.8	76.9%	724.6	20.9%	5.6	0.2%	45.0	1.3%	23.1	0.7%			3,460.0
1996 ^r	2,974.6	76.9%	798.0	20.6%	6.0	0.2%	57.3	1.5%	30.1	0.8%			3,866.1
1997 ^r	3,006.1	76.6%	830.4	21.2%	6.1	0.2%	55.0	1.4%	25.2	0.6%			3,922.8
1998 ^r	2,692.2	76.5%	761.4	21.6%	5.3	0.2%	41.6	1.2%	19.8	0.6%			3,520.4
1999 ^r	2,993.6	76.2%	852.1	21.7%	6.0	0.2%	49.3	1.3%	25.4	0.6%			3,926.4
2000 ^r	3,850.2	75.8%	1,101.7	21.7%	8.0	0.2%	81.3	1.6%	37.2	0.7%			5,078.4
2001 ^r	3,842.3	76.7%	1,054.9	21.1%	7.5	0.1%	70.3	1.4%	34.5	0.7%			5,009.6
2002 ^r	3,718.4	77.1%	997.5	20.7%	5.6	0.1%	69.1	1.4%	31.8	0.7%			4,822.4
2003 ^r	4,284.1	77.6%	1,113.4	20.2%	5.7	0.1%	80.8	1.5%	33.9	0.6%			5,517.9
2004 ^r	5,034.0	76.4%	1,387.8	21.0%	6.7	0.1%	118.7	1.8%	46.1	0.7%			6,593.3
2005 ^r	5,946.8	75.2%	1,684.1	21.3%	8.6	0.1%	194.6	2.5%	76.0	1.0%	0.289	0.004%	7,910.3
2006 ^r	6,550.7	74.2%	1,964.8	22.2%	8.7	0.1%	214.2	2.4%	95.6	1.1%	0.264	0.003%	8,834.2
2007 ^r	7,348.0	75.2%	2,083.1	21.3%	8.0	0.1%	218.9	2.2%	107.5	1.1%	0.316	0.003%	9,765.8
2008 ^r	8,203.7	72.7%	2,644.5	23.4%	9.0	0.1%	322.7	2.9%	111.8	1.0%	0.316	0.003%	11,291.9
2009 ^r	5,892.2	77.3%	1,507.8	19.8%	6.0	0.1%	156.3	2.1%	57.8	0.8%	0.308	0.004%	7,620.5
2010 ^r	7,153.1	75.7%	1,992.5	21.1%	7.1	0.1%	220.7	2.3%	79.5	0.8%	0.521	0.006%	9,453.4
2011 ^p	8,866.9	75.7%	2,447.7	20.9%	9.5	0.1%	264.4	2.3%	119.1	1.0%	0.933	0.008%	11,708.5

^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

A Quick Guide to Future Trends in Energy

The world of energy is always in flux, the following are some new approaches to energy consumption, generation and distribution that are happening on a small scale now, but may burgeon into more significant changes in the future.



A NET-ZERO RESIDENTIAL HOME IN STOUGHTON, WI.

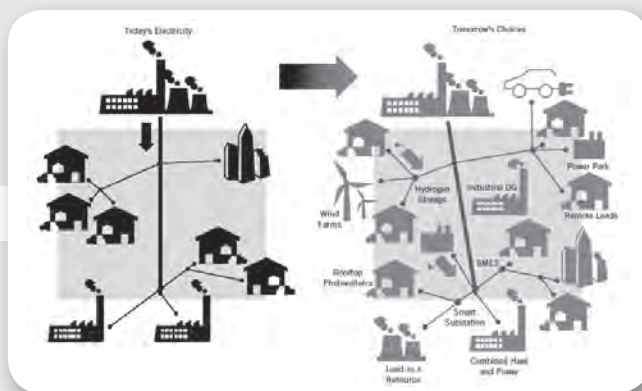
Net Zero Energy Building

A Net Zero Energy Building is any building that generates as much electricity as it uses, having a net energy consumption of zero.

To achieve this, the building must generate a significant amount of energy, usually from renewables. Not only do people in buildings use energy, but the building itself is an energy consumer.

By using design advances and energy efficient technologies, the overall energy consumption of the building is decreased, which increases the likelihood that the building can generate the same amount of energy that it 'spends'. Some energy efficient technologies include: solar space heating, solar thermal water heating, ground source heat pumps, and natural lighting and ventilation.

Distributed Generation Historically, electricity is generated at centralized locations owned by utilities or independent power producers (e.g., coal-fired power plants), and then distributed to utility customers through the grid. Distributed generation—also referred to as decentralized generation—describes a scenario where electricity is generated by privately owned sources (e.g., photovoltaic solar cells) at a non-centralized location, such as a businesses or residential homes. This electricity is sold to the utility for distribution on the grid. Distributed generation increases the number of generators on the grid, which, in theory, also increases the security of the grid, but also can raise other technical challenges such as grid stability.



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Smart Grid A Smart Grid is a modernized electric grid that can gather, use and communicate information collected about the workings of the grid itself. It uses sensing equipment, smart meters, and integrated communications to make the grid more flexible, reliable, and efficient. A smart grid can send the data it gathers from devices on the grid to the utility network, reducing the need for utility workers to manually check the usage on the meters. In addition, since this data is in real-time, it can be used to help customers shift their electricity usage away from peak times, which lowers the demand for utilities, allowing for efficient use of the grid. Smart grids also allow for better integration of distributed generation by providing the ability to reduce demand when needed, and to store energy when the demand isn't as high.

United States Energy Use and Gross Domestic Product

ENERGY USE
PER DOLLAR
OF GDP
45.4%
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 2.4 percent since 2010, and 22.1 percent since 1980. Energy use per dollar of Gross Domestic Product declined 2.2 percent since 2010 and 45.4 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.

1970-2011

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	4,266.3	67.84	1,392.0	15.90	0.3263
1975	215,973	4,875.4	71.96	1,747.1	14.76	0.3584
1980	227,225	5,834.0	78.07	2,094.4	13.38	0.3590
1985	237,924	6,843.4	76.39	2,324.0	11.16	0.3396
1990	249,623	8,027.1	84.49	2,712.6	10.52	0.3379
1995 ^r	266,278	9,086.0	91.03	3,013.3	10.02	0.3316
1996 ^r	269,394	9,425.8	94.02	3,101.1	9.97	0.3290
1997 ^r	272,647	9,845.9	94.60	3,145.6	9.61	0.3195
1998 ^r	275,854	10,274.7	95.02	3,264.2	9.25	0.3177
1999 ^r	279,040	10,770.7	96.65	3,312.1	8.97	0.3075
2000 ^r	282,162	11,216.4	98.81	3,421.4	8.81	0.3050
2001 ^r	284,969	11,337.5	96.17	3,394.5	8.48	0.2994
2002 ^r	287,625	11,543.1	97.65	3,465.5	8.46	0.3002
2003 ^r	290,108	11,836.4	97.94	3,493.7	8.28	0.2952
2004 ^r	292,805	12,246.9	100.16	3,547.5	8.18	0.2897
2005 ^r	295,517	12,623.0	100.28	3,661.0	7.94	0.2900
2006 ^r	298,380	12,958.5	99.63	3,669.9	7.69	0.2832
2007 ^r	301,231	13,206.4	101.31	3,764.6	7.67	0.2851
2008 ^r	304,094	13,161.9	99.29	3,733.0	7.54	0.2836
2009 ^r	306,772	12,703.1	94.60	3,596.9	7.44	0.2831
2010 ^r	309,330	13,088.0	97.97	3,754.5	7.49	0.2869
2011 ^p	311,592	13,315.1	97.47	3,726.2	7.32	0.2798

^a As of July 1.

^c Quadrillions of Btu.

^d Beginning in 1975, the DOE data source has been used.

^p Preliminary.

^r Revised.

Source: U.S. Department of Energy, Energy Information Administration, *Monthly Energy Review* (April 2011), <http://www.eia.doe.gov/mer/>; Tables 1.3 and 7.1 (1970-2011); Wisconsin Department of Administration Demographic Services resident, national population estimates as of July 1 (1970-2011). Bureau of Economic Analysis, Regional Economic Accounts, <http://www.bea.gov/bea/regional/> (1970-2011).

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 2011 dollars.

1970-2011

Year	GDP Deflator	Population ^{a,r} (Thousands)	No. of Households ^{b,c,r} (Thousands)	Gross State Product (Million 2011 Dollars)	Personal Income ^{b,r} (Current Dollars)			Personal Income ^{b,r} (2011 Dollars)		
					Total (Million Dollars)	Dollars Per Capita	Dollars Per Household	Total (Million Dollars)	Dollars Per Capita	Dollars Per Household
1970	24.34	4,417.8	1,328.8	94,057	17,621	3,989	13,261	82,079	18,579	61,769
1975	33.59	4,565.8	1,486.8	109,324	27,830	6,095	18,718	93,917	20,570	63,167
1980	47.79	4,705.6	1,652.3	125,477	47,519	10,098	28,760	112,716	23,954	68,219
1985	61.63	4,744.7	1,720.4	135,785	65,132	13,727	37,860	119,805	25,250	69,639
1990	72.26	4,891.8	1,822.1	157,245	88,213	18,033	48,412	138,383	28,289	75,946
1995	81.61	5,134.1	1,946.3	187,963	116,074	22,608	59,639	161,241	31,406	82,845
1996	83.16	5,182.0	1,971.6	195,536	122,953	23,727	62,362	167,604	32,344	85,010
1997	84.63	5,233.9	1,998.4	203,018	130,478	24,929	65,292	174,777	33,393	87,459
1998	85.58	5,280.0	2,024.5	212,737	141,019	26,708	69,658	186,787	35,376	92,265
1999	86.84	5,323.7	2,053.9	221,930	147,462	27,699	71,795	192,490	36,157	93,718
2000	88.72	5,363.7	2,084.6	226,966	156,603	29,197	75,125	200,090	37,304	95,987
2001	90.73	5,412.7	2,115.7	229,268	162,773	30,072	76,935	203,378	37,574	96,127
2002	92.20	5,460.9	2,147.3	233,904	167,708	30,711	78,103	206,205	37,760	96,031
2003	94.14	5,498.0	2,170.9	238,515	173,248	31,511	79,804	208,630	37,947	96,103
2004	96.79	5,540.5	2,197.4	244,677	180,303	32,543	82,055	211,179	38,115	96,106
2005	100.00	5,584.5	2,223.5	247,906	186,545	33,404	83,897	211,468	37,867	95,105
2006	103.23	5,618.8	2,242.5	251,130	198,556	35,338	88,543	218,038	38,805	97,231
2007	106.23	5,647.2	2,254.8	252,405	206,648	36,593	91,647	220,525	39,050	97,801
2008	108.58	5,669.6	2,265.7	246,482	215,330	37,980	95,041	224,805	39,651	99,223
2009	109.73	5,680.2	2,275.5	243,480	209,595	36,900	92,110	216,531	38,121	95,158
2010	110.99	5,687.0	2,279.8	250,965	217,562	38,256	95,432	222,206	39,073	97,469
2011 ^p	113.36	5,697.0	2,287.8	254,818	228,888	40,177	100,047	228,888	40,177	100,047

^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 (2011).

^c Population and Households revised for 2000-2011.

^p Preliminary estimates.

^r Revised.

Source: U.S. Department of Commerce, Bureau of Census, Population Division, *2000 Census of Population and Housing*, CPH-1-S1 (August 2001) and Preliminary Estimates of the Resident Population for the United States, Regions, States, and Puerto Rico: April 1, 2000 to July 1, 2010 (NST-PEST2010-01) (February 2011); Final Official Population Estimates and Census Counts for Wisconsin Counties: 1970 – 2008; Department of Administration, Wisconsin Demographic Services Center (1970-2011) and Intercensally Revised Annual Estimates of Residents, Housing Units and Households in Wisconsin, 1990-2011 (May 2011); U.S. Department of Commerce, Bureau of Economic Analysis, Regional Economic Accounts, <http://www.bea.gov/bea/regional/> (1970-2011).

HOUSEHOLD
INCOME
IN 2011 DOLLARS
1.3%
ANNUALLY
SINCE 1990

Wisconsin's population and number of households continue to grow since 2006. The number of households has grown slower than the population, as the number of persons per household has declined more slowly.

After growing at an annual rate of 2.4 percent over the 10-year period from 1990 to 2000, the 2011 per household income (in constant 2011 dollars) increased to its highest level since 1970.

Household income growth, in constant 2011 dollars, has been averaging about 1.3 percent annually over the 21-year period since 1990. Gross State Product in 2011 dollars increased by 1.5 percent in 2011 compared to 2010.

Wisconsin Employment, by Type

WISCONSIN LABOR FORCE

0.8%

WISCONSIN EMPLOYMENT

0.4%

In 2011, Wisconsin's working age labor force increased 0.8 percent. Employment in the state increased 0.4 percent (11,600 jobs). Employment in all sectors increased. In the goods producing sector, by 1.6 percent, in the services-producing sector by 0.2 percent, and by 0.4 percent in the nonfarm sector. Most Wisconsin jobs are classified as services producing.

1970-2011 THOUSANDS

Year	Working Age 18-64	Total Employment ^a	Percent Working Age Employed	Total NonFarm ^{b,e}	Goods Producing ^{b,c}	Services Producing ^{b,d}
1970 ^r	2,362.6			1,530.5	565.7	964.8
1975 ^r	2,572.5			1,677.0	570.5	1,106.5
1980	2,783.7			1,938.1	630.6	1,307.5
1985 ^r	2,858.3			1,983.1	580.4	1,402.7
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 ^r	3,157.5	2,815.6	89.2%	2,600.6	679.2	1,921.4
1997 ^r	3,194.8	2,855.8	89.4%	2,655.8	694.9	1,960.9
1998 ^r	3,228.6	2,870.0	88.9%	2,718.0	713.5	2,004.6
1999 ^r	3,261.0	2,879.0	88.3%	2,784.0	720.5	2,063.5
2000	3,292.4	2,894.9	87.9%	2,833.8	723.0	2,110.8
2001	3,332.7	2,897.9	87.0%	2,813.9	689.5	2,124.3
2002 ^r	3,372.3	2,860.9	84.8%	2,782.4	656.2	2,125.8
2003 ^r	3,406.3	2,862.6	84.0%	2,773.8	631.9	2,142.0
2004 ^r	3,443.8	2,868.4	83.3%	2,804.5	633.3	2,171.2
2005 ^r	3,487.5	2,890.1	82.9%	2,838.3	636.4	2,201.9
2006 ^r	3,516.8	2,932.5	83.4%	2,861.5	637.2	2,224.4
2007 ^r	3,538.8	2,948.7	83.3%	2,878.3	630.9	2,247.5
2008 ^r	3,554.9	2,939.8	82.7%	2,871.0	614.7	2,256.3
2009 ^r	3,631.5	2,842.9	78.3%	2,744.1	541.1	2,203.0
2010 ^r	3,668.0	2,821.8	76.9%	2,728.7	528.0	2,200.7
2011 ^p	3,697.6	2,833.4	76.6%	2,740.7	536.2	2,204.5

^a Nonfarm wage and salary employment.

^b These data categories represent numbers of jobs, not numbers of individuals.

^c Goods Producing is a compilation of the Mining, Natural Resources, and Construction industries.

^d Services Producing is a compilation of all non-farm jobs that do not produce goods.

^e Total Non-Farm job is a compilation of many non-farm job categories, which includes Goods Producing and Services Producing.

^p Preliminary.

^r Revised.

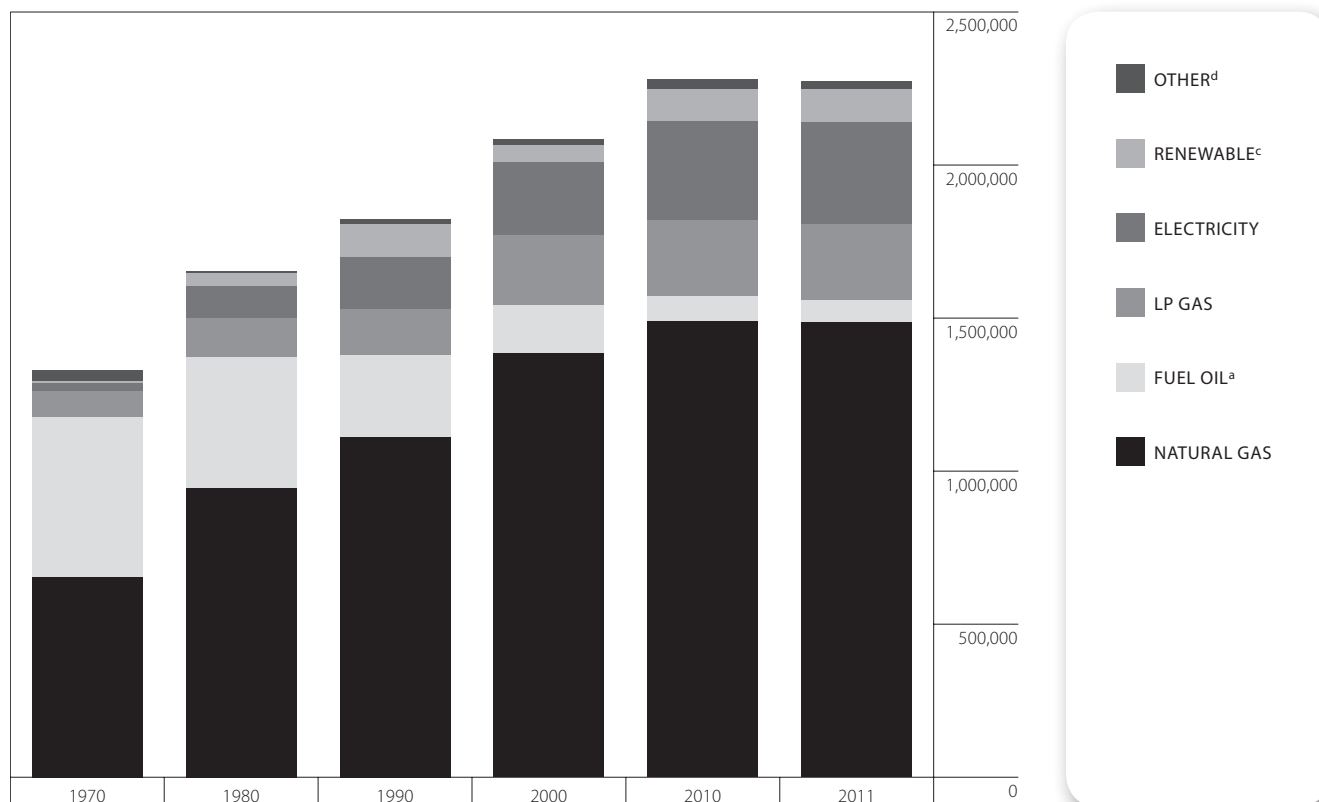
Source: Wisconsin Department of Administration, Demographic Services Center, *Single Year of Age Projections, 2000-2011, Broad Age Groups, Intercensal Revision Controlled to State Estimates (May 2011)*; Wisconsin Department of Workforce Development, Labor Market Information Section, Current Employment Statistics (CES) <http://worknet.wisconsin.gov/worknet/daces.aspx?menuselection=da> (1990-2010) and Local Area Unemployment Statistics (LAUS) <http://worknet.wisconsin.gov/worknet/dalaus.aspx?menuselection=da> (1980-2011).

Wisconsin Occupied Dwelling Units, by Type of Fuel for Space Heating

1970, 1980, 1990, 2000, 2010 AND 2011 NUMBER OF UNITS AND PERCENT OF TOTAL

Fuel	1970		1980		1990		2000		2010		2011	
Natural Gas	654,851	49.3%	945,092	57.2%	1,111,733	61.0%	1,384,230	66.4%	1,488,259	65.3%	1,484,849	65.3%
Fuel Oil ^a	521,256	39.2%	425,622	25.8%	265,600	14.6%	158,499	7.6%	81,908	3.6%	74,110	3.3%
LP Gas	85,549	6.4%	130,476	7.9%	152,823	8.4%	228,408	11.0%	250,022	11.0%	246,414	10.8%
Electricity	24,763	1.9%	101,489	6.1%	168,615	9.3%	236,755	11.4%	320,964	14.1%	333,466	14.7%
Wood	6,795	0.5%	42,783	2.6%	107,239	5.9%	56,862	2.7%	106,608	4.7%	107,814	4.7%
Coal or Coke	29,708	2.2%	2,591	0.2%	787	0.0%	330	0.0%	308	0.0%	326	0.0%
Solar Energy	NA		NA		NA		NA		345	0.0%	765	0.0%
Other	5,334	0.4%	3,578	0.2%	11,294	0.6%	13,839	0.7%	22,028	1.0%	20,056	0.9%
None	548	0.0%	630	0.0%	4,027	0.2%	5,621	0.3%	9,090	0.4%	7,552	0.3%
Total^b	1,328,804		1,652,261		1,822,118		2,084,544		2,279,532		2,275,352	

1970-2011 NUMBER OF UNITS



^a Includes kerosene.

^b Number of households data may not match due to different data sources.

^c Includes wood and solar energy.

^d Includes Coal/coke, no fuel or other fuel as defined by the American Community Survey.

Source: U.S. Department of Commerce, Bureau of the Census, *Census of Housing* (1970, 1980, 1990 and 2000) and American Community Survey (2005-2011).

Wisconsin Motor Vehicle Registrations, by Type of Vehicle

TOTAL VEHICLE
REGISTRATIONS
0.22%

In 2011, total vehicle registrations decreased by 0.22 percent; auto registrations decreased by 2.2 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.

1970-2011

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	2,340,991	2,429,194	12,738	345,737	417,031	5,545,691
2010	2,333,029	2,449,286	13,410	317,387	426,092	5,539,204
2011	2,282,310	2,451,634	14,411	361,893	416,550	5,526,798

^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 (January 2012).

Wisconsin New Single and Two Family Building Permits

1990-2011^a

	1990		2000		2005		2010		2011	
Type										
Single Family	10,663	94.9%	17,548	93.5%	20,380	94.0%	6,375	96.7%	5,253	96.0%
Two Family	578	5.1%	1,219	6.5%	1,306	6.0%	218	3.3%	218	4.0%
Heating Equipment										
Forced Air	10,299	91.6%	16,972	95.6%	19,256	88.1%	5,615	68.3%	4,553	66.8%
Radiant Electric	225	2.0%	343	1.9%	515	2.4%	186	2.3%	177	2.6%
Heat Pump	15	0.1%	50	0.3%	199	0.9%	174	2.1%	155	2.3%
Boiler	113	1.0%	385	2.2%	1,017	4.7%	410	5.0%	390	5.7%
Not Specified	589	5.2%	10	0.1%	871	4.0%	1,841	22.4%	1,538	22.6%
AC Equipped										
Yes	2,699	24.0%	10,820	57.7%	14,208	65.5%	4,009	60.6%	3,514	64.2%
No	8,542	76.0%	7,947	42.3%	7,499	34.5%	2,604	39.4%	1,962	35.8%
Space Heating Source										
Natural Gas	8,518	75.8%	11,640	61.9%	13,061	60.2%	3,696	55.9%	3,118	56.9%
LP Gas	1,395	12.4%	3,733	19.8%	4,703	21.7%	1,539	23.3%	1,265	23.1%
Oil	109	1.0%	49	0.3%	33	0.2%	3	0.0%	8	0.1%
Electric	240	2.1%	175	0.9%	265	1.2%	219	3.3%	208	3.8%
Solid	51	0.5%	51	0.3%	83	0.4%	142	2.1%	106	1.9%
Solar	0	0.0%	51	0.3%	83	0.4%	12	0.2%	13	0.2%
Not Specified	928	8.3%	3,117	16.6%	3,477	16.0%	1,002	15.2%	757	13.8%
Water Heating Source										
Natural Gas	8,326	74.1%	11,690	62.3%	12,348	56.9%	3,455	52.2%	2,862	52.3%
LP Gas	1,082	9.6%	2,746	14.6%	3,484	16.1%	1,037	15.7%	852	15.6%
Oil	22	0.2%	12	0.1%	12	0.1%	1	0.0%	1	0.0%
Electric	667	5.9%	1,495	8.0%	2,058	9.5%	1,163	17.6%	1,055	19.3%
Solid	12	0.1%	27	0.1%	58	0.3%	36	0.5%	27	0.5%
Solar	0	0.0%	1	0.0%	36	0.2%	11	0.2%	13	0.2%
Not Specified	1,132	10.1%	2,796	14.9%	3,709	17.1%	910	13.8%	665	12.1%
Living Area (Sq. Ft)										
1-1,000	394	3.6%	654	3.7%	591	2.8%	363	5.7%	294	5.6%
1,001-1,800	4,784	44.0%	7,681	43.4%	7,764	37.2%	2,671	42.2%	2,041	38.7%
1,801-2,400	3,153	29.0%	4,874	27.5%	6,091	29.2%	1,543	24.4%	1,324	25.1%
2,401-Greater	2,550	23.4%	4,496	25.4%	6,444	30.8%	1,758	27.8%	1,618	30.7%
Total	10,881		17,705		20,890		6,335		5,277	
Average (Sq. Ft)	1,980		1,945		2,148		2,025		2,107	

SINGLE FAMILY
PERMITS
7.7%
FROM
2010 TO 2011

From 2010 to 2011,
there was a 17.6 percent
decrease in construction
for single family
building permits,

TWO-FAMILY
PERMITS
**STAYED
LEVEL**
FROM
2010 TO 2011

while two-family
building permits stayed
level.

There was a 8.3 percent
increase for solar space
heating, and a 18.2
percent increase in
solar for water heating.
Natural gas and propane
remain the most
commonly used fuels for
space heating. The most
common fuels for water
heating are natural gas
and electricity.

^a These statistics are incomplete before January 1, 2005, as not all municipalities who issue building permits reported this information.

Source: Wisconsin Department of Commerce, Division of Safety and Buildings http://www.dps.wi.gov/sb/SB_statsUDCStatisticslist.html;
Amerifax Data Corporation, <http://www.home2000.com/ad/welcome.htm> (1970-2012).

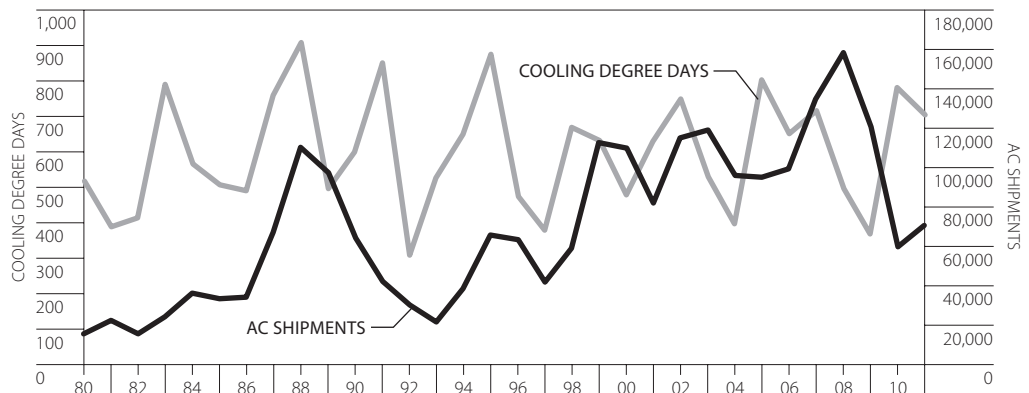
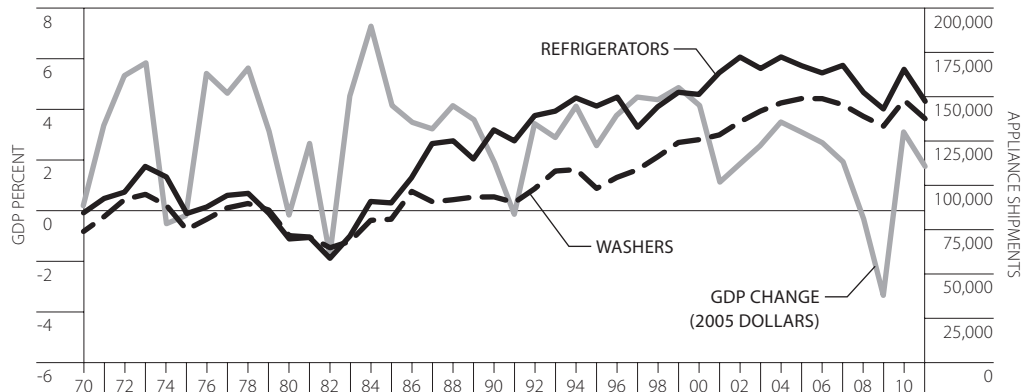
Wisconsin Appliance Shipments, by Type, Cooling Degree Days and Gross National Product

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.

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.

1970-2011

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	516	-0.28%	69,380	15,290	71,230
1985	505	4.14%	89,700	33,100	80,500
1990	599	1.88%	130,800	64,100	93,100
1995	868	2.51%	144,300	65,400	97,800
2000	474	4.14%	150,900	109,600	125,400
2005	797	3.07%	167,062	94,773	148,563
2006	648	2.66%	163,019	99,097	148,519
2007	713	1.91%	167,234	134,569	145,139
2008	495	-0.34%	152,087	157,601	138,575
2009	363	-3.49%	142,502	120,597	132,900
2010	778	3.03%	164,700	59,200	147,500
2011	703	1.74%	147,200	70,400	137,300



^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-2011*. Association of Home Appliance Manufacturers, *Trends in Energy Efficiency-2011*. 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.

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 State Energy Office.

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 1981 through 2010.

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	1,647	1,635	1,567	1,682	1,562	1,499	1,568	1,547	1,506	1,434	1,325	1,451
February	1,365	1,372	1,312	1,361	1,289	1,251	1,277	1,263	1,219	1,173	1,095	1,195
March	1,186	1,173	1,117	1,108	1,072	1,060	1,043	1,043	981	963	929	1,000
April	762	697	667	632	604	637	576	586	557	558	588	597
May	435	343	335	306	295	326	257	278	262	266	313	300
June	157	112	102	86	73	92	62	69	57	60	84	79
July	47	36	30	24	15	23	11	18	13	10	11	15
August	66	56	48	47	34	40	28	36	28	27	15	28
September	253	256	232	232	210	207	194	194	175	171	126	172
October	627	631	594	588	556	556	551	534	513	505	433	505
November	1,002	1,031	973	1,028	963	914	962	942	899	866	780	875
December	1,486	1,486	1,418	1,534	1,433	1,350	1,430	1,407	1,364	1,300	1,195	1,313
Total	9,033	8,828	8,392	8,628	8,106	7,955	7,959	7,917	7,574	7,333	6,894	7,531

^a Population-weighted statewide average, based on 2010 census.

Source: National Climatic Data Center, 1981-2010 U.S. Climate Normals, <http://ggweather.com/normals>

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 1981 through 2010.

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	1	1	2	2	1	2	4	4	3	4	5	4
May	9	14	15	17	18	16	28	26	22	26	25	23
June	48	67	75	85	97	83	120	112	113	120	120	108
July	118	127	139	157	172	150	214	184	193	206	222	194
August	89	96	104	116	130	111	161	136	152	157	193	155
September	22	25	29	31	35	33	48	44	48	51	69	51
October	1	1	2	2	3	3	4	4	5	4	7	5
Total	288	331	365	410	456	398	579	510	536	568	641	538

^a Population-weighted statewide average, based on 2010 census.

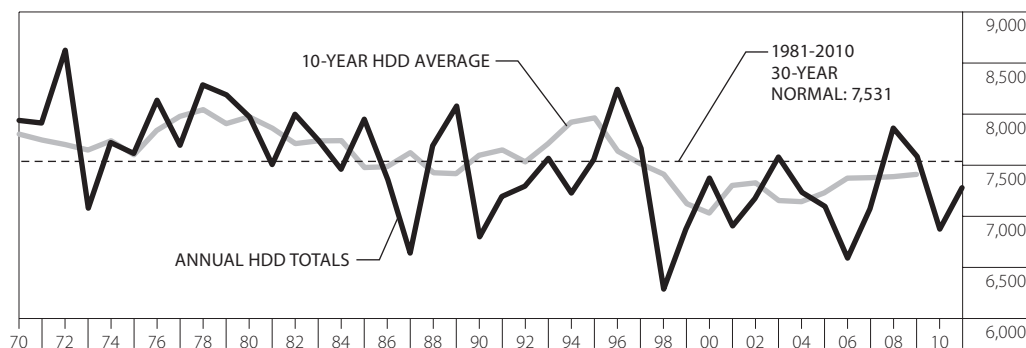
Source: National Climatic Data Center, 1981-2010 U.S. Climate Normals, <http://ggweather.com/normals>

Wisconsin Population-Weighted Heating Degree Days

1970-2011

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 2007 through 2011 because these averages cannot yet be calculated.



Month	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
Normal	1,451	1,195	999	597	300	79	15	28	172	505	874	1,313	7,528
1970	1,716	1,292	1,116	564	294	81	15	15	179	430	888	1,343	7,933
1975	1,375	1,247	1,212	789	220	74	23	17	257	412	714	1,268	7,608
1980	1,465	1,378	1,141	582	240	116	8	14	177	634	867	1,345	7,967
1985	1,614	1,296	883	473	188	107	7	31	194	486	994	1,660	7,933
1990	1,141	1,119	880	532	361	52	18	18	131	497	708	1,321	6,778
1995	1,344	1,197	890	682	254	38	8	1	213	455	1,097	1,376	7,555
2000	1,428	1,057	758	625	244	86	26	15	189	384	909	1,637	7,358
2005	1,435	1,043	1,073	490	330	19	9	12	75	425	810	1,370	7,091
2006	1,043	1,203	949	441	265	46	3	7	191	598	762	1,068	6,576
2007	1,282	1,398	852	615	200	35	11	13	130	319	879	1,338	7,072
2008	1,451	1,378	1,110	578	349	41	7	11	106	478	861	1,477	7,847
2009	1,689	1,160	976	606	263	105	34	50	96	608	671	1,323	7,581
2010	1,447	1,161	811	421	232	37	1	5	176	396	795	1,375	6,857
2011	1,516	1,211	1,059	636	330	70	1	4	211	404	748	1,088	7,278

^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 2010 census data).

^b The 30-year normal runs from 1981 to 2010 and is developed by the National Oceanographic and Atmospheric Agency (NOAA).

Source: Wisconsin State Energy Office, degree day data based on daily data from the University of Wisconsin-Madison, Wisconsin State Climatology Office (<http://www.aos.wisc.edu/~sco/>) (1970-2011).

2011 HDD
3.4%
BELOW
THE 30-YEAR
NORMAL

Using population-weighted^a heating degree days (HDDs) as an index, the winter for 2011 was colder than the winter of 2010, with 6.1 percent more HDDs.

In 2011, the number of HDDs (7,278) was 3.4 percent below the 30-year normal (7,531).

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.

2010 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	1,557	1,515	1,487	1,717	1,514	1,444	1,600	1,557	1,622	1,486	1,313	1,447
February	1,319	1,276	1,237	1,403	1,204	1,180	1,280	1,262	1,298	1,167	1,044	1,161
March	917	891	869	866	816	835	783	848	817	802	787	811
April	576	535	496	448	415	441	372	422	333	382	432	421
May	346	305	277	277	261	241	256	251	203	215	212	232
June	133	104	82	84	56	49	41	29	5	15	27	37
July	4	3	3	0	0	2	0	1	0	0	1	1
August	31	18	14	19	12	7	7	9	6	4	0	5
September	335	310	268	310	243	212	220	221	148	147	117	176
October	531	509	488	512	436	451	462	466	372	393	313	396
November	960	953	891	980	894	819	915	859	814	787	696	795
December	1,478	1,466	1,433	1,580	1,461	1,386	1,531	1,514	1,515	1,401	1,241	1,375
Total	8,187	7,885	7,545	8,196	7,312	7,067	7,467	7,439	7,133	6,799	6,183	6,858

^a Population-weighted statewide average, based on 2010 census.

Source: Wisconsin State Energy Office, degree day data based on daily data from the University of Wisconsin-Madison, State Climatology Office (<http://www.aos.wisc.edu/~sco/>)

2011 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	1,688	1,689	1,642	1,780	1,635	1,578	1,689	1,649	1,559	1,485	1,369	1,516
February	1,335	1,349	1,306	1,392	1,316	1,253	1,323	1,298	1,230	1,193	1,108	1,211
March	1,228	1,241	1,192	1,224	1,157	1,126	1,156	1,171	996	998	967	1,059
April	746	797	747	671	703	679	636	693	565	572	613	636
May	524	383	365	346	323	335	284	311	271	300	350	330
June	194	106	94	77	77	73	72	87	44	40	74	70
July	16	5	3	2	1	0	1	2	0	0	0	1
August	19	49	29	12	3	3	3	6	1	0	0	4
September	275	335	298	247	262	246	240	235	222	215	156	211
October	497	571	501	458	462	419	450	432	390	396	356	404
November	908	956	869	878	860	766	814	795	772	740	666	748
December	1,263	1,362	1,237	1,299	1,266	1,106	1,245	1,161	1,083	1,052	974	1,088
Total	8,693	8,843	8,283	8,386	8,065	7,584	7,913	7,840	7,133	6,991	6,633	7,277

^a Population-weighted statewide average, based on 2010 census.

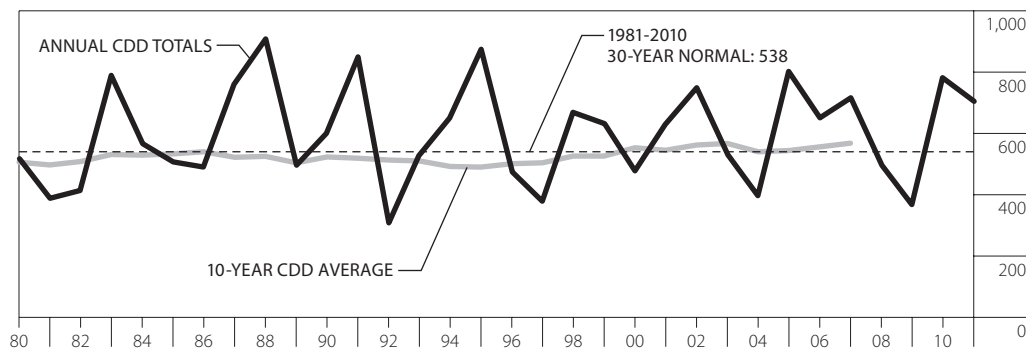
Source: Wisconsin State Energy Office, degree day data based on daily data from the University of Wisconsin-Madison, State Climatology Office (<http://www.aos.wisc.edu/~sco/>)

Wisconsin Population-Weighted Cooling Degree Days

1980-2011

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 2007 through 2011 because these averages cannot yet be calculated.



Month	April ^b	May	June	July	August	September	October ^b	Total
Normal	4	23	108	194	155	51	5	540
1980	9	34	71	219	156	27	0	516
1985	31	28	60	185	98	103	0	505
1990	32	3	120	177	164	99	4	599
1995	0	8	224	273	311	47	5	868
2000	0	37	88	137	154	54	5	474
2005	3	4	211	228	200	119	32	797
2006	1	53	95	302	169	25	4	648
2007	8	48	132	202	196	90	37	713
2008	0	1	93	195	150	52	4	495
2009	0	14	114	80	123	32	0	363
2010	8	59	110	285	278	36	2	778
2011	1	27	94	336	188	48	9	703

^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 2010 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 1981 to 2010 and is developed by the National Oceanographic and Atmospheric Agency (NOAA).

Source: Wisconsin State Energy Office, degree day data based on daily data from the University of Wisconsin-Madison, State Climatology Office (<http://www.aos.wisc.edu/~sco/>) (1970-2011).

2011 CDD
30.6%
ABOVE
THE 30-YEAR
NORMAL

Using population-weighted^a cooling degree days (CDD) as an index, the summer of 2011 was cooler than the summer of 2010, with 9.6 percent fewer cooling degree days. In 2011, the number of cooling degree days (703) was 30.6 percent above the 30-year normal (538).

The 10-year average is plotted on the graph 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 2011, the number of CDDs decreased because the summer was cooler than last year. 2008 and 2009 represented a slight departure from a trend since 2005 of hotter summers with more CDDs.

2010 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	5	0	0	9	0	0	5	5	16	8
May	21	58	59	57	63	55	66	81	71	69	50	59
June	53	53	66	63	79	67	88	96	143	128	142	110
July	169	173	214	195	220	243	256	234	293	307	339	285
August	159	174	217	196	209	248	267	245	265	280	331	278
September	9	4	13	5	16	20	7	15	38	36	63	36
October	0	0	0	1	0	0	1	0	10	4	3	2
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	411	462	574	517	587	642	685	671	825	829	944	778

^a Population-weighted statewide average, based on 2010 census.

Source: Wisconsin State Energy Office, degree day data based on daily data from the University of Wisconsin-Madison, State Climatology Office (<http://www.aos.wisc.edu/~sco/>)

2011 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	1	1	1
May	0	6	15	9	14	22	16	18	51	46	28	27
June	16	55	69	63	87	71	115	89	139	145	84	94
July	221	256	297	271	277	320	306	301	355	368	364	336
August	112	46	98	112	151	139	150	159	199	200	247	188
September	20	16	25	40	42	33	50	44	46	44	62	48
October	16	4	7	21	6	6	18	15	13	10	7	9
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	385	383	511	516	577	591	655	626	803	814	793	703

^a Population-weighted statewide average, based on 2010 census.

Source: Wisconsin State Energy Office, 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

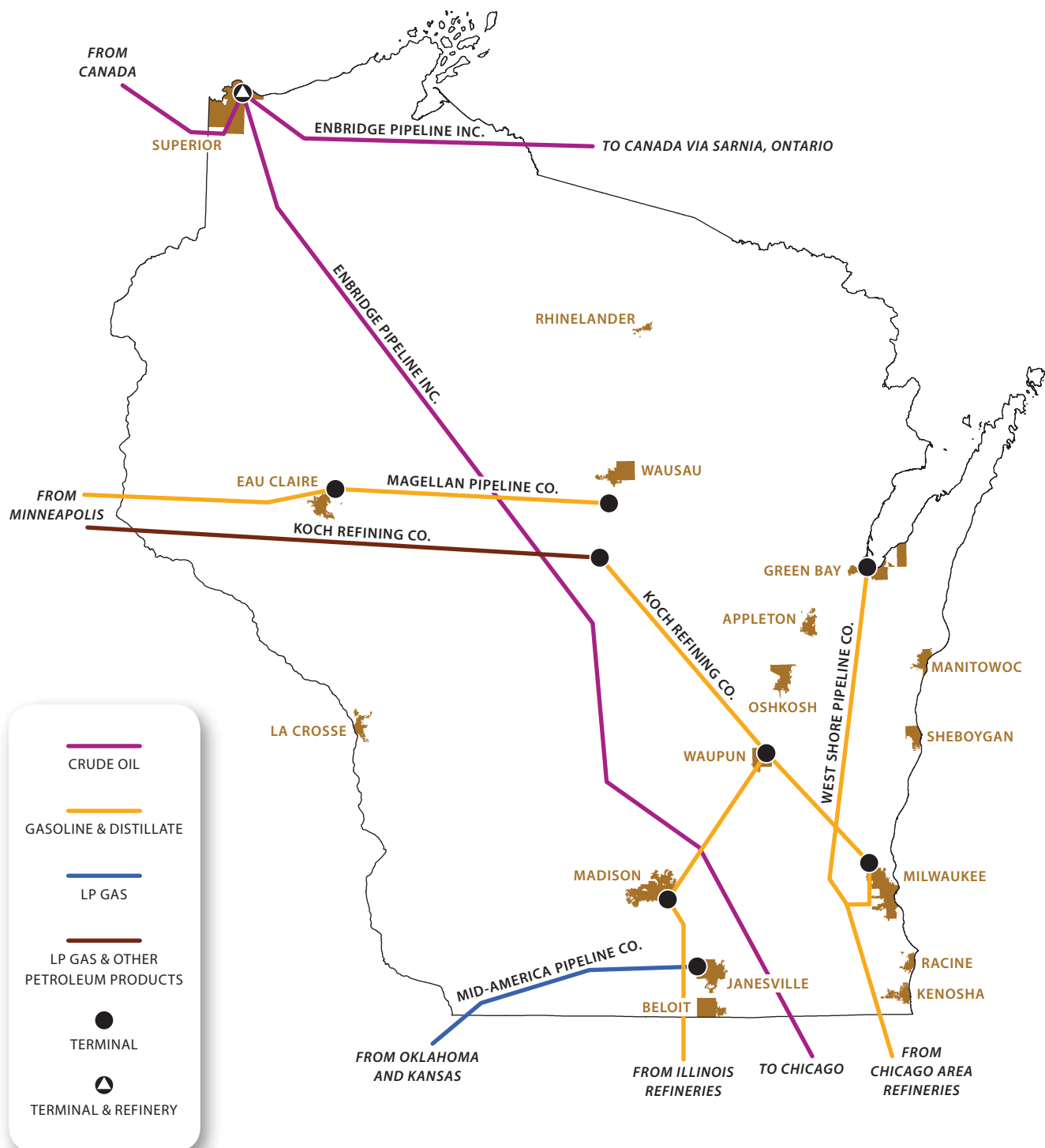
1 gigawatt-hour (GWh) = 1,000 MWh or 1,000,000,000 watt-hours

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.

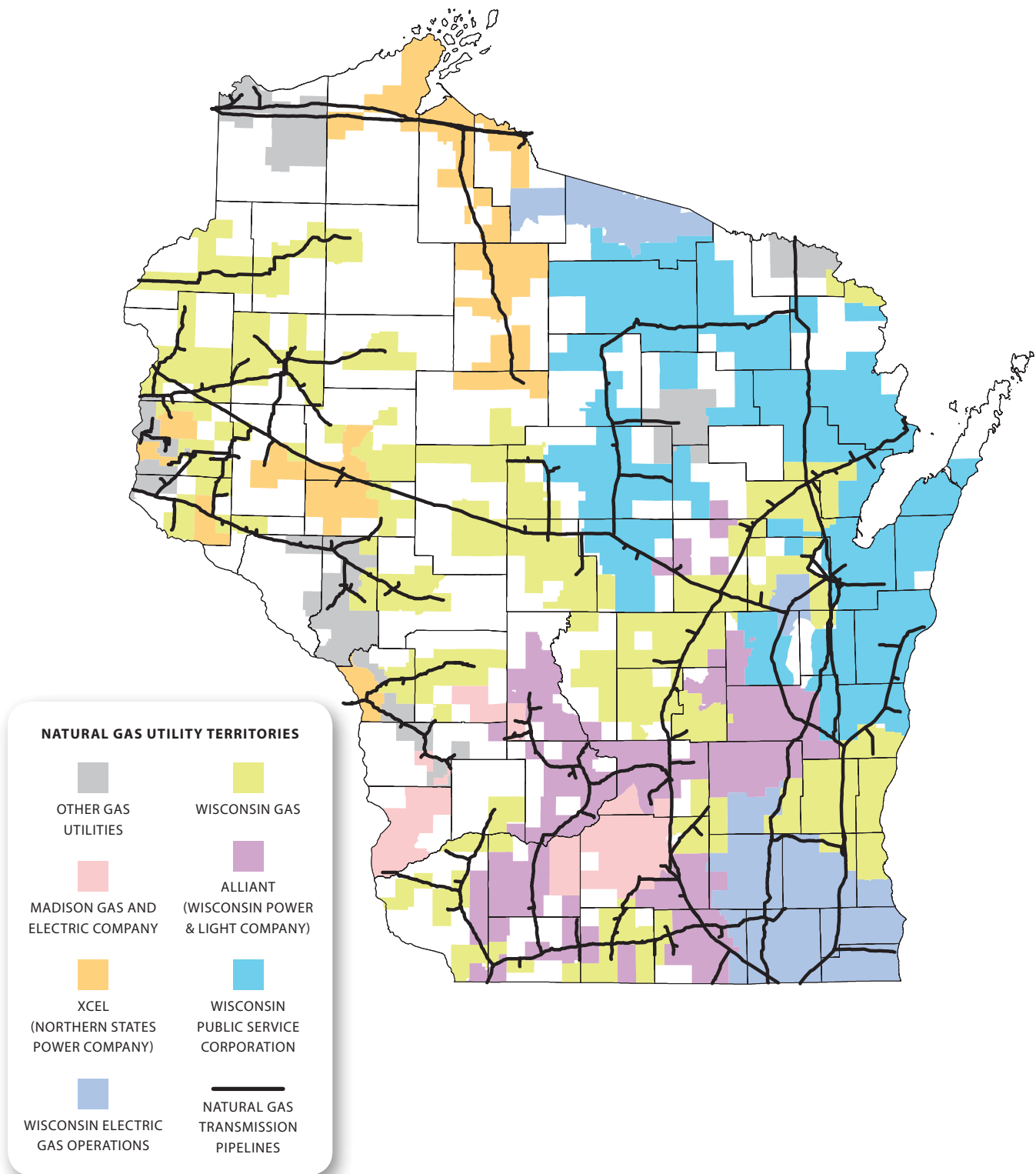
1 face cord of wood = 8 feet x 4 feet x 16 inches = 42.7 cubic feet = approx. 1,333 lbs.

Wisconsin Petroleum Pipelines



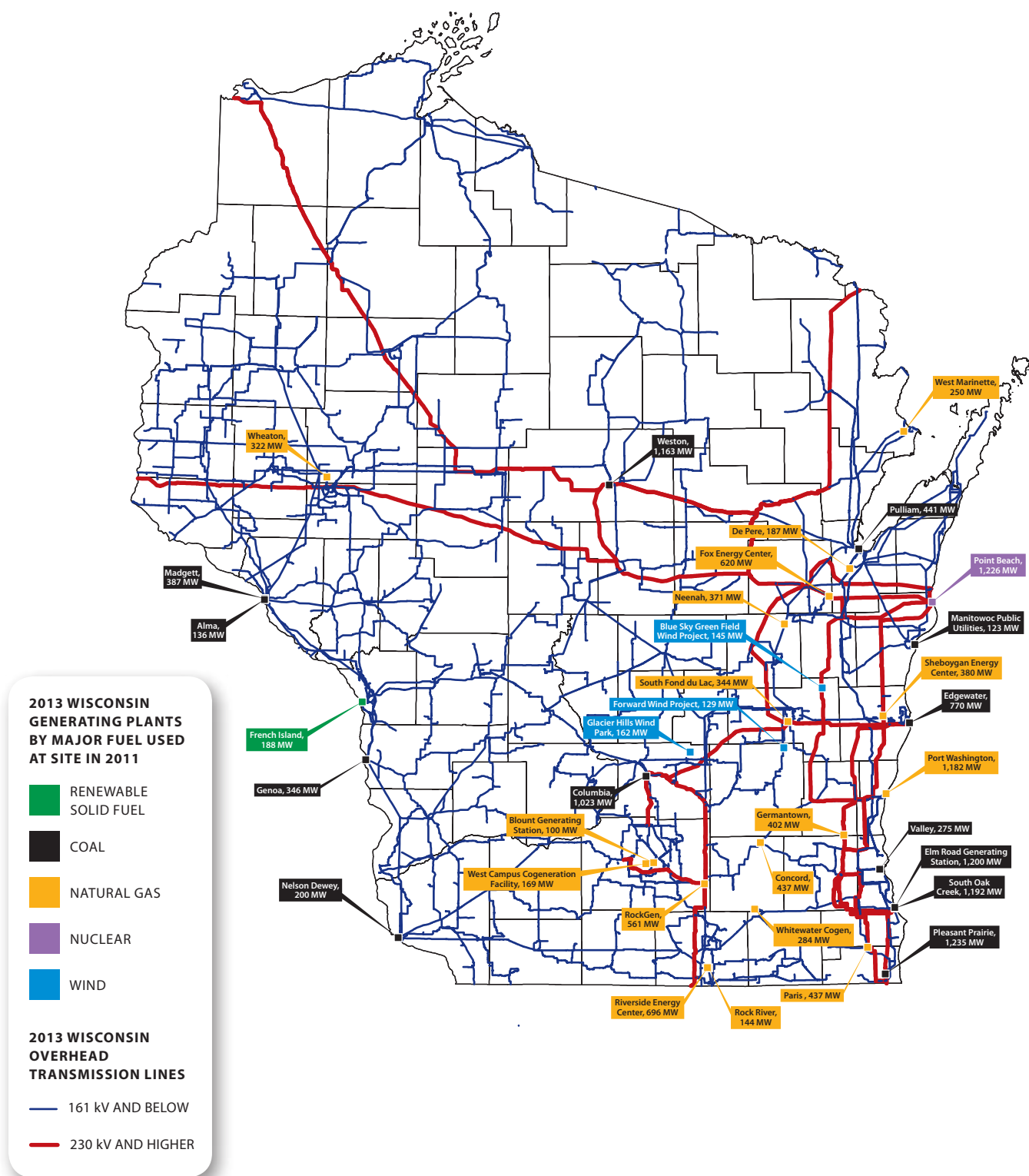
Source: Wisconsin State Energy Office.

Wisconsin Natural Gas Utility Service Territories and Major Pipelines



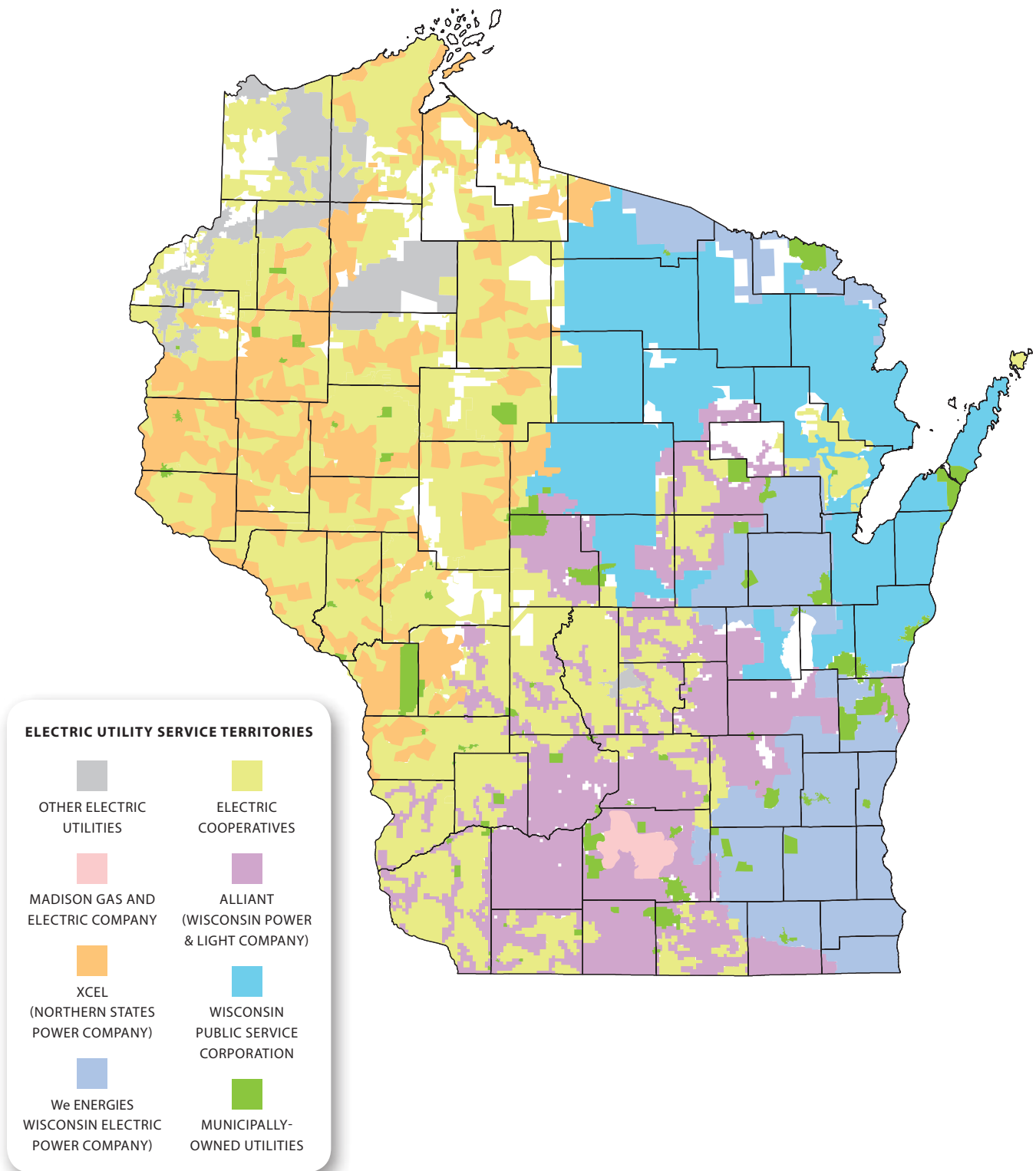
Source: Public Service Commission of Wisconsin.

Wisconsin Electric Generating Facilities Over 100 Megawatts and Electric Transmission Lines



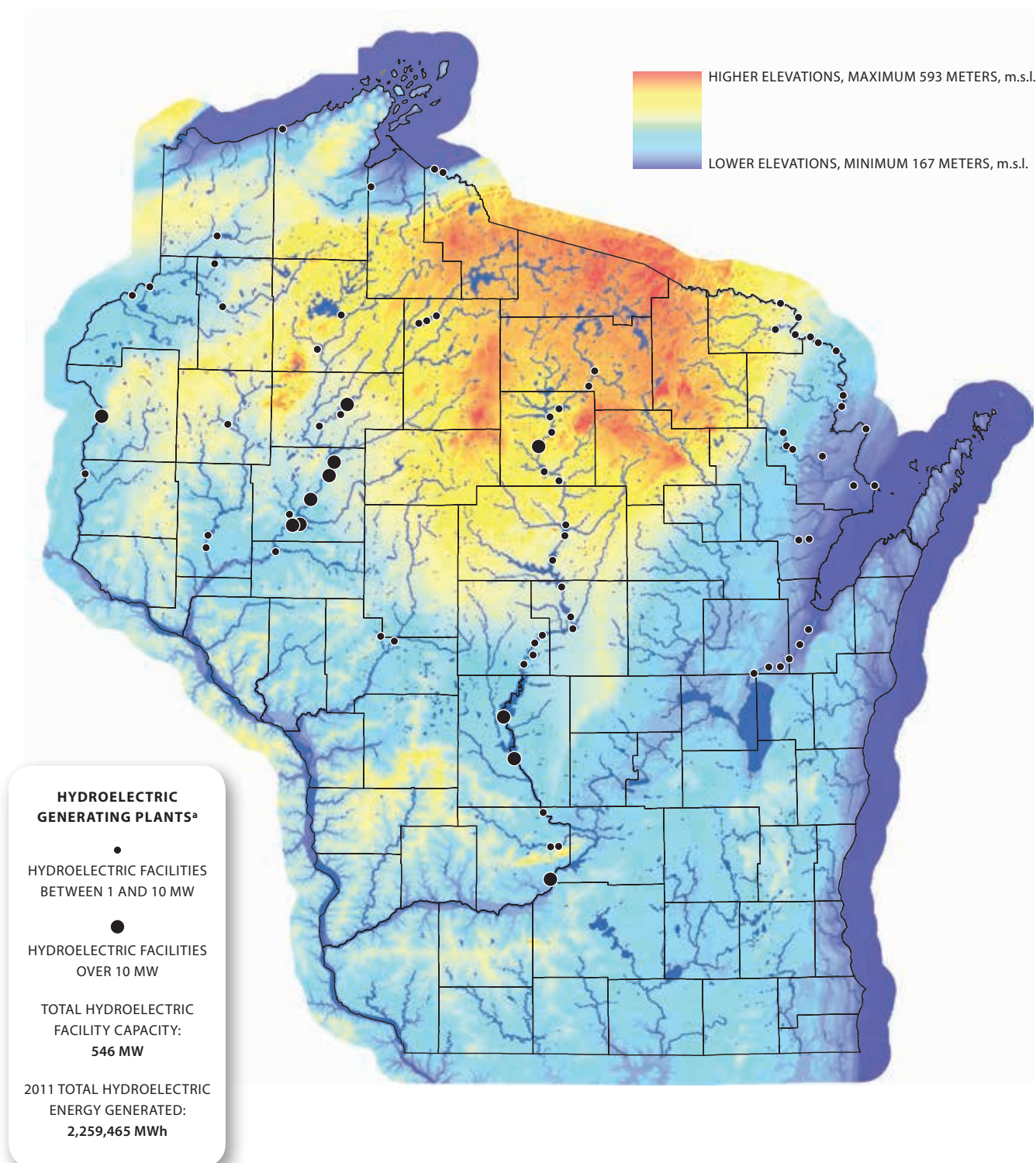
Source: Public Service Commission of Wisconsin.

Major Electric Service Territories



Source: Public Service Commission of Wisconsin.

Hydroelectric Generation Sites in Wisconsin, 2013



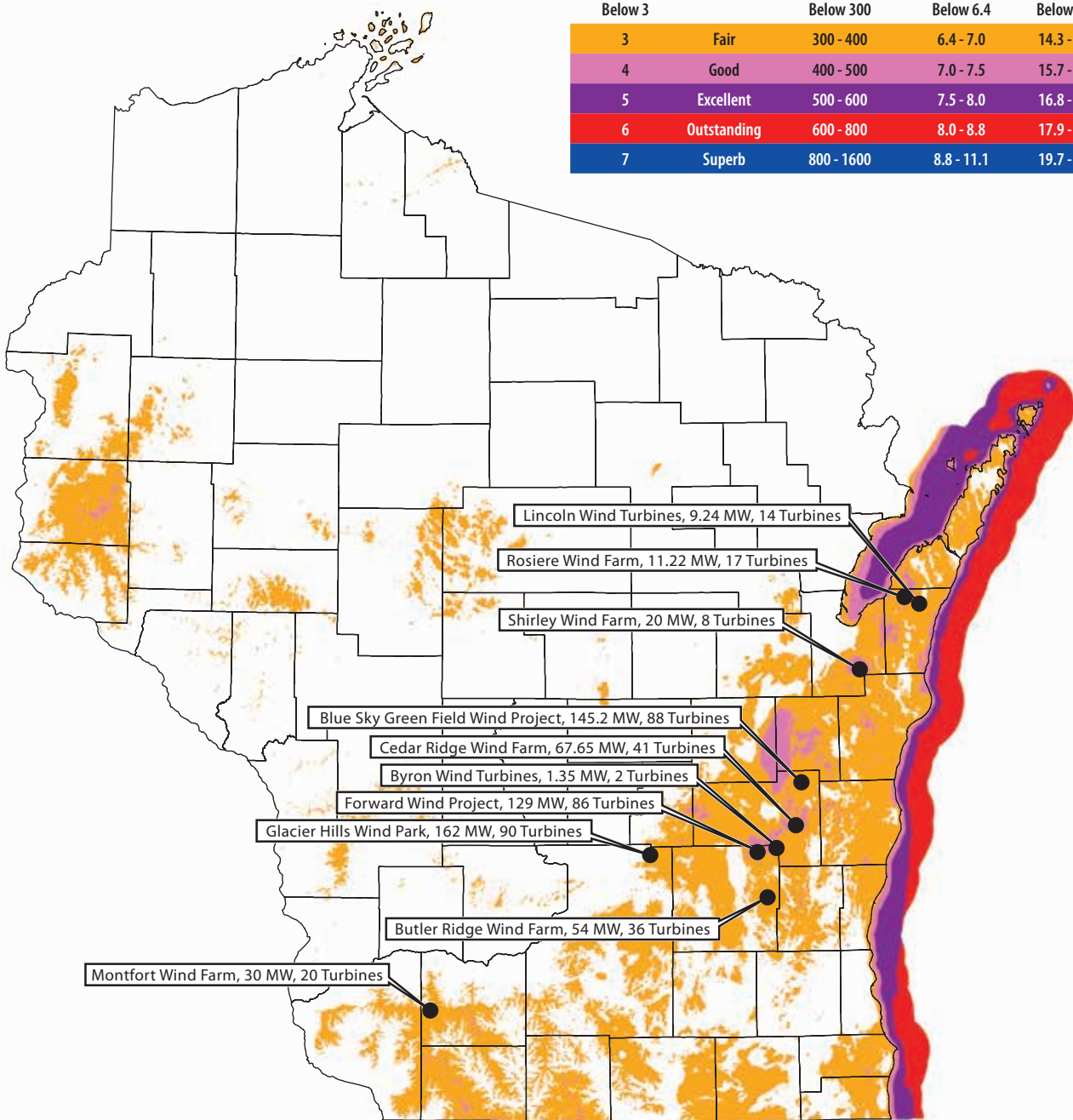
^a Capacity and energy generated include hydroelectric facilities owned by utilities, merchants, cooperatives, and other nonutilities.

Capacity and Energy Data Source: Public Service Commission of Wisconsin.

Hydroelectric Facility GIS Data Source: Public Service Commission of Wisconsin, Department of Administration.

Estimated Wind Power Energy Potential (at 70 meters) and Existing Wind Development Locations, 2013

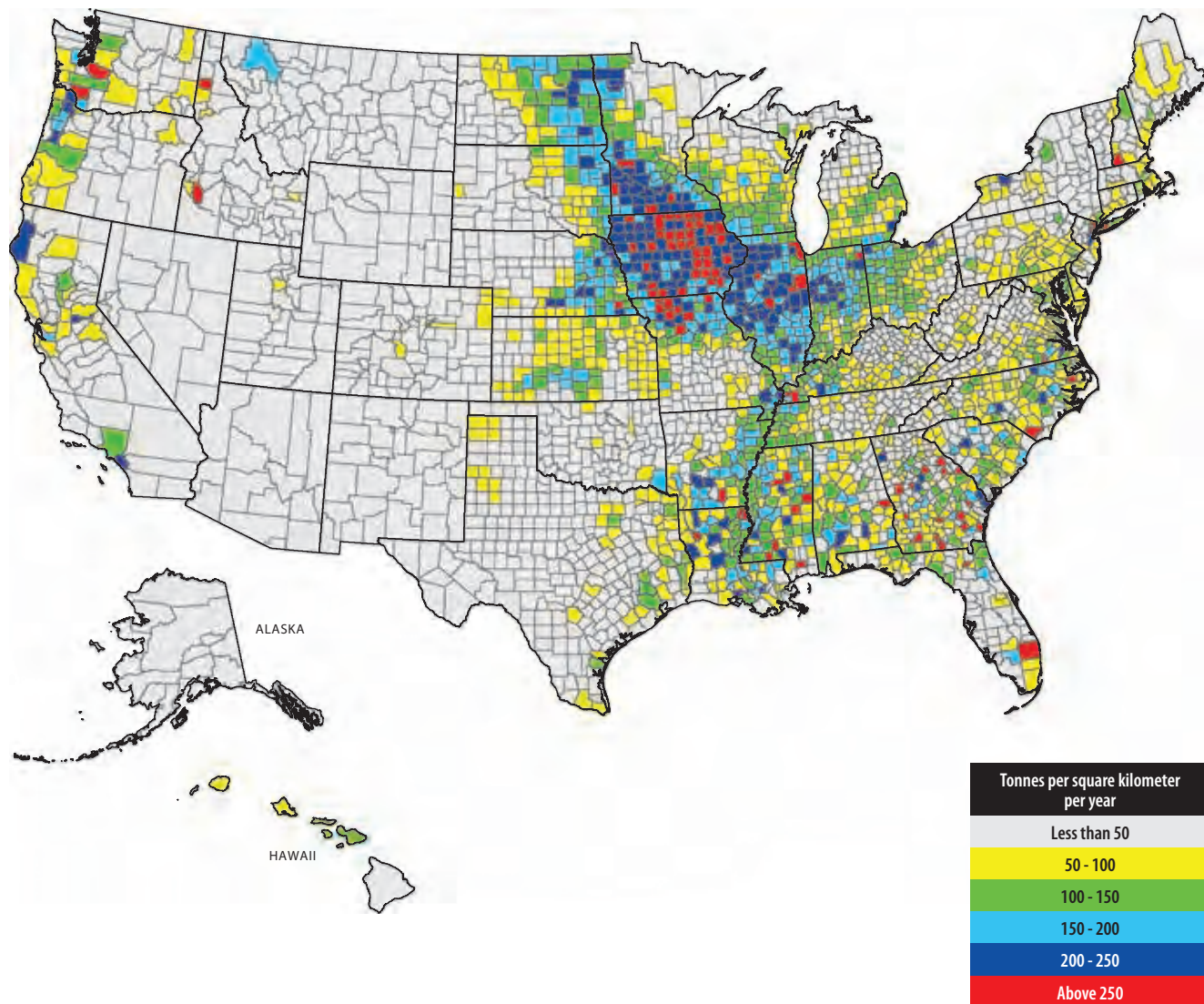
Wind Power Classification	Resource Potential	Wind Power Density at 70 m (watts/square meter)	Wind Speed at 70 m (m/s)	Wind Speed at 70 m (mph)
Below 3		Below 300	Below 6.4	Below 14.3
3	Fair	300 - 400	6.4 - 7.0	14.3 - 15.7
4	Good	400 - 500	7.0 - 7.5	15.7 - 16.8
5	Excellent	500 - 600	7.5 - 8.0	16.8 - 17.9
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.

Wind Development Data Source: Public Service Commission of Wisconsin.

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/>.

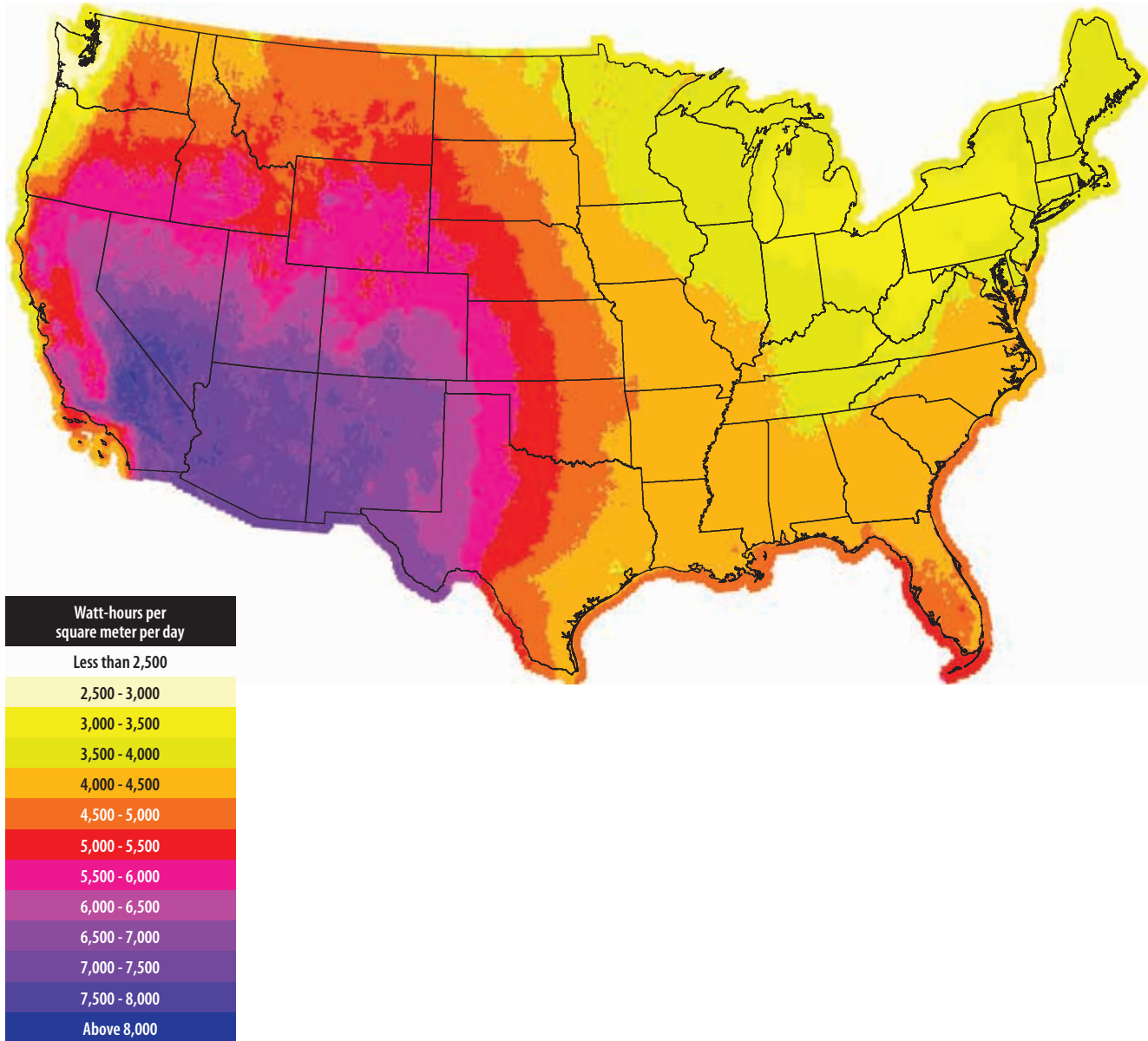
GIS Data Source: <http://www.nrel.gov/>.

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 Insulation for the United States, Two-Axis Tracker



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.