CITY ENERGY USE AND LOAD GROWTH
Utilities Serving the City of Madison

The electricity that flows into Madison is produced or purchased by two utilities headquartered in the city. Madison Gas and Electric's territory covers most of the city, while portions of the city's far west side and far east side are served by Alliant Energy.

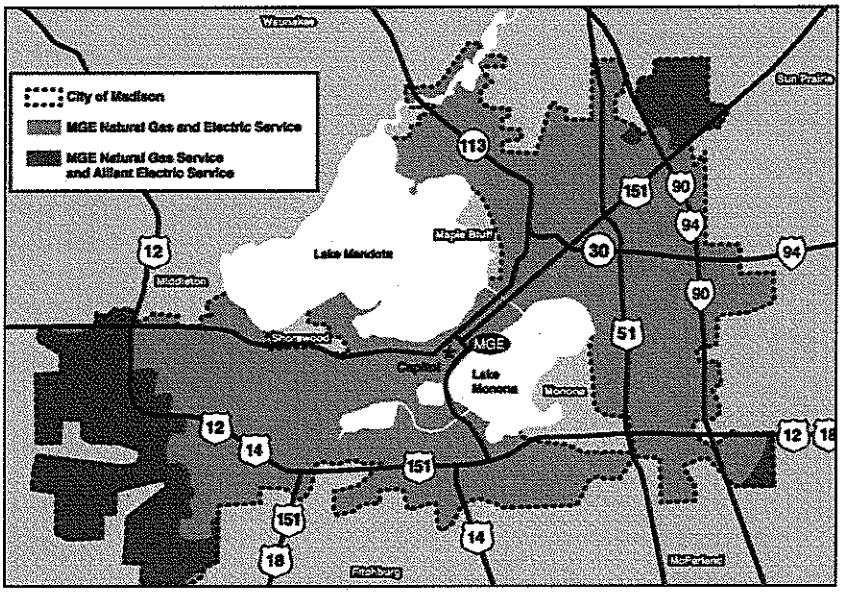

Figure 1.
MGE Territory Map

Both are investor-owned utilities (IOUs) with rates, programs, and construction plans requiring approval by the Wisconsin Public Service Commission (WPSC). They are responsible for generating or acquiring electric power and for delivering it to customers over their distribution system. MGE is one of the smallest IOUs in the country and its electric service territory is contained entirely within Dane County. Alliant is a multi-state utility with large service territories in Wisconsin and Iowa and small territories in Minnesota and Illinois. Both utilities have their headquarters in the City of Madison.

The third utility that has a presence in Madison is the American Transmission Company, which owns and operates the transmission lines that serve the eastern two-thirds of Wisconsin and Upper Michigan. It is owned by the state's investor-owned utilities that divested their transmission assets to it as a result of legislation passed in 1999. ATC began operations in 2001. The rates ATC charges to transmit bulk power are regulated by the Federal Energy Regulatory Commission (FERC) and in-state construction plans are regulated by the WPSC.

Energy Usage and Load Growth in the City

Neither MGE nor Alliant has a breakout of the customers it serves that live specifically in the city of Madison, but an assessment of the dimensions of load and load growth can be gained by looking at figures for Dane County and for the MGE service territory as a whole. MGE currently serves approximately 111,000 residential customers in the Dane County area and 17,250 business customers. In 2002, these customers consumed 3098 million kilowatt-hours (MKWH) of electricity, 2260 MKWH by businesses and 839 MKWH by residences.

Five years ago, in 1997, MGE delivered 2781 MKWH, which represents an annual growth rate of approximately 2.3%. MGE projects that in 2010, it will be serving 130,000 residential customers and 20,000 businesses and will need to supply 3616 MKWH, which is a projected annual growth rate of approximately 2%. (See Figure 2.)

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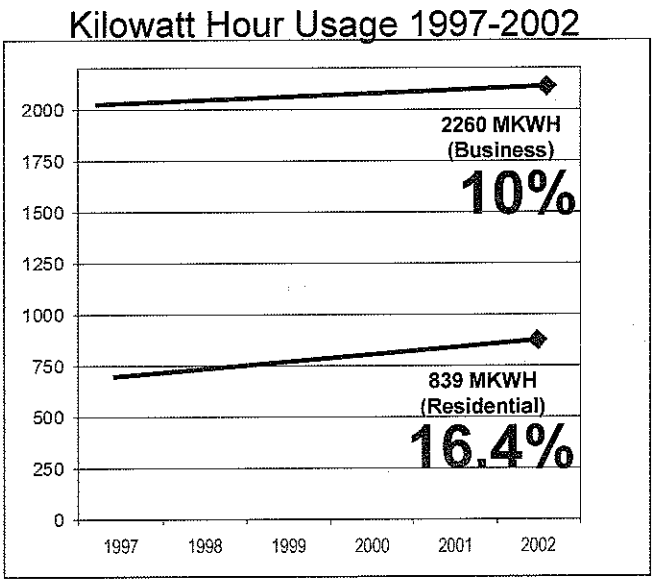

Figure 2.
Kilowatt Hour Usage from 1997-2002 – showing the percentage increase over time, broken out by business and residential customers

Peak demand growth is growing even faster. MGE system peak demand in 2002 was 720 MW and is expected to grow to 895 MW in 2010, amounting to an annual average increase of 3%.

In addition to population growth and new businesses growth, per capita increases in electricity use are also driving demand in an upward direction. While Dane County's population has increased 16% in the last ten years, residential customers are consuming 16% more electricity per meter. Increases in the use of computers and computer

systems, air conditioning, electronics and appliances, coupled with the proliferation of new and larger homes, result in demand increases that exceed population growth. Over 90% of MGE's customers now have air conditioning. Businesses are using, on average, 50% more electricity than they did ten years ago. Business use of computer systems is also driving increased air conditioning use. Alliant's load increase in the city is primarily due to the spread of the city on the west side.

Electricity Costs for City Residents and Businesses

The costs of electricity for consumers in the Madison area and across the state have grown rapidly in recent years. In July 2004, the monthly bill for a typical MGE residential consumer – based on 600 kWh of monthly consumption – was $71.10. For a typical Alliant consumer it was $64.02.

In the five-year period between 1998 and 2003, monthly costs for a typical MGE residential consumer grew from $46.16 to $64.86 for a 40.5% increase or 8% a year. In the same period, these costs for an Alliant consumer grew from $40.58 a month to $58.35 for 43.8% increase or 8.7% a year.

Rates for industrial and commercial customers have seen similar increases.

The state as a whole, which once had the lowest rates in the region, now has higher average rates than other Midwestern states. The prices paid my Madison electric users are high relative to other parts of the state.

Rate increases are being driven by a number of factors, including construction of new facilities, higher costs for natural gas and other fuels and rates of return granted by the PSCW. Some of these factors are not unique to Wisconsin. But driven by load growth and the inability to import power from other states, Wisconsin faces an immediate need to expand generation and transmission capacity. The PSCW estimates that average bills will rise another $70 a year to pay for the $3.7 billion dollars of new transmission lines and power plant projects that are expected to be built.

There are many reasons for the differences in prices between Madison and other parts of the state. Dane County is the fastest growing county in the State of Wisconsin, and leads the state in both employment and income growth. Madison had the largest growth in population of any city in the state since 2000. This growth, particularly with its emphasis in high-tech and bio-tech, has required significant investments in new electric facilities. Madison as a community is not heavily industrial relative to commercial and residential electric uses. This mix of customers and businesses directly affects the mix of fuel

resources needed to best serve the community. Madison residents get less of electricity from coal-fired power plants than other parts of the state. This means a higher-reliance on natural gas which has historically been more expensive. And Madison was the first city in the state to require significant under-grounding of electric service lines. While burying lines brings aesthetic and reliability benefits, it is also more expensive.

Madison's Energy Supply Portfolio

Current Generation Resources Inside the City

Of the electrical energy used in the city of Madison, 85% is imported from sources outside the metropolitan area. This is a key fact, which emphasizes the importance of the transmission system to serving reliable power to the city.

Of the 15% that is produced from local sources, most - 90% - is generated at MGE's 200 Megawatt (MW) Blount Street Station. This 100 year-old facility is primarily coal and natural gas-fired, although it also burns increasing amounts of paper-derived fuel (PDF). The PDF used at the Blount Street Station is a mix of shredded pre-consumer paper, plastic wrap and cardboard. Some examples include bulk jar labels and other packaging for products. This pre-consumer material is typically damaged or misprinted. Additional in-area generation includes five natural gas-fired combustion turbines at three sites, amounting to 90MW, used to meet peak demand, and 44 MW of standby generators at industrial facilities which can also be used by MGE to meet system peak demand. These backup generators are currently being used about 50 hours a year. Additionally, there are now five small solar-electric installations in the city.

In the summer of 2005, the West Campus Cogeneration Facility (WCCF) is expected to come on line. This 150 MW generator will also provide steam and chilled water to the UW campus. Once the WCCF is on-line, the proportion of power MGE needs to import will decline to around 70% but will subsequently rise as demand grows.

In addition to the WCCF, two additional heating plants serve the UW Campus. These plants are multi-fueled and are capable of producing steam, chilled water, electricity and compressed air.

The primary fuels for the Charter Street Heating Plant are coal and natural gas. Tires and paper pellets are added to the coal mixture for added energy. Fuel oil is used as a back-up fuel source. The Walnut Street Heating Plant uses natural gas as the primary fuel with oil as a backup source.

Production reliability and fuel efficiency are the primary goals of the UW's Operations Unit. Equipment is activated only when loads require additional steam or chilled water capacity. In an effort to maximize the

fuel efficiency, a portion of the steam load at the Charter Plant is used to produce up to 9.8 megawatts of electricity.

Currently, the University plans to continue utilizing these two power plants after the new West Campus Cogeneration Plant project is completed.

Capitol Heat & Power Plant (CHPP) supplies steam and chilled water to the Capitol, GEF 1, GEF 2, GEF 3, 1 West Wilson, 101 E. Wilson and Risser Justice. CHPP is the only source of heating for the City County Building, Monona Terrace Center, and the under construction County Court House. CHPP is the main source of electricity to the Capitol. In addition to the CHPP, the State also operates the Hill Farms Heating Plant (HFHP) and the Mendota Mental Health Power Plant (MMHPP). All of the state facilities are multi-fueled with the capability of burning coal, natural gas and fuel oil.

All electrical generation from these facilities is consumed by the State with none going out to the MGE electrical grid. Production reliability, emission reductions and fuel efficiency are the primary goals of the operational units. In addition, Department of Administration is looking to replace old, inefficient equipment.

Energy Efficiency and Conservation Efforts

City residents and businesses have been utilizing energy efficiency and conservation measures to a great degree. In the past 15 years, MGE estimates that customer conservation measures have saved 368,000 Megawatt-hours (MWH), more than the annual energy usage of the UW-Madison campus. These efforts have also saved 96 MW of peak day demand. MGE expects that customers will double these efforts in the next ten years. Nonetheless, MGE projects load will continue to grow 2% per year through 2010.

The University and the State are in the middle of a $30 million dollar energy conservation program through the Wisconsin Energy Initiative (WEI).

WEI was established in 1992 by the Department of Administration (DOA) to increase energy efficiency of the state-owned facilities and provide other economic and environmental benefits to the taxpayers.

MGE's Fuel Supply Mix

Overall, MGE owns generation resources that supply 62% of its power while it is purchasing the other 38%. Power and capacity are acquired from a variety of different sources both inside and outside Wisconsin, including natural gas combustion turbines in Illinois, a combined cycle natural gas unit in Rock County, and system power from the Commonwealth Edison system.

About two-thirds of MGE's power comes from coal combustion at Blount and also at the Columbia plant in Portage, which is co-owned by MGE and Alliant and operated by Alliant. Four percent is produced by MGE-owned natural gas turbines in Madison and Marinette and 2% is from renewable sources. (Discussed below.)

In addition to constructing the WCCF, MGE expects to add 50 to 100 MW of new baseload coal from the proposed Elm Road project in Oak Creek, which is expected to come on line in 2009 or 2010, and 40 MW of windpower purchased from a large installation straddling Fond du Lac and Dodge counties.

2004 Resources

Unit Name	Location	Fuel Source(s)	Capacity (MW)	Year(s) Built
Lincoln/Red River Wind Farm	Kewaunee Cty, WI	Wind	11	1998 & 1999
Expo Center PV	Madison, WI	Solar	<1	2000
McKay Center PV	Madison, WI	Solar	<1	2001
Friends PV	Madison, WI	Solar	<1	2000
Lussier Center PV	Madison, WI	Solar	<1	2002
Vilas Zoo PV	Madison, WI	Solar	<1	2003
Municipal Build. Park. Shelter	Madison, WI	Solar	<1	2004
Rodefeld Landfill Purchase	Madison, WI	Landfill Gas	2	1997 & 2004
Columbia	Portage, WI	Coal	225	1975 & 1978
Blount	Madison, WI	Coal/Natural Gas/Waste	194	1902 - 1968
Nine Springs CT	Madison, WI	Natural Gas/Oil	15	1964
Sycamore CT	Madison, WI	Natural Gas/Oil	36	1967 & 1971
Fitchburg CT	Fitchburg, WI	Natural Gas/Oil	44	1973
M34 CT	Marinette, WI	Natural Gas/Oil	80	2000
Standby Generators	Dane Cty, WI	Ultra Low Sulfur Diesel	44	1999
CE Purchase	CE Purchase	System Mix	15	1999 - 2004
Calpine Purchase	Rock Cty, WI	Natural Gas	75	2004 - 2012
Rainy River Purchase	Kendall, IL	Natural Gas	50	2002 - 2011
El Paso Purchase	Cordova, IL	Natural Gas	50	2002 - 2006

2004 Resources				
Unit Name	**Location**	**Fuel Source(s)**	**Capacity (MW)**	**Year(s) Built**
Anticipated Additional Resources				
Unit Name	**Location**	**Fuel Source(s)**	**Expected Peak Capacity (MW)**	**Expected In-Service Date**
Forward Energy Center	Brownsville, WI	Wind	40	Fall 2005
West Campus Co-Gen.	Madison, WI	Natural Gas	130	Summer 2005
Elm Road Station	Oak Creek, WI	Coal	50, 100	2009, 2010

Figure 3.
MGE Energy Supply Portfolio

MGE does not own an interest in any nuclear generating station.[1]

Alliant Energy	
Coal	58%
Nuclear	16%
Peakers (Primarily Gas)	2%
Hydro	1%
Purchased Power	24%

Wisconsin Power & Light	
Coal	56%
Nuclear	11%
Peakers (Primarily Gas)	1%
Hydro	1%
Purchased Power	30%

Figure 4.
Alliant and WPL Energy Supply Portfolio

The Blount Generating Station

Located in the heart of downtown Madison, the Blount Generating Station (BGS) provides a critical 200 MW of power for Madison. Blount produces 90% of the electric power produced in the metropolitan area. As is typical of as older coal plants, air pollution emissions are greater on a per-energy-basis than modern coal plants, natural gas turbines, or wind power and other renewables. The thermal outflow from the plant has an impact on Lake Monona.

It is, however, a crucial facility for maintaining electric power reliability and MGE has developed a cooperative relationship with the

[1] Nuclear power may be included in the energy MGE purchases in the bulk power market, but the source is often unidentified.

Wisconsin Department of Natural Resources (WDNR) to achieve higher environmental standards than required by regulation.

MGE and the Wisconsin Department of Natural Resources are engaged in an innovative program to achieve higher environmental standards than required by regulation. Through this Environmental Cooperative Agreement, MGE is voluntarily undertaking a number of steps at BGS to improve its efficiency and reduce its environmental impacts.

To date, MGE has:

- Increased the use of alternative, paper-derived fuels that burn cleaner than coal and would otherwise be landfilled;
- Implemented an environmental management system consistent with ISO 14001 international standards;
- Installed state-of-the-art boiler controls and retrofitted burners to improve overall efficiency and combustion and reduce emission;
- Created a Community Environmental Advisory Group (CEAG) of customers to provide input on Blount environmental planning and performance.

Near-term additional plans include:

- Burning even greater percentages of alternative, paper-derived fuels;
- Coal burner combustion efficiency improvements;
- Efficiency improvements in the PDF combustion equipment; and
- Efficiency improvements to the flame stabilizer.

All of these improvements will further reduce sulfur dioxide, mercury, and nitrogen oxide emissions.

MGE recently completed a study evaluating all reasonably available options for further reducing pollution from BGS. The study evaluates control technologies, fuel switching, and other mitigation measures and analyzes their environmental impacts and cost-effectiveness. MGE is currently reviewing this analysis with the WDNR, the CEAG and others with respect to potential emission reduction goals for BGS and to inform its long-term planning for Blount Generating Station.

West Campus Cogeneration Facility

The West Campus Cogeneration Facility (WCCF) will come on line in the spring of 2005 to help meet the growing needs of Madison residents. It will produce electricity for MGE customers and the University of Wisconsin-Madison, and steam and chilled water for heating and air-conditioning on the campus. The facility is sized to produce 150 MW of electricity, 500,000 pounds of steam an hour, and 20,000 tons of chilled water.

Fueled by natural gas and equipped with state-of-the-art pollution control technology, WCCF will be one of the cleanest, most efficient

plants in the state, as well as the country. From a thermal perspective, co-generation is substantially more efficient than a conventional power plant. When in co-generation mode, WCCF will be nearly 70% efficient in converting its fuel to useful energy, whereas most electric-only power plants attain efficiencies of only 30 to 35%. Combining electric and heating purposes in one facility reduces emissions, fuel use, and space required compared with separate facilities.

There are three Memoranda of Understandings (MOUs) related to the WCCF. The City of Madison has entered into a MOU with MGE, a second MOU is between the Regent Neighborhood Association, MGE, UW, and DOA, and the third MOU is between MGE, several citizen/environmental groups, UW, and DOA. These MOUs attempted to address several concerns related to the plant. Provisions of these memoranda include: use of low-sulfur diesel fuel as backup for the plant and as a fuel for City buses; a study and implementation plan to reduce VOC emissions in the area; a water mitigation plan to recharge groundwater to replace the water used by the plant from local lakes; and a photovoltaic/hydrogen fuel cell demonstration project.

TRANSMISSION ISSUES FOR THE CITY OF MADISON

The transmission system in the Dane County area is aging and inadequate. Upgrades are needed in the near term to provide system reliability and in the longer term to maintain that reliability and to allow access to new sources of power.

ATC presented modeling to the Committee, which showed the potential for brownouts or cascading outages given the loss of a significant transmission line in Dane County during periods of high demand. In the near term, ATC is implementing reliability enhancement projects in Dane County, such as upgrades and repairs to transmission lines and substations as well as a new line on the far-east side connecting the Femrite and Sprecher substations. These efforts will require capital investments in excess of $250 million.

Dane County Reliability Plan

Project Scope:

Plan is Being Implemented in 5 Work Packages:

- **Work Package 1** – Madison Isthmus and UW Campus Area
  - In service by June 2004; 13 projects total – 2 CA Filings
- **Work Package 2** – Greater Madison Area
  - Work Package 2A – In service: 2004
    - 7 projects – 1 CA filing
  - Work Package 2B – In service: 2007
    - 7 Projects – 1 CPCN filing
  - Work Package 2C – In service: 2005
    - 8 Projects – 1 CA filing
- **Work Package 3** – Columbia-North Madison 345 kV
  - In service: 2006; 3 Projects – 1 CPCN filing
- **Work Package 4** – Madison Isthmus Underground Pipe Installation
  - In service: 2006
  - 2 Projects – No CA required
- **Work Package 5** – Convert to 138 kV existing Blount-Ruskin-Huiskamp
  - (Conceptual); In service: 2008
- **Potential Future Initiative** – New 345 kV Facilities in Madison Area
  - (In Development); In service: 2010 - 2012

Dane County Reliability Plan – Infrastructure

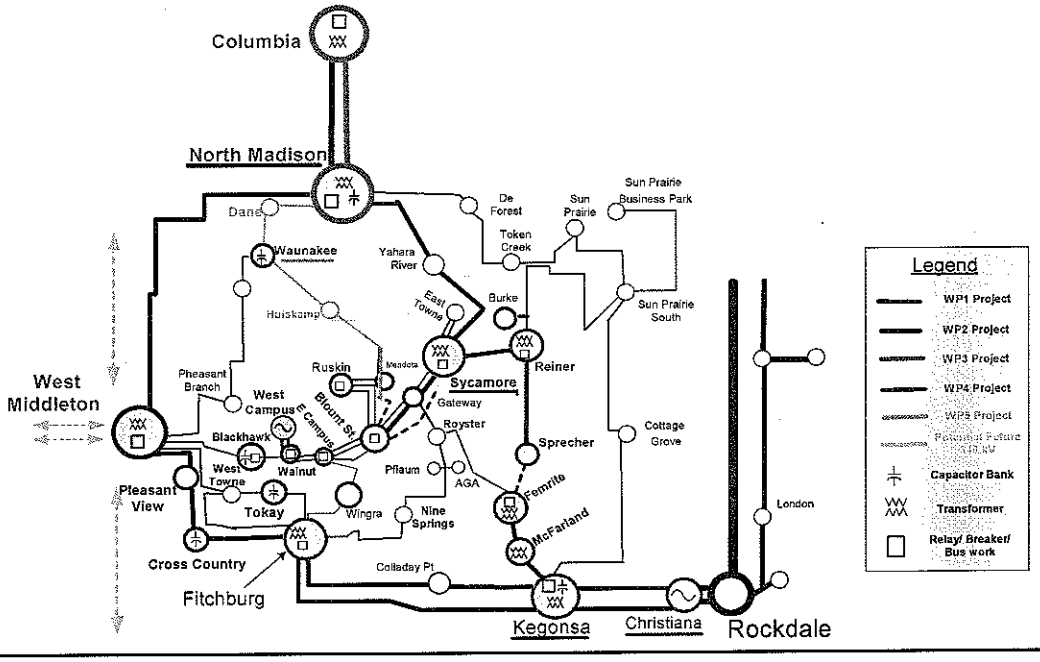

Figure 5.
American Transmission's Proposed New Right-of-Ways

In the future, new transmission will be necessary to access new sources of power whether traditional or renewable. Existing lines to the west – into southwest Wisconsin and into Minnesota and Iowa - are extremely congested. This congestion precludes, for example, bringing additional wind energy from those states, even though the wind resource is stronger in Minnesota and Iowa than at most locations in Wisconsin. Until this congestion is relieved, new wind resources to serve Wisconsin's load will have to be located in state. Even new proposals for wind generation in eastern Wisconsin are facing problems presented by a transmission system that may not presently allow energy to flow from generators to market on a firm basis.

ATC is studying the possibility of building new transmission to relieve the congestion to the west. This is likely to be a 345 kV line from the West Middleton substation either south into Illinois or southwest through southwestern Wisconsin into Iowa. A southwestern line could connect Madison with new wind energy from southwestern Wisconsin, or from Iowa, but also to new coal or other generation located on the Mississippi River. It is not likely to be built before 2010 at the earliest.

Even at present, lack of transmission capacity is interfering with the brokering of electric power. In 2002 MGE could not purchase or sell energy on 50 days because of the lack of transmission capacity.

Of course, the construction of new transmission infrastructure comes with environmental, economic, and social costs that must be balanced against other potential alternatives such as demand reduction (energy conservation/efficiency) or local and distributed generation. ATC, along with the Citizen Utility Board, has formed and sponsored the Dane County Energy Collaborative to assist with planning and soliciting public input in regard to the proposed infrastructure improvements in Dane County and route selection.

ATC will work to utilize existing utility corridors where possible to minimize public and environmental impacts in accordance with new Wisconsin legislation that prioritizes the siting of transmission in the following order:

- Existing utility corridors;
- Highway and railroad corridors;
- Recreational trails, to the extent that facilities can be constructed below ground and not interfere with sensitive areas;
- New corridors.

MADISON CITY GOVERNMENT OPERATIONS AND ENERGY USE

Information on City of Madison government energy use and cost was provided to the Committee for every meter and aggregated by agency and the city as a whole.

In 2003, Madison City Government used 56.5 MKWH of electricity for a total cost of $4.2 million dollars, or an average cost of 7.4 cents per kilowatt. Of that total, 54 MKWH, or 95%, was provided by MGE, representing 1.7% of its total load. By far the largest user among city agencies were Traffic Engineering and the Water Utility, followed by Monona Terrace, Ice Arenas and Parks, the Transit Utility, the Parking Utility, and then others.[2]

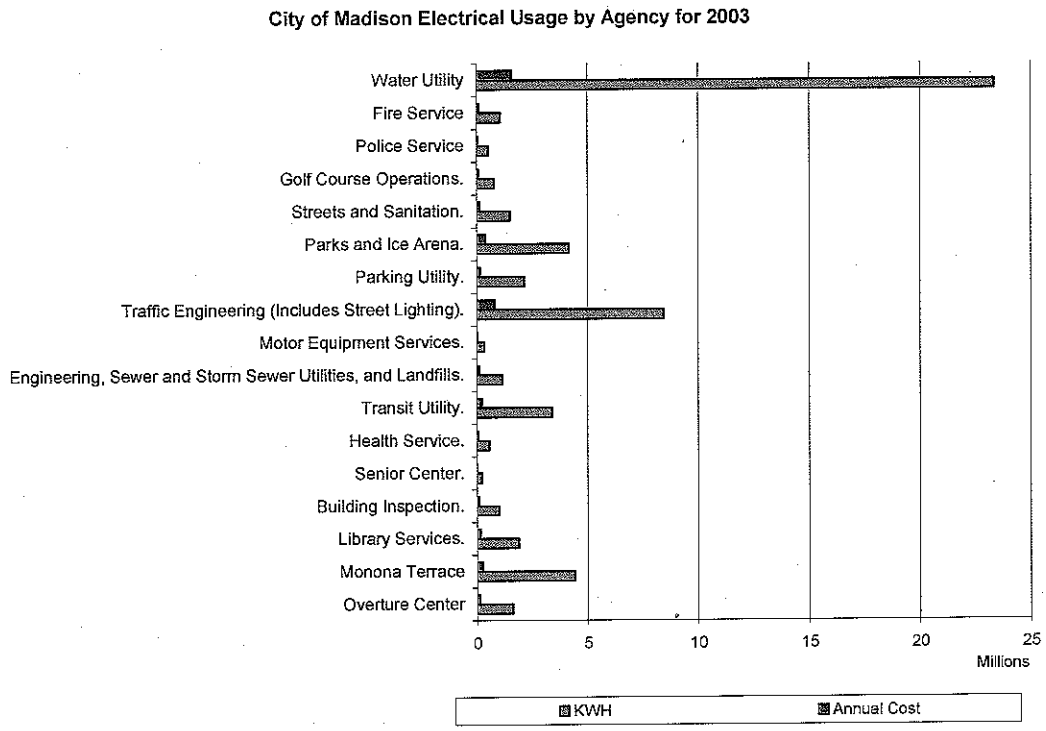

Figure 6.
City of Madison Electrical Usage by kWh and Annual Costs

The Transit Utility has been purchasing a portion of its electricity from MGE's green-pricing program. In 2003, the utility acquired 803 MWH of wind energy for an incremental premium of 3.3 cents per kilowatt-hour (kWh). The total cost was $26,747. This 803 MWH represents 1.42% of city government load. Madison Metro purchases more wind power than any other customer participating in MGE's wind power

[2] In 2004, the City of Madison sold the ice arenas.

program. Since about 2% of MGE's system power is now derived from renewable energy, city operations in effect now receive about 3% renewable power.

New operations and facilities, such as street lighting for expanding areas of the city and a new fire station on the east side, will tend to increase city electrical usage and demand. On the other hand, the Energy Conservation and Green Building Committee has identified opportunities for efficiency and has proposed to the mayor that city departments be challenged to reduce energy use by 10% by 2010.