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CHAPTER 29 – UTILITIES AND ENERGY

For more than a century, certain services--energy and telecommunications services, in particular--have been regulated as natural monopolies, but in recent decades, as strategies have been devised to address the monopoly nature of these services, regulation has been replaced with market competition. Some forms of energy--electricity and natural gas--are provided by public utilities, while others--such as coal and petroleum products--are sold in unregulated markets.

This chapter is in two parts. The first part explores the nature of utility regulation, with particular emphasis on telecommunications and electric utilities. The second part provides a brief overview of energy use in Wisconsin, in general, and describes activities in the state to conserve energy and promote the use of energy derived from renewable resources.

David L. Lovell, Principal Analyst
Wisconsin Legislative Council

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UTILITIES

Utility services, such as electric power, natural gas, telephone, and water service, are easy to take for granted--they are generally available, reliable, and affordable. But they are also absolutely central to the functioning of our modern society. That general availability, reliability, and affordability did not come about by accident. They result from decades of development by the industries that provide these services and careful regulation by the state and federal governments. What is more, the industries continue to find innovative ways to provide services to the public, as well as finding entirely new services to provide, and regulators continue their efforts to ensure that these services are as universally available, reliable, and affordable as possible.

Q: What energy services does the PSC regulate?

A: Electricity and natural gas. Others, such as fuel oil, liquid petroleum, and coal, are not "natural monopolies."

Utilities as Regulated Monopolies

A public utility is a business that provides a vital service to society and that is considered to be a "natural monopoly"; that is, because of the massive investments in infrastructure required for the industry, it is perceived to be in the public interest to allow a single company to provide the service as a regulated monopoly, rather than having consumers pay for the construction of multiple systems by competing service providers. In Wisconsin, the Public Service Commission (PSC) regulates electric power and natural gas providers, and water and sewer service providers; the PSC retains very limited jurisdiction to regulate telecommunications companies.

The purpose of utility regulation is to protect the public interest while allowing a private concern to act as a monopoly in providing a necessary service. It is designed to ensure that the utility provides adequate service without using its monopoly position to obtain unjust enrichment. In order to be considered adequate, utility service must be available to all who need or want it, and it must be reliable, safe, and reasonably priced. To be considered reliable, the service must be available when needed or wanted, it must

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be sufficient, and it must meet quality standards. The PSC has a number of tools available to ensure that service meets these expectations.

In many cases, a regulated utility must obtain PSC approval prior to taking major actions, such as changing rates, commencing construction of major facilities, issuing stocks or bonds, or entering into business agreements with certain other entities. For actions that are subject to its approval, the PSC determines whether the action is prudent and in the public interest. The PSC will not allow a regulated utility to take an action that it determines is imprudent. For example, if the PSC determines that construction of a proposed facility is not needed and would create a financial liability for the utility and its ratepayers, it might find that the proposal is not prudent and so not allow it. In such a case, the PSC may deny approval outright, or it may make its approval subject to specific conditions that it considers necessary to protect the public interest.

The PSC approves utility investments if they are prudent and in the public interest.

The rates a utility charges for service are an important aspect of utility service that the PSC reviews. The principal model of rate setting is known as rate-of-return regulation. Under this model, the PSC sets a rate of return that a utility is allowed to earn on the value of its plant and equipment (its capital investments). Rates for service are then established that will produce revenues sufficient to cover the utility's operating expenses and capital investments (the cost of providing utility service) plus the authorized return on its capital investments.

The PSC also promulgates and enforces service rules, which are designed to ensure reliable and safe service and the fair treatment of customers. Service rules address topics such as connection and disconnection of service, metering and billing, security deposits, extension of service to unserved properties, customer service, consumer protection, safety, and service quality.

Trend Away From Regulation, Toward Competition

With new technologies, old assumptions about the monopoly nature of certain utility services no longer hold.

Utility rates were set under rate-of-return regulation for most of the 20th Century and this model still applies to much of the utility industry. Recent technological advances have produced new ways of providing old services, as well as entirely new services. With the new technologies, old assumptions about the monopoly nature of the market for certain utility services no longer hold, and it has become apparent that some utility services can be provided in a competitive market.

Since the 1980s, various service providers have been partially or fully deregulated, alternatives to rate-of-return regulation have been devised, and certain industry sectors have been significantly reorganized. The key policy innovation enabling competition in a "natural monopoly" was to give competitors access to established (termed "incumbent") utilities' transmission infrastructure. The evolution of utility service and utility regulation is ongoing.

State Versus Federal Jurisdiction

The regulation of public utilities is shared between state and federal regulators. There are general principles that set the bounds between state and federal jurisdiction, but their application is not always clear and simple. Some utility transactions are subject to both jurisdictions and in some cases a transaction (such as an interstate merger) may require approval from multiple federal agencies and from agencies in more than one state.

In general, state jurisdiction applies to activities or transactions that occur entirely within one state and that have a retail nature, while federal jurisdiction applies to activities or transactions that cross state lines or that have an interstate or wholesale nature. In the telecommunications sector, this generally means that local telephone service and intrastate long-distance telephone service (toll service within one state) are subject to state regulation, while interstate long-distance service is regulated by the Federal Communications Commission (FCC).

In the electric power sector, federal law gives regulatory jurisdiction to the Federal Energy Regulatory Commission (FERC). In general, state regulators must approve the rates for sales of electric power to end users, while FERC must approve the rates for sales to any entity that will resell the power. FERC has jurisdiction over long-distance transmission of electric power, while the PSC has jurisdiction over local distribution. The PSC has exclusive jurisdiction over the construction and operation of generation facilities, except for nuclear facilities, which are regulated by both the PSC and the federal Nuclear Regulatory Commission. With some exceptions, the sale of generation and transmission facilities and the acquisition or merger of electric utilities are subject to both state and federal regulation.

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Jurisdiction over natural gas companies is similar, with federal regulation of wholesale transactions and interstate pipelines and state regulation of retail sales and distribution systems. Water and sewer utilities usually are strictly local functions and are regulated only by the states.

Telecommunications Utilities

New telecom services--distance learning, telemedicine, etc.--are based on the transfer of data.

The early telecommunications industry offered only one service, utilizing only one technology--the transmission of voice over copper wires. The only distinction made in services was between local and long distance. In the 130 or so years since its birth, the industry has evolved to offer many more services utilizing several technologies. The new services generally are based on the transfer of data: "distance learning" uses telecommunications systems to connect students to classrooms or to online learning materials and libraries use them to make information available to their clients far beyond what they can keep onsite; "telemedicine" allows doctors in rural settings to confer with specialists in major hospitals, to read x-rays or other images, for example, and to monitor patients who are at home; many business functions use telecommunications, including communication within a business, between businesses, and with customers; governments use telecommunications to make their functions transparent to the public and to engage the public in those functions; and many forms of entertainment, such as watching videos or playing games, now rely on telecommunications.

In addition to the old copper wire technology, telecommunications systems now utilize fiber optic cables, coaxial cables (i.e., cable television systems), and radio waves, using either land-based cell towers or satellites for the relay of signals. Internet protocol is one of the most recent developments, including voice over Internet protocol (VoIP) service. VoIP can be used in connection with more than one transmission technologies. It is a manner of formatting information, rather than a distinct transmission technology. What is more, while VoIP signals can travel from one computer to another over the Internet, much VoIP traffic travels from telephone to telephone or from computer to telephone using the publicly switched telephone network for some part of the transmission. Industry representatives indicate that the use of VoIP is significant and growing. Cable providers in Wisconsin use VoIP exclusively, and other landline providers and wireless providers are increasingly using it, as well. Some suggest that the industry, as a whole, will make a complete transition to VoIP in the next 10 years.

Deregulation of the Telecommunications Industry

Dating to the turn of the 20th Century, the telecommunications industry was dominated by AT&T, a holding company consisting of three principal elements: American Bell Telephone, providing voice service; Western Electric, the manufacturing arm; and Bell Laboratories, the research arm. The federal government's first investigation into the monopoly nature of the company was in 1913, by the Interstate Commerce Commission, which was followed by numerous agreements and consent decrees entered into between AT&T and federal regulators. The U.S. Department of Justice commenced a comprehensive challenge to

AT&T's monopoly status in 1974, leading to the 1982 federal court order (referred to as the Modified Final Judgment, or MFJ) that, effective in 1984, broke apart the three arms of AT&T, divided American Bell Telephone into regional Bell operating companies (RBOCs), and opened long-distance telephone service to competition.

Subsequent state and federal legislation has largely deregulated telephone service, working within the framework of the MFJ. The goal has been to create competitive markets in telecommunications services. The strategy devised to get around the natural monopoly nature of telecommunications is to allow competitors to enter the market by using the existing infrastructure of the incumbent service providers.

To enable competition in a natural monopoly, incumbent service providers are required to give competitors access to their existing infrastructure.

The Federal Telecommunications Act of 1996 required incumbent providers of basic local exchange service (incumbent local exchange carriers, or ILECs) to give access to their facilities, at fair wholesale market rates, to competitors that wished to enter the local telephone market (competitive local exchange carriers, or CLECs). It also allowed local telephone service providers to enter the long-distance market and overrode state regulations that restrict competition in telephone service.

Wisconsin regulations developed in the 1980s and 1990s focused on landline systems, designed to protect CLECs from the market power of ILECs. Wireless (cellular) telephone providers were exempt from virtually all PSC regulation. Satellite providers are regulated under federal law, which preempts state regulation of these providers. A series of legislative enactments created a dizzying array of regulatory schemes, from which ILECs were allowed to select. This situation continued through the first decade of this century, until 2011 Wisconsin Act 22 swept away most distinctions between telecommunications service providers and most state regulation of retail telephone service.

Under current FCC interpretations, calls using VoIP that are either initiated or completed from a telephone (termed "interconnected VoIP") are telecommunications services subject to state regulation, while those that are both initiated and completed from a computer are not. Act 22 specified that interconnected VoIP service is exempt from virtually all PSC regulation. With the anticipated complete industry transition to VoIP, this exemption will apply to all voice service.

With the anticipated transition to VoIP, all voice service will be exempt from virtually all PSC regulation.

While the PSC no longer regulates the relationship between telecommunications utilities and their retail customers, federal law gives state regulators a role in inter-utility (or "inter-carrier") relations, enforcing the requirement that ILECs make their facilities available to CLECs. In addition, Act 22 specified that, in general, the rate that an ILEC

charges for making these connections for intrastate service cannot exceed what it charges for interstate service, and authorized the PSC to enforce this requirement.

Reconsolidation

The telecommunications industry has undergone considerable reconsolidation. Some of the RBOCs have re-merged. The RBOCs formed in Illinois, Indiana, Michigan, Ohio, and Wisconsin merged to form Ameritech, which was later acquired by SBC, formerly Southwestern Bell, creating a large telecommunications company providing local service not only in multiple states but in several widely separated regions of the United States. More recently, a merger brought the ILEC services of SBC and the CLEC and long-distance services of AT&T together in one company under the AT&T name.

The telecommunications industry has undergone considerable reconsolidation, nationally and within Wisconsin. In spite of this, the industry today looks nothing like it looked prior to the breakup of the Bell System.

Consolidation of ILECs has occurred within Wisconsin as well. AT&T Wisconsin remains the largest ILEC. However, several mid-sized to large companies have been formed by the merger and acquisition of existing small utilities. Verizon Communications, for example, grew in this manner and then, in 2010, was itself acquired by Frontier North. CenturyLink is a holding company that includes a dozen separate telecommunications utilities and TDS Telecom is a holding company of 19 small utilities.

In spite of this reconsolidation, the telecommunications industry looks nothing today like it looked prior to the breakup of the Bell System. Gone are the regulated monopolies offering voice service only over copper wires in distinct service territories. In their place are a number of major players and numerous smaller companies providing innovative services by multiple technologies in direct competition with each other.

Current Telecommunications Industry in Wisconsin

Voice Service

For some time, traditional phone companies have no longer been the leading providers of voice service, having lost that position to wireless (cell phone) providers. As Table 1 shows, approximately two thirds of voice service subscriptions are wireless, while only a quarter of subscriptions are land lines. VoIP is still a small, but growing portion of the market, for two reasons. First, there is an overlap between landline and VoIP, some VoIP services being carried over land lines. More important, many households have one land line and one

Wireless (cell phone) providers have replaced traditional land-line telephone companies as the dominant providers of voice service.

or more wireless subscriptions, which is why the total number of voice service subscriptions can be 1.5 million more than the state population.

In all three categories of service, the top five providers have the great majority of subscriptions. Two providers, AT&T and Verizon, are in the top five for both wireless and landline. Although data are no longer available by provider, information from 2010 showed AT&T to be the largest provider of voice service.

Table 1. Technologies Used to Provide Voice Service in Wisconsin

	Subscriptions	% of Total	Top Five Companies	% of Sector
Wireless	5,040,000	67%	Cellco Partnership(Verizon), US Cellular (TDS), New Cingular Wireless (AT&T), Sprint Nextel, and Net Lec (Northeast Communications of WI)	94%
Landline	1,770,000	24%	AT&T, CenturyLink, Frontier, TDS, One Communications Corp.	86%
VoIP	660,000	9%	AT&T, Charter, Time Warner Cable, TDS, Vonage	94%
Total	7,470,000	100%		

Source: PSC staff.

Advanced Telecommunications Services; Broadband

The term "advanced telecommunications services" refers to the various data-based services described earlier--distance learning, telemedicine, etc. These functions are considered critical to economic development as well as to the way that our modern society functions. They are highly data-intensive and so are dependent on high-speed data networks. Except where private data networks are used, they require broadband Internet access. The FCC defines "broadband" as any service that provides download speeds of at least 4 megabytes per second (mbps) and upload speeds of at least 1 mbps. Most broadband applications, though, require speeds greater than this.

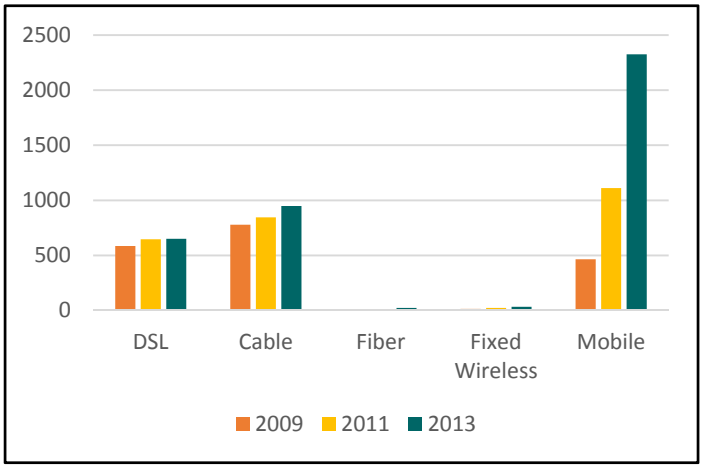
The deployment of broadband facilities continues to grow. However, there are still places with no broadband service.

The deployment of broadband facilities continues to grow. Access is available in almost every telephone exchange (by DSL) or zip code (by cable television), and often by both.

However, there are still places in the state with no broadband service, and the speed of the service available varies greatly.

Broadband service can be provided using any of several technologies. As Figure 1 shows, by 2011, wireless broadband subscriptions surpassed DSL and cable subscriptions, and have increased over 100% between 2009 and 2011 and again between 2011 and 2013. Cable and DSL broadband subscriptions also continue to increase but at a slower pace. Though a very small portion of the market, fiber and fixed wireless subscriptions are becoming more common.

Figure 1. Technologies Used to Provide Broadband Service in Wisconsin (thousands of subscribers)
Source: PSC staff.



Using federal stimulus funds, the PSC launched a broadband deployment effort. As part of this effort, it contracted with LinkWISCONSIN to create an interactive map of the state showing where broadband service is available. This map will help policymakers to develop programs to stimulate the deployment of broadband facilities and consumers to locate Internet service providers offering broadband service in their areas. In addition, the PSC has established and facilitated the work of nine regional broadband planning teams to address broadband infrastructure needs on a more local level. Building on the regional plans developed by these teams, the PSC has developed a "Playbook for Broadband Progress." As the title suggests, this is not a plan but rather is a compendium of strategies or "plays" that state and local government agencies, broadband service users and providers, and others can use to foster the deployment of broadband facilities.

The LinkWISCONSIN interactive map of broadband service availability in Wisconsin is available at this address: http://www.link.wisconsin.gov/lwi/default.aspx

The 2013-15 Biennial Budget Act (2013 Wisconsin Act 20) created the broadband expansion grant program. Under this program, the PSC awards grants for the purpose of constructing broadband infrastructure in underserved areas of the state, meaning areas served by fewer than two broadband service providers. For-profit and not-for-profit organizations, including cooperatives and telecommunications utilities, may apply for grants; in addition, a municipality may submit a joint application with another eligible applicant. Act 20 appropriated $500,000 annually for broadband expansion grants. The first grants were awarded in May 2014, funding six projects in rural areas of northern and western Wisconsin.

Video Service

Subscription video service ("cable TV") was initially offered by cable television companies, using coaxial cable technology, and by satellite companies. Land-based delivery of video services in Wisconsin was dominated by Time Warner and Charter Communications. At about the time that cable companies began competing with telecommunications companies in the delivery of voice service, telecommunications companies began competing with cable companies in the delivery of video service. AT&T is now a third dominant video service provider in Wisconsin.

For most of its history, land-based video service was regulated by municipalities under franchise agreements negotiated by municipalities and service providers. Legislation in 2007 replaced municipal franchises with state franchises, issued by the Department of Financial Institutions (DFI). At this time, there are 35 active video service franchises. The three dominant companies provide service primarily in eastern and central Wisconsin. The remaining franchise holders are mostly small cable or telephone companies, including some municipal and cooperative telephone companies, located throughout the state.

Universal Service Fund

To help ensure that everyone can obtain and afford telecommunications service, the state created the Universal Service Fund (USF) in 1997. From the USF, the PSC provides direct assistance to low-income customers and customers in high-cost areas of the state. It also assists disabled customers to obtain equipment to give them access to telecommunications and provides funding for deployment of essential telecommunications services, such as telemedicine services in rural areas. The Legislature sets the budget for the program; the PSC then apportions the cost among the telecommunications providers in the state, which collect the funds from customers as a fee on their bills. The budget for all programs funded from the USF is about $42.7 million in each year of the 2013-15 fiscal biennium. There is also a federal USF. It is funded in the same manner as the state USF, and provides similar services.

Trends in Telecommunications

Technology

The growing dominance of wireless providers for both voice and broadband service is a very significant trend. This development is made possible by the on-going evolution of the transmission network from copper wire to optical fiber, and the switching of transmission from analog to digital format. The end point of this trend is not known, but it seems unlikely that we will see the end of landline service altogether.

Another significant trend is the growing reliance by telecommunications providers on VoIP, especially when bundled with an Internet access subscription. Some envision a complete conversion to VoIP in the next decade or so, while others think that some remnants of the publicly switched telephone network will remain for some time beyond that. Because the

state does not have jurisdiction to regulate computer-to-computer VoIP, and because 2011 Act 22 exempts interconnected VoIP from all retail regulations (apart from the collection of certain fees), the conversion to VoIP has the potential to complete the deregulation of retail telecommunications service in Wisconsin.

Universal Access to Service

When 2011 Act 22 repealed most regulations on retail telecommunications service, it ended the "obligation to serve," the duty of ILECs to serve as "providers of last resort." When telecommunications utilities enjoyed monopolies in their local service territories, this policy had ensured that any person could obtain landline telephone service at a reasonable cost. In repealing the obligation to serve, the act recognized the growing dominance of wireless service and the competition that had developed among multiple landline, cable, and wireless providers. The new regime relies on this competition, rather than regulation, to ensure that all customers have access to service and to discipline pricing among competitors.

Some observers suggest that competition may not be sufficient in hard-to-serve areas. In some places, abrupt topography makes wireless service unreliable. They note that Act 22 repealed the requirement for PSC approval prior to abandonment of service and facilities. These observers fear that ILECs will abandon landline service in high-cost, rural areas, leaving some customers with few, if any, reliable options. The ILECs respond to these concerns that they have no intention to abandon any services or facilities, and PSC staff is not aware of any such abandonments having occurred.

Electric Utilities

Structure of Electric Utilities

The three components of the electric power system are generation, transmission, and distribution.

In Edison's time, individual electric power plants were built to serve a single city; distribution lines connected these power sources to the customers. Over time, as service was extended beyond the cities, it became apparent that system reliability could be improved and economies of scale could be achieved by connecting neighboring power plants. These interconnections also allowed electric utilities to buy electric power from neighboring utilities. These developments established the three components that make up the electric power system: facilities for the generation of electric power; networks of high-voltage transmission lines to carry power between utilities, or to load centers within a utility's service territory; and networks of low-voltage distribution lines to carry power to end users.

The early electric power industry consisted of vertically integrated monopolies. That is to say, each utility served an exclusive service territory and provided all three functions of

electric utilities--generation, transmission, and distribution. These monopolies were strictly regulated under the rate-of-return model, as they are today. However, substantial regulatory innovations have been made, principally affecting the structure of the utilities, for which reason these innovations are commonly referred to as "restructuring."

Electric Industry Restructuring

The restructuring of the electric power industry has, in general, the same goals as the deregulation of the telecommunications industry--to obtain the benefits of competitive markets in the production and delivery of electric power. It has been prompted by a number of factors. A key factor is the fact that the cost of producing electric power varies from plant to plant, depending on things such as the age and efficiency of the plant and the cost of the fuel used. However, utility customers pay a price that reflects the cost of production from all generation facilities that a utility uses. Large users of electricity, in particular, would like the ability to access the wholesale market to buy power directly from the least expensive source. This led to an interest in creation of competitive retail markets for electric power.

The restructuring of the electric power industry has, in general, the same goals as the deregulation of the telecommunications industry--to obtain the benefits of competitive markets in the production and delivery of electric power.

Issues of wholesale competition are subject to federal jurisdiction and so depend on the actions of Congress and FERC; issues regarding retail energy markets, in particular the question of allowing end users to buy electric power directly from the provider of their choice, are governed by the states.

Wholesale Competition

Congress and FERC have made very substantial progress in the creation of competitive wholesale markets in electric power. With enactments dating to 1978, Congress authorized non-utility entities to compete with electric utilities in producing power, and required the owners of electric transmission lines to let any generator transmit power over their lines at approved and published rates.

Much progress has been made in creating a nationwide competitive wholesale electric power market, but states have varied greatly in creation of competitive retail markets.

In numerous subsequent orders, FERC has worked to create conditions in which the owners of generation and transmission facilities are not able to gain unfair advantage over competitors. It has done this, in particular, through ordering the "structural separation" of generation functions from transmission functions, and by setting standards for regional transmission organizations (RTOs), ensuring that all

participants in the market have equal and fair access to the transmission functions that are necessary for the market to work.

Retail Competition

The states vary greatly in the actions they have taken to create competitive retail electric power markets. Some states enacted sweeping restructuring laws, allowing retail competition for all customers, splitting vertically integrated utilities into separate generation, transmission, and distribution entities, and creating market-based mechanisms to set prices for electric power. California led the retail competition experiment in the late 1990s and was followed by about half of the states. However, the system California designed to set market prices failed spectacularly in 2000 and 2001, causing extreme spikes in the cost of electricity and contributing to widespread blackouts. The failure was due in part to extreme weather events and inadequate facilities, but was due in substantial part to flaws in the market design and manipulation of the wholesale market by power generators and traders. Following this crisis, California significantly curtailed its retail market experiment, several other states repealed their restructuring legislation, and several more tabled pending restructuring legislation.

Wisconsin did not fully restructure its electric utility industry.

Other states did no more than conduct studies of retail electric competition. In Wisconsin, the PSC initiated an incremental process to make the reforms it considered necessary precursors to the creation of a retail power market. However, it did not complete this process and the subject never came to the Legislature. At this time, 18 states operate some form of retail electric power market.

Reliability of Electric Power Supply

During the 1990s, when restructuring dominated the electric utility policy arena, electric utilities largely deferred decisions regarding construction of new generation and transmission facilities. One reason for this was uncertainty about the future regulatory landscape, in particular the ability of investors to fully recover their investments in these highly capital-intensive facilities. However, demand for electric power continued to grow throughout this period. As a result, Wisconsin and many other states found themselves on the verge of a power supply crisis.

Legislation around the turn of the century was designed to facilitate the construction of need electric power infrastructure.

This developing crisis was brought to light dramatically in 1997 when a period of exceptionally hot weather produced record demand for electricity, which taxed the transmission system and threatened to bring it down entirely. The Wisconsin Legislature responded with a series of enactments to strengthen the system and facilitate the construction of needed facilities. Legislation in 1997 and 1999 brought about the

separation of generation and transmission facilities in much of Wisconsin by calling for the formation of an independent transmission company within the framework of an RTO. The purpose and result of these changes were to increase system reliability by strengthening wholesale electric markets and bringing regional coordination to the system, consistent with the FERC actions described earlier.

Additional enactments were designed to facilitate the construction of needed generation and transmission facilities. In particular, efforts were made to shorten and streamline the process by which proposed construction projects are reviewed and approved, including the coordination of the Department of Natural Resources' (DNR) environmental permitting process with the PSC's review. Legislation also provided revenue enhancements to municipalities in which utility facilities are located. The purpose was to provide financial mitigation to municipalities for the impacts of a facility on a community and to thereby reduce potential local opposition to the siting of new facilities.[1]

Current Electric Industry in Wisconsin

The developments described above have transformed a vertically integrated industry into a more diverse industry with varying degrees of vertical integration or separation. As in the telecommunications industry, consolidation of energy utilities has also occurred. Nationwide, mergers and acquisitions have created a number of very large, multi-state utilities often in the form of holding companies. In Wisconsin, Alliant Energy was formed by the merger of Wisconsin Power and Light Company (WP&L) with two Iowa utilities; Wisconsin Energy, the parent company of Wisconsin Electric Power Company (WEPCO), grew within the state by acquiring Wisconsin Gas, one of the major natural gas utilities of the state; and Northern States Power-Wisconsin (NSPW) is a subsidiary of Xcel Energy, a company with operations in eight states from Michigan to Texas. Most recently, in June 2014, Wisconsin Energy announced an agreement to acquire Integrys Energy Group, the parent company of Wisconsin Public Service Corp. This trend has not been followed by the small investor-owned utilities, nor by the municipal utilities or cooperatives.

Developments in the last 35 years have transformed a vertically integrated industry into a more diverse industry with varying degrees of vertical integration or separation.

[1] In addition, utilities often voluntarily agree to make "mitigation" payments to the communities that are host to their facilities.

Generation

Electric generation plants can be categorized by their use. Base load plants are those that run essentially all the time, to meet the base level of electricity that is needed continuously. Peak load plants ("peakers"), on the other hand, are run only when needed to meet peaks in demand. There are both daily and seasonal demand peaks. Air conditioning uses a great deal of electricity, producing a summertime peak in demand. There is also a noticeable peak around the winter holidays, due to the popularity of outdoor lighting during this time. On a daily basis, high summer temperatures lead to peaks in demand in the late afternoon, when people are coming home from work and cooling down their homes. In between base load and peak load plants are what are sometimes called intermediate load plants. Base load plants tend to be large (capacities of 500 MW and higher) and very expensive to build but inexpensive to run. Coal and nuclear plants provide the greatest share of base load generation. Some renewable resource, such as water and biomass, contribute to base load generation; wind power is an intermittent resource, providing power only when there is sufficient wind. Combined cycle gas turbines (CCGT) are commonly used as peak load plants. These are efficient and flexible plants. They can be built in various sizes, often less than 100 MW, and can be turned on and off fairly easily, compared to coal and nuclear plants. When natural gas prices were high, CCGTs were used almost exclusively to meet peak demand, but with the current low price of gas, they are increasingly being used for intermediate and even base load.

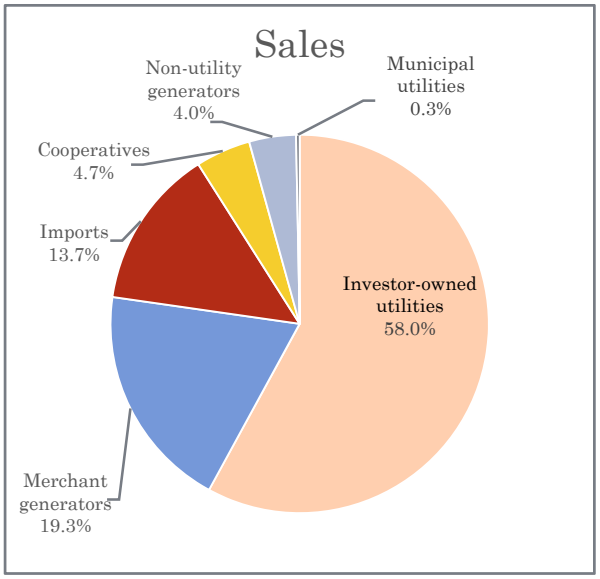
Coal and nuclear power plants run almost continuously, providing base load. Natural gas-fired plants are used as needed to meet peak demand, and are increasingly being used for intermediate and base load.

All of the major electric utilities in Wisconsin own generating facilities, as do some of the smaller utilities. Some generating facilities are owned by non-utility companies, termed independent power producers (IPPs) or merchant generators. Merchant generators are not regulated by the PSC, though they are often affiliated with regulated utilities; it appears that at least one Wisconsin utility has a merchant generator affiliate. Merchant generators most often own renewable resource generation (primarily wind and water) and CCGTs; also, as is described below, the operating nuclear plants in Wisconsin are owned by merchant generators.

Wholesale electric cooperatives and municipal electric companies are entities that supply electricity at wholesale to their member electric cooperatives and municipal utilities, respectively. Dairyland Power Cooperative (DPC) and Wisconsin Public Power, Inc. (WPPI) are the principal players in this arena. Both own small amounts of generating capacity and purchase the majority of their electricity from other generators.

The majority of electricity used in Wisconsin is generated by investor-owned utilities. (See Figure 2.) Merchant generators provide the next largest share. The non-utility generator category in the figure is mostly large industrial energy users that generate electricity for their own use and sell excess power into the grid. The import category is electricity purchased from generators in neighboring states.

Figure 2. Sources of Electricity (2012)
Source: Department of Administration (DOA), State Energy Office.



There are four nuclear generating units in Wisconsin. The oldest is the La Crosse Boiling Water Reactor, built as a demonstration facility in 1967 by the Atomic Energy Commission and DPC. It is now owned by DPC, which closed the plant in 1987 and has recently begun to decommission it. The three other nuclear generators were built by Wisconsin utilities and later sold as part of a nationwide trend in which utilities are reducing their risk by selling their nuclear plants to a relatively few national companies that are specializing in the operation of nuclear plants. NextEra, the parent company of Florida Power and Light, owns and operates the two-unit Point Beach facility, which is licensed to operate into the 2030s. Dominion Energy, of Virginia, bought the Kewaunee Nuclear Generating Station, but closed the facility in 2013 and is beginning the process of decommissioning it.

Spent fuel is a continuing issue for nuclear generating plants. In the absence of a federal disposal facility, generators are forced to store the material on-site. After a number of years of storage in pools, spent fuel is moved to above-ground dry cask storage. DPC has moved all spent fuel from the La Crosse facility into dry-cask storage, and Dominion Energy will do the same with the spent fuel at Kewaunee. Both will have to continue to safeguard this material indefinitely, even though the plants are no longer operating.

A relatively few national companies now specialize in the operation of nuclear power plants.

The last decade or so saw a substantial amount of construction of new electric generation capacity in Wisconsin. Nearly 2,000 megawatts (MW) of coal-fired base load generation has been built, although nearly 1,000 MW of coal-fired generation has been either retired or converted to use natural gas. At the same time, from these conversions and new construction, nearly 3,000 MW of gas-fired generation has been brought on line. In addition, about 900 MW of wind generation has been built. All of the coal-fired facilities

have been built by public utilities; some of the gas-fired and wind-powered projects have been built by public utilities, as well, though a number have been built by merchant generators.

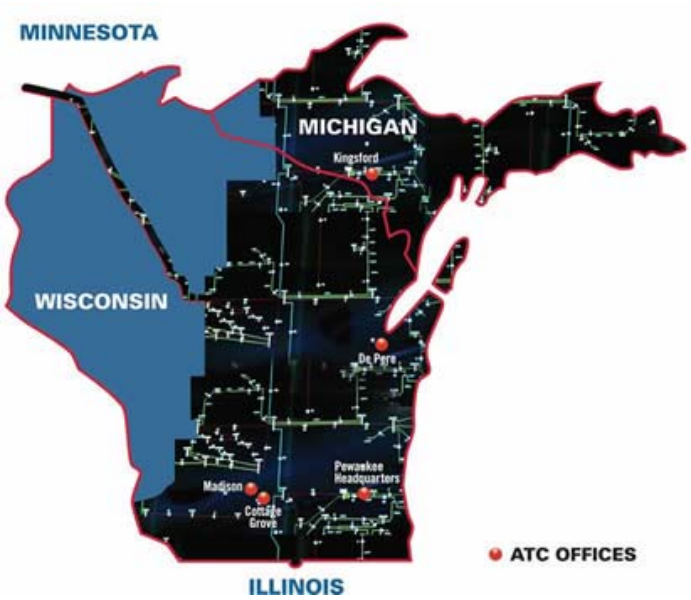
This building cycle appears to be slowing. As of this writing, no proposals for new electric generating facilities are pending before the PSC. One wind project has been approved but not built yet, and one or more utilities are studying possible new gas-fired generation projects.

Transmission

In response to the late-1990s legislation described earlier, the utilities in the eastern 2/3rds of the state--WEPCO, Wisconsin Public Service Corp. (WPSC), WP&L, and Madison Gas and Electric Co. (MG&E)--created the American Transmission Co. (ATC) and contributed their transmission facilities in Wisconsin, northern Illinois, and the Upper Peninsula of Michigan to it. In addition, two municipal electric companies (WPPI and Badger Power Marketing), and a number of municipal utilities and cooperatives have invested in ATC, giving them a share in the company's transmission facilities. The two entities that own the bulk of the transmission facilities in western Wisconsin, NSPW and DPC, retained ownership of those facilities at the time ATC was formed. Figure 3 shows the service area of ATC.

The transmission network in southern and eastern Wisconsin is owned by the American Transmission Company. Northern States Power-Wisconsin owns the bulk of the remaining transmission lines in Wisconsin.

Figure 3. American Transmission Co. Service Area



At the time that ATC was formed, Wisconsin faced serious transmission problems. In particular, there were transmission "bottle necks" which, under the regional power market described below, increased the cost of transmitting power to Wisconsin users. In addition, the growing interest in renewable energy, especially wind power, created the need for new lines to carry this power from the scattered generation sites to users.

Note: The diagonal line across northwestern Wisconsin is the Arrowhead-Weston transmission line.
Source: ATC website: About Us--Service Area, http://www.atcllc.com/about-us/servicearea.

Major investments are being made in the transmission grid in Wisconsin to address these issues and to ensure the overall reliability of the system. Since it became operational in 2001, ATC has invested $3.2 billion to upgrade more than 1,780 miles of existing lines, construct more than 580 miles of new lines (including the Arrowhead-Weston and Rockdale-West Middleton lines), and make other system improvements. Some of these improvements have increased the efficiency of the system by reducing line losses--the loss of electric power as heat--meaning that more of the electricity put into the transmission system reaches end users. ATC anticipates investing an additional $3.0 to $3.6 billion in the next 10 years in similar projects.

Major investments are being made in the transmission grid in Wisconsin.

Northern States Power - Wisconsin (NSPW) is also making transmission system improvements. CapX2020 project, an 800-mile transmission project of 11 utilities in four states, is now under construction, and NSPW is developing a number of other projects, including new construction as well as upgrades of existing facilities.

Because of the regional nature of modern energy markets and the fact that the various electric utilities' transmission systems are interconnected and interdependent, regional planning is critical for maintaining a reliable and efficient system. Numerous regional initiatives, involving utilities, regulators, and regional system operators, are ongoing for this purpose. One of the key issues in the Midwest is planning the transmission facilities that will bring energy from wind farms in the Great Plains to the major population centers in the Great Lakes region.

The Midcontinent Independent System Operator (MISO) is a key player in both the generation and transmission of power. It is a membership organization consisting of power generators, power traders, transmission companies, and other entities in a region that includes all or part of 15 states and one Canadian province, from Ohio and Michigan west to Nebraska, Montana, and Manitoba. MISO was originally established as an RTO which, under FERC regulations, was responsible for ensuring the reliability of the transmission system within its region and was required to prepare comprehensive plans for the transmission system. MISO has expanded its functions and now also manages a regional power market, which uses an auction process to set daily wholesale prices of power at more than 1,700 discrete locations throughout its region. It also determines the dispatch of generating facilities within its region as needed to meet demand and maintain the functioning of the transmission system.

The Midwest Independent System Operator (MISO) is a key player in both the generation and transmission of electric power in all or part of 15 states and one Canadian province.

Distribution

Electric utilities and cooperatives are the only entities that may provide retail electric service in Wisconsin. There are five "major" electric utilities in the state, although they vary substantially in size. (See Table 2 and Figure 4.) In addition, there are six small investor-owned utilities and 82 municipal utilities. Rural electric cooperatives are another important part of the retail electric service market. Apart from the requirements of the State Electrical Code, cooperatives are not subject to PSC regulation. There are 24 cooperatives serving rural areas, primarily in the western and northwestern parts of the state.

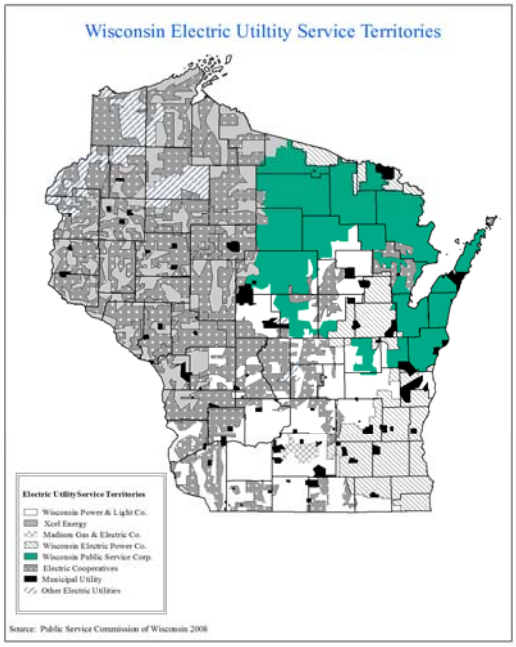
Electric utilities and cooperatives are the only entities that may provide retail electric service. Cooperatives are generally exempt from PSC regulation.

Table 2. Retail Electric Sales by the Five Largest Utilities (2013)

Utility	Sales (Thousands of MW Hours)	Revenues ($ Millions)
Wisconsin Electric Power Co. (Wisconsin Energy)	25,828	$2,992
Wisconsin Public Service Corp. (Integrys)	10,826	$990
Wisconsin Power and Light Co. (Alliant Energy)	10,430	$1,005
Northern States Power Co.--WI (Xcel Energy)	6,561	$646
Madison Gas and Electric Co.	3,318	$409

Source: PSC, from Utility Annual Reports.

Figure 4. Electric Utility Service Territories



Source: PSC staff.

Emerging Issue: Distributed Generation and Third-Party Ownership

Distributed generation, in the broadest sense, is any generation that is not a large, centralized generating station, though the statutes define it as being no larger than 15 MW. It can use any source of energy, even small, modular nuclear generating units, but often uses renewable resources such as water, sun light, or biogas. Distributed generation can be owned by the incumbent electric utility, by the end user of the electricity, or by a third party. To encourage development of distributed generation, Wisconsin has standards for interconnection between these generators and utility networks.

Distributed generation is often sited at or near the location of one or more end user. The end users can be as small as an individual home or as large as a major manufacturing or commercial facility. Epic, the medical software company, is a good example of what can be done. It has constructed a 10 MW wind farm at Springfield. Currently, it sells the output of this facility into the grid, but it is in the process of building an underground transmission line to bring the power directly to its Verona campus. It has installed 1.5 MW of solar generating capacity in the form of roof-top panels and is planning two biodigester projects, one on site to manage food and garden waste and another in collaboration with nearby farmers.

Federal law requires electric utilities to buy electricity generated by non-utility entities, large and small, in their service territories. The price a utility pays for this electricity is set in tariffs, approved by the PSC. Utilities generally pay their "avoided cost," that is to say, what it would have cost the utility to generate the electricity itself. For very small facilities, some utilities have observed a "net metering" policy, which is to say that the utility pays the generator the same amount it charges to sell electricity, for an amount of electricity up to the amount the utility sells to that customer – equivalent to running the meter forward when the utility is delivering electricity to the customer and running it backward when it is receiving electricity from the customer. For electricity beyond that amount, the utility pays either the avoided cost or a price in between.

Third party ownership of distributed generation is an increasingly popular option and business model. Most end users of electricity do not have the technical expertise to operate their own energy system, nor the capital to install it. Companies with the necessary expertise and capital will install and operate a system for an end user. While this arrangement works well for the two parties, it raises legal questions and concerns for the incumbent utility. In particular, if the third party sells electricity to the end user, does that make it a public utility, operating without a certificate from the PSC in the incumbent's exclusive service territory? In addition, does this relationship relieve the incumbent of its obligation to provide service to the end user? If not, how does the incumbent recover its cost of providing stand-by service? The PSC could resolve these issues. However, given the fundamental policy choices involved, some suggest that they may be best resolved by the Legislature.

ENERGY

It is no exaggeration that almost every modern human endeavor is dependent, directly or indirectly, on some external source of energy. This part of this chapter provides a brief overview of energy use in Wisconsin and describes state policies and programs related to the production and use of energy.

Energy Use in Wisconsin

Energy is used for many purposes and in many forms. In rough approximation, about one-third of Wisconsin's energy use is for transportation, about one-fourth is for manufacturing,

and the balance is used mostly in residential and commercial buildings--for heating, cooling, lighting, and other functions. Agriculture accounts for the small remaining fraction of our total energy use.[2] (See Figure 5.) The largest share of the energy used in the state is in the form of petroleum (used primarily for transportation), followed by natural gas and electricity. (See Figure 6.) Figure 6 shows coal as accounting for only 3.8% pf energy used in Wisconsin. However, the full importance of coal is seen by adding the coal used to generate electricity to this, which brings this figure up to 15.2%, a four-fold increase.

Figure 5. End Use of Energy by Economic Sector (2011)

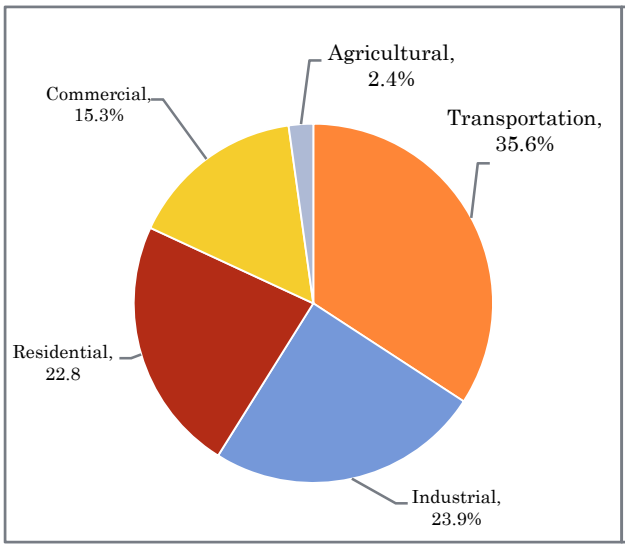
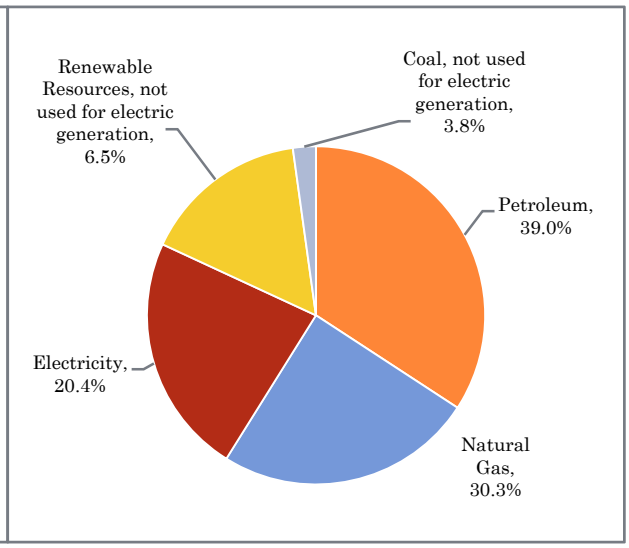


Figure 6. End Use of Energy by Fuel (2011)



Source: DOA, State Energy Office.

Electricity is a form of energy that is generated from other forms of energy. Figure 7 shows electric generation capacity in Wisconsin by fuel type. The largest share of generation capacity is provided by coal-fired facilities, with natural gas-fired generation close behind. These are followed, in order, by nuclear power, petroleum-fired generation, and the several forms of renewable energy, although the renewables collectively, exceed petroleum.

Actual generation shown in Figure 8, follows a somewhat different pattern. Coal and nuclear power plants run almost continuously, while most, but not all, natural gas- and petroleum-fired power plants run only as needed to meet demand. As a result, as shown in these figures, coal and nuclear facilities provide larger proportions of the total electricity generated in the state than their proportion of capacity, and gas and petroleum facilities produce proportionately far less.

[2] These figures refer to "end use" energy, the energy that reaches the end user. "Resource energy," in contrast, includes the energy that is lost in the production and delivery of energy to end users.

Figure 7. Electric Generation Capacity, by Fuel Type (2012)

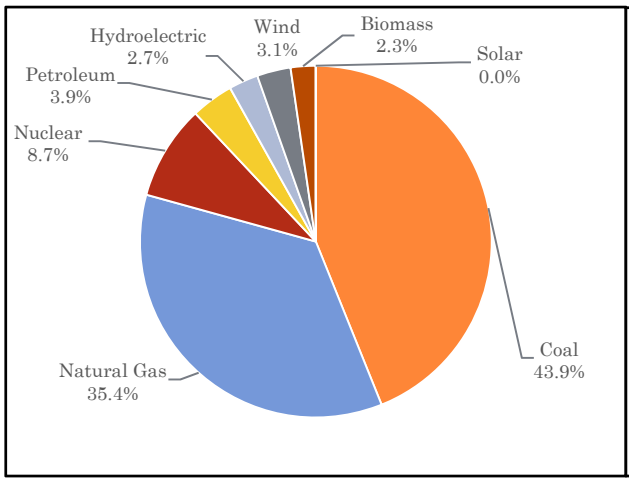
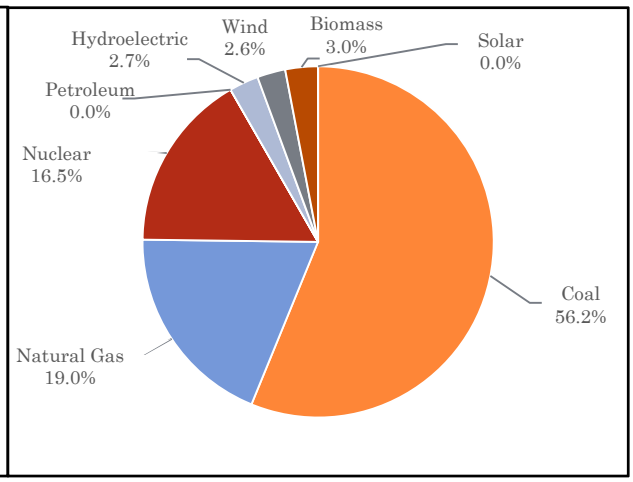


Figure 8. Actual Electric Generation, by Fuel Type (2012)



Source: DOA, State Energy Office.

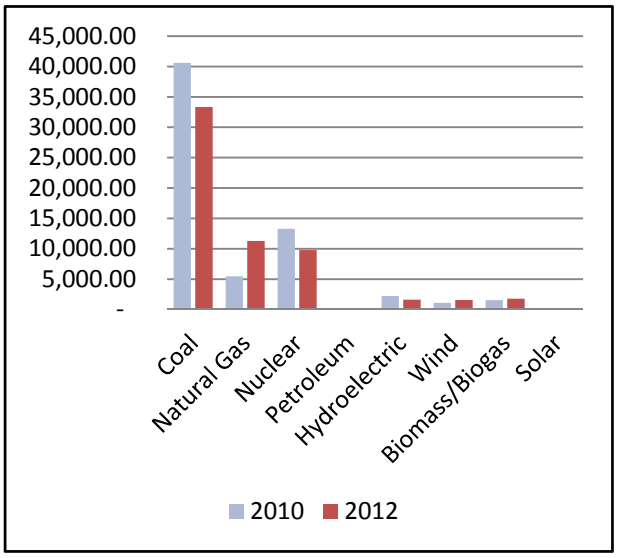
For further information on energy use in Wisconsin, including the annual Energy Statistics Book, see: http://energyindependence.wi.gov/section.asp?linkid=1733&locid=160

There is a growing emphasis on renewable energy. The term refers to energy from sources that can be replenished, such as biomass (plant matter and animal waste, generally), or that are inexhaustible, such as sunlight, wind, or water.[3] Many forms of renewable energy are natural, but energy derived from agricultural, industrial, or municipal waste are also generally considered renewable. Many renewable resources are used to make electricity, including sunlight, wind, water, biomass, and geothermal heat. Others, such as biomass and various waste materials, are used to make liquid or gaseous fuels, such as ethanol and methane (often referred to as "biogas"). Still others, such as sunlight and geothermal sources, are used as direct sources of heat, for heating buildings and for industrial processes, among other uses.

The mix of fuels used to generate electricity is changing. (See Figure 9.) In particular, the dominance of coal is decreasing. In spite of the recent construction of several large coal-fired facilities, the retirement of some facilities and conversion of others to natural gas, described earlier, has reduced the proportion of coal-fired generation capacity. Actual generation by coal has also dropped. The role of nuclear generation is also declining. However, the information in Figure 9 does not reflect the closing of the Kewaunee Nuclear Generating Station, which occurred in 2013. The 2014 figures will show a significant reduction in nuclear capacity and generation. At the same time, the role of natural gas has increased.

[3] An alternative definition of "renewable resource" is any energy source that is not a fossil fuel, excluding nuclear energy.

Figure 9. Electric Generation by Fuel
Source: DOA, State Energy Office.



The decline of coal and the rise of natural gas may be explained in financial terms. Two sets of regulations, relating to the emission of toxic pollutants and to the interstate transport of certain air pollutants, could require the owners of coal-fired generation to make extensive and very expensive up-grades to their facilities. Although the U.S. Supreme Court has upheld both sets of regulations, in general terms, they are still the subjects of litigation, and it is not known when they will be implemented. In addition, in June 2014, the President announced regulations on carbon dioxide emissions; however, the final form these regulations will take and when they will be implemented, even if they will be implemented, are still unknown.

At the same time, natural gas prices have been low. What is more, gas-fired electric generation facilities can be built in smaller units than coal-fired facilities, and at a lower cost per MW of capacity.

A third factor is the growing role of renewable energy, driven in part by popular demand, but primarily by the renewable portfolio standard, described later in this chapter.

These factors together appear to have triggered, or at least contributed to the downward trend of coal. It is not clear how long the trend will continue, or how far it will go. The utilities have long anticipated the federal regulations on air pollution and have factored the anticipated cost of them into their decision making. These costs and the current low cost of natural gas have no doubt influenced their decisions on what new generation to build.

To the extent that future regulation of carbon dioxide emissions is expected, there is an increasing interest in "carbonless" electric generation. This includes two categories. First, the use of biomass to generate electricity cycles carbon from short-term repositories or "sinks" (e.g., forests or crops) rather than removing it from long-term sinks, such as coal and oil deposits. Some energy sources, though, are almost totally carbonless. These include certain renewable energy sources, such as wind and hydro power, and nuclear generation.

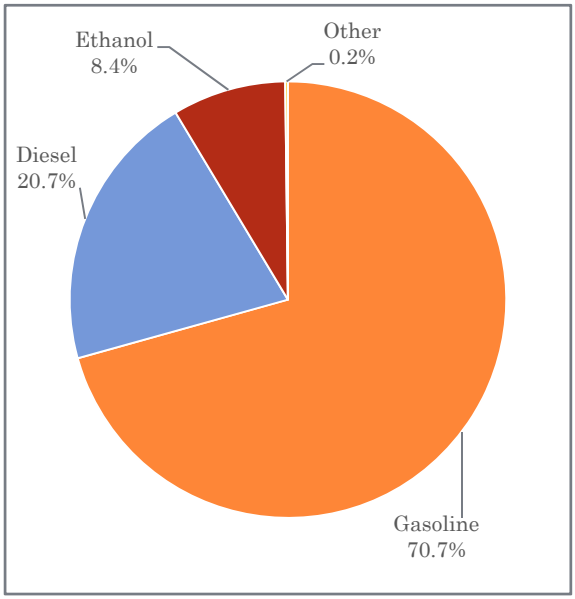
Transportation Fuels

The great bulk of transportation fuel used in Wisconsin, as elsewhere, is gasoline and diesel. (See Figure 10.) However, use of alternative fuels is growing. While there is no state mandate for the blending of alternative fuels with other fuels, federal law requires suppliers to utilize certain amounts of renewable fuels. Ethanol is the principal renewable

fuel available and so, under this federal mandate, it has become a significant portion of the transportation fuel supply.

Three other alternative fuels, compressed natural gas, liquid propane gas, and liquid natural gas, are a very small (0.2%) but growing component. The principal users of these fuels are commercial and municipal fleets, which have their own, centralized fueling facilities. Expansion of their use is limited by the general lack of fueling stations available to the public and the limited availability of vehicles designed to use these fuels.[4]

Figure 10. Transportation Fuel Use (2013)



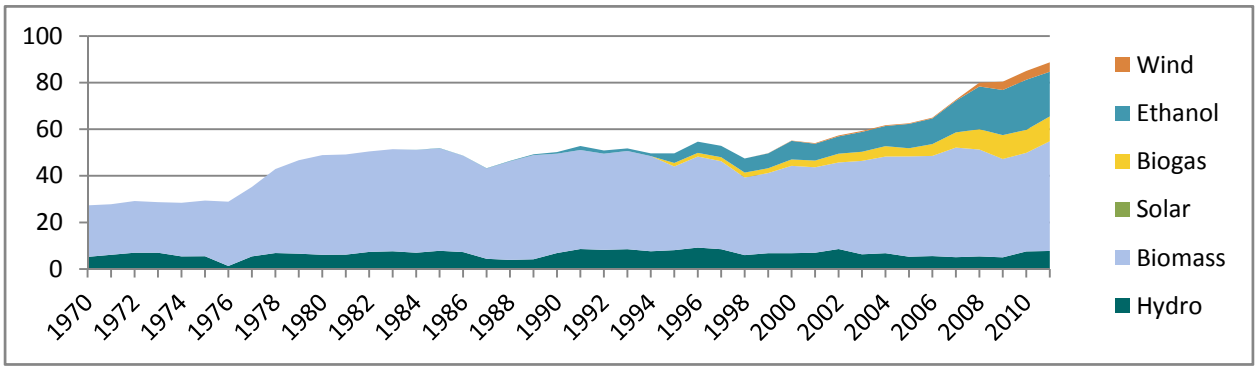
Note: "Other" consists of compressed natural gas, liquid propane gas, and liquid natural gas, in decreasing order.

Source: DOA, State Energy Office.

Renewable Energy

Wisconsin has long used energy from biomass and hydro power. (See Figure 11.) Initially, the biomass used was primarily waste from logging and forest products industries. That use has continued, even expanded, at the same time that other biomass resources have been exploited. While hydro power capacity has not increased in a long time, production of hydroelectric power varies from year to year, based on stream flow. Use of other renewable energy sources, biogas, ethanol, and wind, has become significant in just the past two to three decades.

Figure 11. Energy Derived from Renewable Resources



Source: DOA, State Energy Office.

[4] Because the data regarding fuel use is based on gas tax reports, it does not include fuels used by tax-exempt entities, primarily state agencies and municipalities. The actual total use of "other alternative fuels" in particular is higher than shown in Figure 10.

State Energy Policy

The state energy policy is set forth in s. 1.12, Stats. The policy is in five parts. The first part relates to energy conservation. It states that a state agency or local governmental unit shall investigate and consider the maximum conservation of energy resources as an important factor when making any major decision that would significantly affect energy usage.

The second part of the energy policy establishes three goals relating to the generation and use of energy:

- To reduce the ratio of energy consumption to economic activity in the state, referred to as the "energy intensity" of the state economy. This goal seeks to increase the overall energy efficiency of the state's economy by reducing the amount of energy consumed per unit of economic activity.
- To base all new capacity for electric generation on renewable energy resources, to the extent feasible.
- To increase the forested area of the state, in order to ensure a future supply of wood fuel and reduce atmospheric carbon dioxide.

The five-part state energy policy is designated to guide the state in decisions affecting its own energy use and regulatory actions affecting others' energy use.

To monitor progress toward achieving the first of these goals, the DOA is required to develop an index of the energy intensity of the state economy and report annually to the Legislature regarding progress made. To monitor progress made toward achieving the third goal, the DNR is required to submit a biennial report to the Legislature regarding the extent of forest lands in the state and their potential to provide wood fuel.

The third part of the energy policy is a priority list of options for meeting the energy demands of all energy users in the state. It states that, "to the extent cost-effective and technically feasible," options for meeting energy demands should be considered in the order of the priority list. The options, in order, are the following:

- Energy conservation and efficiency.
- Noncombustible renewable energy resources.
- Combustible renewable energy resources.
- Nonrenewable combustible energy resources, in the order listed:
    - Natural gas.
    - Oil or coal with a sulfur content of less than 1%.
    - All other carbon-based fuels.

The fourth part of the policy is a pair of directives to state agencies and local governmental units. First, it requires that, in designing all new and replacement energy projects, state agencies and local governmental units rely, to the greatest extent feasible, on energy efficiency improvements and renewable energy resources. Second, it requires that, to the greatest extent feasible, state agencies and local governmental units design all new and replacement energy projects following the priority list in the third part of the policy.

The fifth part of the policy is a priority list of options for the siting of electric transmission facilities, similar to the priority list for meeting energy demand. It states that, "to the greatest extent feasible that is consistent with economic and engineering considerations, reliability of the electric system, and protection of the environment," transmission routes should be selected making use of the following types of corridors, in the order listed:

- Existing utility corridors.
- Highway and railroad corridors.
- Recreational trails, to the extent that the facilities may be constructed below ground and that the facilities do not significantly impact environmentally sensitive areas.
- New corridors.

The DOA and the PSC are required to implement the priority list of energy sources in designing and implementing energy programs and making energy-related decisions and orders. The DNR, the Department of Transportation, and the PSC are required to implement the transmission corridors priority list in making all decisions, orders, and rules affecting the siting of new electric transmission facilities.

The energy policies are binding only on state agencies and local units of government, although they also serve as encouragement to others to follow a similar path in meeting energy needs.

In addition to the policies in s. 1.12, Stats., the PSC is required, upon request, to analyze the impact that a bill or proposed rule will have on the cost or reliability of electricity generation, transmission, or distribution of fuels used in generating electricity and to prepare a report including findings and conclusions. A request for this analysis may be made by the chair or ranking minority member of the standing committee of the Legislature to which the proposal has been referred or, if not referred to a standing committee, by the Speaker of the Assembly or the President of the Senate. The purpose of such a report is to ensure that the Legislature and its committees know the impact that a given proposal will have on the cost or reliability of electric power prior to taking action on the proposal.

The energy policies in s. 1.12, Stats., apply only to state and local governments, although they serve as encouragement to others to follow a similar path in meeting energy needs. The policies do not dictate the outcome of any individual agency decision; rather, an

agency's compliance with the policies is reflected in the process the agency uses in reaching decisions, as well as the overall pattern of the agency's decision.

State Energy Office

The State Energy Office (SEO) in the DOA performs a variety of functions focused on the development and use of clean and renewable energy resources and improving the efficiency of energy use. Much of its work involves administering federal energy contracts and deploying federal funds to businesses and local governments. It also provides information to the public and elected officials. Currently, the SEO is launching a program to assist local governments and schools with technical assistance on energy retrofits; it is also providing cost sharing grants to trucking firms to help them reduce diesel engine idling. It also administers a number of programs providing financial and technical support, often targeted at the development of specific energy resources or applications, and assists local governments to identify and implement energy efficiency and renewable energy projects.

The State Energy Office promotes energy efficiency and renewable energy through information services, technical and financial assistance, and other activities.

The SEO has a number of other responsibilities including the collection and publication of statistics regarding energy use in Wisconsin and oversight of the state's alternative fuels fleet program. It also has emergency management functions relating to petroleum fuel supplies pursuant to the state's Energy Assurance Plan.

Conservation and Renewable Energy Programs

Since the 1970s, Wisconsin has had active programs to advance both the efficiency with which we use energy and the use of renewable energy resources. Although transportation and other energy sectors have been addressed by the programs, the greatest focus is efficiency in the use of electric power, in the building sector and the generation of electricity from renewable resources.

"Focus on Energy"

The state's principal conservation and renewable energy program is known as the Focus on Energy program. Under this program, all investor-owned electric and gas utilities are required to collectively fund and contract for the administration of statewide energy efficiency and renewable resources programs. Each utility must spend an amount equal to 1.2% of its annual operating revenues for these programs, which collectively, based on recent utility revenues, is approximately $100 million. The PSC is directed to oversee the programs, setting goals and priorities, establishing program design standards, and coordinating all energy efficiency and renewable resource programs.

Focus on Energy is the state's principal conservation and renewable energy program.

Program activities include educating energy users (residential, commercial, institutional, and industrial) regarding opportunities to save money through reducing their energy use, and providing technical and financial assistance for energy users to purchase efficient appliances, lighting, and mechanical equipment, to weatherize their homes, to increase the efficiency of industrial processes, and to install renewable energy systems. The programs include concerted efforts to encourage the formation of private markets for energy conservation activities and energy efficient equipment that will, in the long run, function independent of the program.

Chicago Bridge and Iron (formerly Shaw Environmental and Infrastructure) has the contract to administer the Focus on Energy program. Its 2011-2014 contract sets goals for energy savings by the program. In 2013, with a year remaining on the contract, it had achieved 91% of its goal for natural gas savings and 97% of its goal for electricity savings. An independent auditor found a cost-effectiveness ratio of 3.41, meaning that for every dollar spent, the program returns $3.41 in energy savings and environmental benefits.

The statutes give municipal electric utilities and electric cooperatives the option of joining the Focus program or conducting what are termed "commitment to community" programs, in which the utility or cooperative provides a program similar to Focus to its customers or members. All 82 municipal utilities have joined the Focus program, as have about half of the 24 electric cooperative.

Renewable Portfolio Standard

An RPS requires suppliers of electric power to include a specified amount of power from renewable resources.

To further stimulate the development of renewable energy resources, the state has adopted a renewable portfolio standard (RPS). An RPS is a requirement that suppliers of electric power include in their portfolio of electric supply a specified amount of generation capacity that is derived from renewable resources. Electric power suppliers may comply with the standard by generating electricity from renewable sources, buying electricity from another generator that uses renewable sources, or buying credits from another supplier that has generated or bought more electricity from renewable sources than required to meet the standard. Credits are banked and traded through the Midwest Renewable Energy Tracking System (MRETS), a regional, private sector clearinghouse. The RPS applies to both electric utilities and rural electric cooperatives.

The original RPS, created by 1999 Wisconsin Act 9, called for utilities to provide 2.2% of their sales from renewable resources by 2011. As the utilities had already surpassed the original requirement, 2005 Wisconsin Act 141 increased the standard to approximately 10% by 2015. PSC staff report that all electric providers are in compliance with their obligations

under the RPS, and that most have substantial credit accounts in MRETS. In addition, the state-wide goal has already been met.

Building Codes

In addition to the programs described above, the state promotes energy conservation in the private sector through building codes promulgated by the Department of Safety and Professional Services (DSPS). The codes relating to commercial buildings, historic buildings, and rental residential units include explicit energy conservation codes; the Commercial Building Code also incorporates by reference the entire International Energy Conservation Code, developed by the International Code Council. In many other portions of the building codes, such as the design standards for one- and two-family dwellings, the DSPS considers energy conservation in setting specific standards. In some instances, such as lighting standards for commercial buildings, the statutes direct the DSPS to consider energy efficiency in designing standards.

Tax Incentives for Renewable Energy

Tax exemptions and credits are often used for policy purposes. With regard to renewable energy, they are used to lower the cost of installing or using renewable energy systems, the purpose being both to help individuals and companies to use renewable energy and to stimulate markets for the required equipment.[5] Solar and wind energy systems are exempt from the property tax, and the following are exempt from the sales and use taxes:

Tax exemptions and credits encourage the use of renewable resources by reducing the cost.

- Biomass that is used for fuel sold for residential use.
- Any residue that results from the harvesting of timber or the production of wood products that is used as fuel in a business activity.
- Certain equipment that generates energy from wind, sunlight, or agricultural waste, and electricity or energy produced by such equipment.

In addition, individuals and companies can claim credits for the following against their income taxes, subject to certain limitations:

- A refundable credit[6] equal to 10% of the amount paid for the purchase of equipment used primarily to harvest or process woody biomass for use as fuel or as a component of fuel.

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[5] In addition to the exemptions and credits that specifically target renewable energy systems, certain broader exemptions and credits, such as the property and sales tax exemptions for certain machinery and equipment used in manufacturing, can also be applied to these systems.

[6] When a refundable tax credit exceeds the claimant's tax liability, the claimant receives a payment for the difference between the amount of the credit and the tax liability; for a nonrefundable credit, no such payment is made, although unused amounts generally can be carried forward and used in future years.

- A nonrefundable credit up to $.10 per gallon of biodiesel fuel produced by the claimant.
- A nonrefundable credit up to 25% of the cost of installing or retrofitting fuel pumps to dispense ethanol or biodiesel fuel blended with gasoline.

Private Sector Activities

The private sector plays an important role in improving energy efficiency.

The private sector plays an important role in improving the energy efficiency of buildings. As noted earlier, Focus on Energy works extensively with the private sector. Another group of players, known generically as energy service companies (ESCos), are also important. They include some well-known names, such as Johnson Controls and Westinghouse. Some electric utilities act as ESCos for their customers. A model that ESCos use frequently is called "performance contracting" or "shared savings." Using this model, an ESCo makes an analysis of the energy use in a client's building and makes efficiency improvements to the building. In some cases, it will take over the management of a building's energy using systems. The ESCo then recovers its costs by retaining a share of the savings the client realizes as a result of the efficiency improvements. ESCos have mostly worked with governmental agencies and institutions, such as schools, universities, and hospitals, but Johnson Controls is expanding into the residential sector in Wisconsin.

Energy Use by State Government

State government is one of the largest energy users.

For many years, there have been various programs to reduce energy use by state government. These programs serve several purposes. They reduce one of the largest sources of energy demand in the state and save taxpayers significant amounts of money in avoided energy costs. In addition, they encourage similar conservation efforts in other sectors of the economy by demonstrating the effectiveness and feasibility of new, efficient energy systems. Also, at least in theory, these programs stimulate production of new, efficient energy systems by creating demand for them, helping to bring down their cost to the general public.

Construction and Renovation of State Buildings

The Legislature has established a number of requirements for state construction and remodeling projects, including the use of life-cycle cost analysis of building projects and the energy-consuming systems used in such projects, development of energy standards for state buildings that exceed the requirements of the State Building Code, incorporation of passive solar designs in building projects, and use of active solar, photovoltaic, geothermal, and other renewable energy sources to the extent feasible. The statutes also direct the State Building Commission to ensure that central steam generating facilities built by the state, to serve state buildings, are designed for the cogeneration of steam and electricity and are

designed to utilize biomass and refuse-derived fuels, to the greatest extent feasible. In addition, the statutes authorize the DOA to invest in energy-saving improvements to state buildings where the cost savings from reduced energy use will cover the cost of the improvements in a reasonable time. Similarly, the DOA may enter into performance contracts with third parties for this purpose. To finance energy improvements under these initiatives, the Legislature authorized $30 million bonding revenue in the 2007-09 fiscal biennium, $50 million in the 2009-11 fiscal biennium, and $100 million in the 2011-13 fiscal biennium.

A separate program targets the energy use of the six state agencies that consume the great majority of electricity purchased by the state (the Departments of Administration, Corrections, Health Services, Public Instruction, and Veterans Affairs, and the University of Wisconsin (UW) System). First, each agency must prepare a biennial energy cost reduction plan that includes all system and equipment upgrades that will pay for themselves over the life of the systems or equipment. Second, the DOA was required to set goals for the use of renewable electric energy by each agency, with the overall goal that 10% of all state agencies' electric energy use is derived from renewable resources by 2007, and 20% by 2011.

Building on these statutory requirements, former Governor Doyle and Governor Walker have issued executive orders intended to further reduce energy use by the state. Under the orders, the DOA must, among other things, do the following:

- Using fiscal year (FY) 2005 as a base year, reduce energy use in all state facilities by 10% by FY 2008, and 20% by FY 2010.
- Ensure that new buildings are constructed to be 30% more energy efficient than the Commercial Code.
- Establish sustainable building guidelines applicable to the construction, operation, and maintenance of all state buildings. The guidelines are to be based on the Leadership in Energy and Environmental Design (LEED) rating systems for new and existing buildings.

The Conserve Wisconsin Initiative has significantly reduced energy use by state agencies, conserving resources and saving taxpayer money.

The DOA is implementing the executive orders and the statutory requirements together as the Conserve Wisconsin Initiative. While some specific goals have not been met, the DOA has accomplished much under these programs and directives. From 2005 to 2010, the state reduced its total energy use by 9.8%. Reductions by individual agencies ranged from a 3% reduction by the Department of Corrections to a 52.8% reduction by the State Fair Park. In addition, the six agencies that are required to prepare biennial energy cost reduction plans continue to prepare and implement their plans, with assistance from the DOA. Individual energy

improvements have included energy audits, lighting upgrades, and window and steam trap replacements.

The DOA has prepared sustainable building guidelines and guidelines to achieve greater energy efficiency in new state buildings than would be realized under the Commercial Building Code, which it has incorporated into its master specifications and design guidelines for state building projects. Using these guidelines, the new administration building on the UW-Oshkosh campus was built to LEED standards. Through this and other projects, the DOA staff have been able to document that the cost of construction to LEED standards is no greater than the cost of "conventional" construction. They also report that contractors and trades people are well versed in the necessary construction techniques and equipment.

With regard to energy purchased by the state, staff at the DOA report that the statutory goal that 10% of all electricity purchased by the state be from renewable resources was met by 2008, and that, in 2010, 16% of the state's electricity use was from renewable resources.

State-Owned Heating Plants

The state owns and operates over 30 plants that generate steam for the heating and cooling of buildings at UW campuses, prisons, veterans homes, and other state institutions. About half of them burn coal; the remainder burn natural gas. Collectively, these plants represent a very large portion of the state's energy consumption and greenhouse gas emissions.

In part in response to lawsuits alleging Clean Air Act violations at some of the state's coal-fired heating plants, the DOA has converted several of these plants, including the plant on the UW-Madison campus and the Capitol Heat and Power Plant in Madison, from coal to natural gas. DOA projects that these and other planned projects will reduce the state's use of coal by more than 80% by 2015, in comparison to 2007. These projects are effectively changing the state's fleet of heating plants from one dominated by coal combustion with natural gas back-up to one dominated by natural gas combustion with coal back-up.

State Procurement

State agencies are required to apply life-cycle cost analysis in purchasing supplies and equipment, whenever such analysis is appropriate. More specific requirements apply with regard to energy-consuming equipment that costs more than $5,000 per unit. In the past, DOA has made extensive use of such analysis in the selection of automobiles and copiers, in particular. In 2008, it incorporated "green" purchasing guidelines relating to energy-consuming equipment into the state procurement manual. The guidelines require the purchase of energy equipment identified under either the EPA's Energy Star Program or the U.S. Department of Energy's Federal Energy Management Program, and the application of life-cycle cost analysis for types of equipment not covered by those programs.

The DOA also operates an alternative fuels program for the state automotive fleet. The statutes require the DOA to promote the use of alternative fuels and, by executive order,

Governor Doyle directed the DOA to reduce the use of petroleum-based gasoline in state-owned vehicles by 20% by 2010 and by 50% by 2015; and to reduce petroleum-based diesel fuel use by 10% by 2010 and by 25% by 2015.

Low-Income Energy Programs

For information regarding Home Energy Plus, including where to apply for assistance, see: www.homeenergyplus.wi.gov

The DOA administers low-income energy assistance programs under the program name Home Energy Plus. The programs are funded with federal funds received by the state and fees collected by electric and natural gas utilities and remitted to the state, and are implemented by contract agencies at the county level. The programs offer a variety of services, including direct bill payment assistance for some customers who are unable to make full payments, and early intervention programs to identify and assist customers in danger of falling behind in bill payments. The programs also provide financial assistance for the installation of insulation and other energy conservation measures in the homes of low-income families to reduce the total energy needs of the homes, thereby making energy more affordable for those families. In addition, the programs provide emergency furnace repair or replacement assistance.

Additional References

1. Legislative Council Staff: http://www.legis.wisconsin.gov/lc
   - *Regulation of Telecommunications Services*, Information Memorandum 2011-07 (June 2, 2011).
   - *Municipal Regulation of Wind Energy Systems (2009 Wisconsin Act 40)*, Information Memorandum 2009-05 (October 27, 2009).
   - *The New Law Relating to State-Issued Franchises for Video Service Providers*, Information Memorandum 2008-01 (January 15, 2008).
   - *2005 Wisconsin Act 141: Energy Efficiency, Renewable Energy, and Energy Policy*, Information Memorandum 2006-01 (March 30, 2006).
2. At the beginning of each biennial legislative session, the Legislative Fiscal Bureau publishes Informational Papers on various state programs, including taxation and regulation of public utilities and other utilities topics. These Informational Papers are available at: http://www.legis.wisconsin.gov/lfb.
3. Legislative Audit Bureau: http://www.legis.wisconsin.gov/lab
   - Audit Report 11-13, *Focus on Energy* (December 2011).
   - Heating Assistance and Weatherization Services (audit in progress November 2012).
4. Broadband resources:
   - LinkWISCONSIN: http://www.linkwisconsin.org/lwi/default.aspx?bhcp=1.

- Broadband Reference Guide: http://psc.wi.gov/utilityInfo/tele/broadband/documents/BroadbandReferenceGuide.pdf.
- Broadband Expansion Grant Program http://psc.wi.gov/utilityInfo/tele/broadband/grants/bbGrantJan2014.htm.

5. Low-Income Energy Programs:

   http://homeenergyplus.wi.gov.

6. Governmental Agencies' Internet Sites:

   - Wisconsin PSC: http://psc.wi.gov.
   - Wisconsin DOA, State Energy Office: http://energyindependence.wi.gov/index.asp?locid=160.
   - FERC: http://www.ferc.gov/.
   - FCC: http://www.fcc.gov/.
   - Federal Energy Information Administration: http://www.eia.doe.gov/.

GLOSSARY

CLEC: Competitive local exchange carrier.

FCC: Federal Communications Commission.

FERC: Federal Energy Regulatory Commission.

ILEC: Incumbent local exchange carrier.

IPP: Independent power producer.

NRC: Nuclear Regulatory Commission.

RPS: Renewable portfolio standard.

RTO: Regional Transmission Organization.

Wisconsin Legislative Council
One East Main Street, Suite 401
Madison, WI 53703-3382
Phone: (608) 266-1304