Building A Green Capital City

A Blueprint for Madison's Sustainable Design and Energy Future

Mayor's Energy Task Force
Madison, Wisconsin
September 2004

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ACKNOWLEDGEMENTS

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GENERAL INTRODUCTION

Overview: Madison's Energy, Environment and Economy

The city of Madison is frequently listed in national magazines as the number one city in areas ranging from quality of life (*Money Magazine*), and business and careers (Forbes, April 2004), to men's health (*Men's Health* Magazine; NY Times 2003) and for inspiration (*Delicious Living*, 2003). It is the second largest city in the state, making Madison a key part of the economic engine of Wisconsin.

In October of 2003, Mayor Dave Cieslewicz convened the Mayor's Energy Task Force and charged it with the task of making Madison a green capital city and creating a city that is a national leader in energy efficiency and renewable energy that also supports the city's economic vitality.

In setting the context for this initiative, the mayor asked committee members to consider recent events including the August 2003 power blackout on the east coast, the approval of the West Campus Co-Generation Facility in Madison, plans for new power lines in the area, and biotech expansion that would need reliable power. The mayor reported that he had recently toured the Oscar Mayer plant and the major concern expressed by the plant manager was energy reliability.

Mayor Cieslewicz's vision:

Make Madison a green capital city, a national leader in energy efficiency and renewable energy that also supports the city's economic vitality.

The mayor made it clear that the city needs to be aggressive with regard to energy conservation and renewable energy before considering new power lines but that all three options need to be reviewed in light of the city's future energy needs.

There are several trends the committee discussed in detail that support the mayor's energy efficiency and renewable goals. Energy costs in Madison are rising. Fossil fuel prices have become volatile which brings into question the affordability of our energy as well as its reliability.

Equally important is concern over environmental issues as Madison's air quality becomes increasingly impacted by human activity, including the production of electric power. The Madison area is at risk of being classified by the EPA as a non-attainment area for air quality because of tropospheric ozone levels. These trends, if not remedied, could negatively affect Madison's economic development, specifically business retention, business development, and the ability to attract new businesses.

Currently, Madison imports 85 percent of its energy with over 95 percent coming from fossil fuel sources, namely coal and natural gas. Of those sources within city boundaries, Madison Gas & Electric Company (MGE) operates a hundred-year old coal-burning plant (the Blount Generating Station). The UW-Madison has a coal plant at Charter Street and a gas plant at Walnut Street. And, the State of Wisconsin has several coal-fired facilities including the Capitol Heating plant in downtown Madison. These plants are not as clean and efficient as modern facilities, and initiatives are currently underway to increase the efficiency of some of them and to minimize their environmental impacts. MGE's new gas-fired West Campus Co-generation Facility, scheduled to begin production in 2005 will be a model of clean, efficient energy production from fossil fuel.

While not the focus of the Committee's work, these power plant modernization initiatives are an important part of the city's overall effort to become a green capital city. By becoming a leader in energy conservation and renewable energy, the city can help reduce its dependence on fossil fuels from whatever source and replace them with cleaner sources of energy.

The Mayor's Task Force has not been the only initiative in the area to address the future of our community, and our state's energy supply and use.

American Transmission Company (ATC) is looking to site new transmission lines in the Madison area. Madison's current lack of adequate transmission is a contributing factor to MGE's inability to access power outside the metropolitan area and transport it in for city residents. MGE will be bringing 40MW of new wind power on line (located outside of Dane County) and improvements in transmission are necessary to bring an increasing percentage of power, including renewable power, into Madison. A Madison-based collaborative venture involving utilities and various stakeholder interests was launched late last year to discuss the need for transmission improvements. That initiative, spearheaded by the Citizens Utility Board and the American Transmission Company is examining the need for and siting of new transmission facilities in Dane County to serve the area's growing demand for electricity.

Governor Jim Doyle has also convened an Energy Task Force to consider new initiatives on the state level as well as the future of the state's Focus on Energy program. Recommendations from that Task Force will be presented to the Governor for possible inclusion in the state budget as well as next year's legislative session.

Another collaborative involving Madison Gas and Electric and citizen's groups also meets periodically to review the future of that utility's green-pricing program.

As the nation faces severe challenges regarding electric reliability, costs, and the environmental effects of current electric power production, federal leadership has been lacking. As a result, states and localities have had to chart their own course towards a more reliable and environmentally desirable energy future. Cities like Madison are relying upon their own resources to define a progressive energy vision that is ambitious yet achievable.

What this report attempts to show is that by integrating green building design and adopting new energy technologies, the Mayor's vision for a green capital city, that also supports its economic vitality, can lead Madison in becoming a national leader in energy conservation and renewable energy

The Case for Energy Efficiency, Green Building and Renewable Energy

Energy efficiency reduces the demand for energy, lessens the need for new power plants and transmission lines, and lowers greenhouse gas emissions. It also results in cost savings and increases local investments in the community. Energy conservation is an essential element of green buildings. Buildings use 65% of electricity nationwide and Madison's facilities and infrastructure have a significant impact on city energy use. City facilities, street lights and traffic signals, public water supply wells and pumping stations, and wastewater pumping stations were major users of energy totaling 56.5 GWh in 2003 at an annual cost of $4.2 million dollars.

Madison can plan its energy strategy responsibly by combining aggressive energy efficiency and green building programs, first to reap large energy savings (see Figure 2, p. 15) and then to promote renewable energy. The city can then address the issue of additional generation and transmission infrastructure. This is the mayor's approach to addressing Madison's energy future.

Mayor's Energy Task Force

The work of the task force was accomplished through the voluntary contributions of environmental and energy officials and experts from government, utility, University, private, nonprofit and community sectors. The Mayor's Energy Task Force members researched and gathered information on best practices, new technology, and innovative solutions from local, state, and federal governments. The task force also considered partnerships that could be developed with the private sector. More information regarding the work of the Mayor's Energy Task Force can be found on the City of Madison's website at www.cityofmadison.com/mayor/energy/index.html.

The Mayor's Energy Task Force was divided into two committees—the Utility Infrastructure Committee and the Energy Conservation & Green Building (ECGB) Committee.

The Utility Infrastructure Committee was charged with addressing Madison's long-term energy needs, reviewing energy supply and distribution plans, exploring renewable and alternative sources of power for Madison's future, and developing a process for providing citizen input into energy generation and distribution projects.

The Energy Conservation & Green Building Committee was to develop recommendations to improve energy efficiencies and conservation in city facilities, identify ways to encourage private industries and residents to conserve, and develop demonstration projects for green building through public-private partnerships.

This report lays out the recommendations of each committee.

EXECUTIVE SUMMARY

In October 2003, Mayor David Cieslewicz convened the City of Madison Energy Task Force to examine critical questions regarding the city's use and supply of energy and to make recommendations for the future. The Mayor also charged the Task Force with developing recommendations that, when effected, would have the city "acknowledged as a progressive leader regarding renewable energy and conservation within the next five years."

Early in the process, the Task Force organized into two committees: the Utility Infrastructure Committee and the Energy Conservation and Green Building Committee.

Utility Infrastructure Committee

The Utility Infrastructure Committee was charged to:

- Analyze the city's long-term demands for energy generation;
- Explore different approaches to increasing the amount of low-emission electricity serving Madison;
- Develop a process for providing citizen input into energy generation, distribution, and transmission projects.

The Utility Committee reached a consensus understanding of the city's electric supply situation and of new opportunities available to the city. The Committee concluded that:

- The City's electric demand and peak electric demand are growing rapidly and, therefore, that new sources of supply will be required;
- The transmission grid in and around Madison is in need of upgrade to assure reliability and access to new sources of power;
- The City has the opportunity to provide more of its electric needs through new sources of renewable electricity, especially wind-power, that are being developed in Wisconsin;
- These new sources will likely provide renewable power at a significantly reduced cost compared to renewable sources currently available;
- City government and citizen support for renewable electricity will further the development of renewable resources in Wisconsin.

On the basis of its discussion, the Utility Infrastructure Committee developed the following recommendations:

- That the City government set a goal of purchasing 10% of its annual electrical energy from renewable sources by 2006 and 20% by 2010.
- That the City issue a Clean Energy Challenge to city residents, urging them to purchase renewable power from their utility. The goals are two-fold: (1) to persuade 5% of city residents to buy renewable power, and (2) to be recognized as an EPA Green

Power Partner by having 2% of the entire community's electricity purchased from renewable sources.

- That the City be engaged in the siting and approval process for new transmission facilities that may be necessary to provide reliable electricity and new renewable power sources to the city of Madison.
- That the City continue to identify opportunities where the installation of distributed generation and combined heat and power systems would benefit the community.

Energy Conservation & Green Building Committee

The Energy Conservation & Green Building Committee was charged to:

- Develop recommendations to address improving energy efficiencies and conservation in City facilities;
- Identify ways to encourage private industries and residents to conserve;
- Develop demonstration projects for green building through public-private partnerships.

The Energy Conservation & Green Building (ECGB) Committee recognized that an effective approach to reducing Madison's energy use and enhancing its building practices must:

- Address both changes in end-user behavior and changes in city policy;
- Involve city government, businesses, and residents;
- Provide a framework of specific tools and methods;
- Lead to cycles of actions that take us closer to our goals;
- Include measurements and reports to gauge and accelerate improvement.

The Energy Conservation and Green Building Committee made the following key recommendations:

- That the city adopt a Sustainable City Program, which would include:
  1. Adopting a guiding principle on sustainability;
  2. Establishing an Office of Sustainable Development staffed (on a part-time basis) by members of existing city departments;
  3. Developing both the financial resources and the framework for full-scale implementation of sustainable development.

- Developing a GRE^{2}EN Commitment (Green building, Resource & Energy-Efficiency, and Environment), a set of strategies for the city to:
  1. Lead by example and green its own existing and future buildings and operations;
  2. Enact policies and incentives to promote green building, energy efficiency, and renewable energy in the private sector;

3. Facilitate green partner organization programs, educate city staff, businesses, and residents, and communicate successful public and private initiatives.

- Implement High Profile Initiatives, including:
  1. Mayor's Award for outstanding green performance;
  2. Solar Mile on the East Washington Corridor;
  3. A green framework: Build Green / Save Green / Power Green / Buy Green / Drive Green / Manage Green with highly visible programs to launch each.

The Committees reconvened as the Task Force to review each other's work and jointly recommended that the City establish a Sustainable Design and Energy Commission to continue the work of the Task Force, oversee the Madison Clean Energy Challenge and to advise the mayor and Common Council.

UTILITY INFRASTRUCTURE COMMITTEE REPORT

Mayor's Energy Task Force

This report was written by Chris Deisinger with assistance of Michael Vickerman, Renew Wisconsin, and Greg Bollom, Madison Gas and Electric, with contributions from Faramarz Vakili, University of Wisconsin and Robert Cramer and Adel Tabrizi, State of Wisconsin. It represents the work of the Utilities Infrastructure Committee of the Mayor's Energy Task Force (members are listed on the Acknowledgements pages 1-2).

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UTILITY INFRASTRUCTURE EXECUTIVE SUMMARY: *Utility Infrastructure Committee Report*

In October 2003, Mayor David Cieslewicz convened the City of Madison Energy Task Force to examine critical questions regarding the city's use and supply of energy and to make recommendations for the future. The Mayor also charged the Task Force with developing recommendations that, when effected, would have the city "acknowledged as a progressive leader regarding renewable energy and conservation within the next five years."

Early in the process, the Task Force split into two committees: the Energy Conservation and Green Building Committee and the Utility Infrastructure Committee. The Utility Infrastructure Committee was set up to:

- Analyze the city's long-term demands for energy generation;
- Explore different approaches to increasing the amount of low-emission electricity serving Madison;
- Develop a process for providing citizen input into energy generation, distribution, and transmission projects.

The Utility Infrastructure Committee benefited from the participation of a diverse group of stakeholders from the Madison community with expertise in energy issues, including representatives from the City, utilities, the University, industry, environmental groups, and others. It was chaired by Michael Vickerman of Renew Wisconsin and Preston Schutt of the Wisconsin Division of Energy and Public Benefits.

Through its work the committee reached a consensus understanding of the city's electric supply situation and of new opportunities available to the city. The committee concluded that:

- The City's electric demand and peak electric demand are growing rapidly and, therefore, that new sources of supply will be required;
- The transmission grid in and around Madison is in need of upgrade to assure reliability and access to new sources of power;
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- That the City establish a Sustainable Design and Energy Commission to continue the work of the Task Force, oversee the Madison Clean Energy Challenge and to advise the mayor and Common Council.
- That the City be engaged in the siting and approval process for new transmission facilities that may be necessary to provide reliable electricity and new renewable power sources to the city of Madison.
- That the City continue to identify opportunities where the installation of distributed generation and combined heat and power systems would benefit the community.

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.

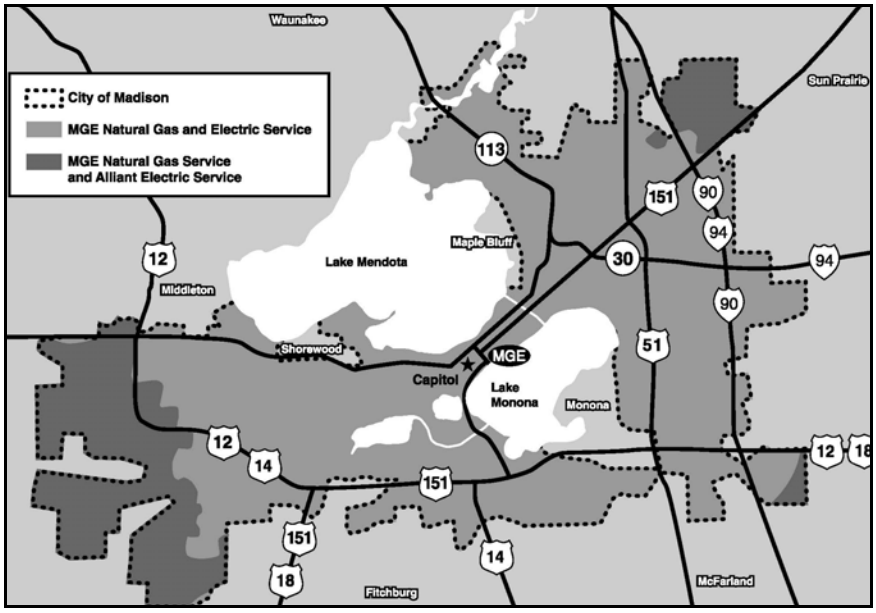

Figure 1.
MGE Territory Map

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.)

MGE serves approximately 111,000 residential customers in the Dane County area

…and approximately 17,250 business customers.

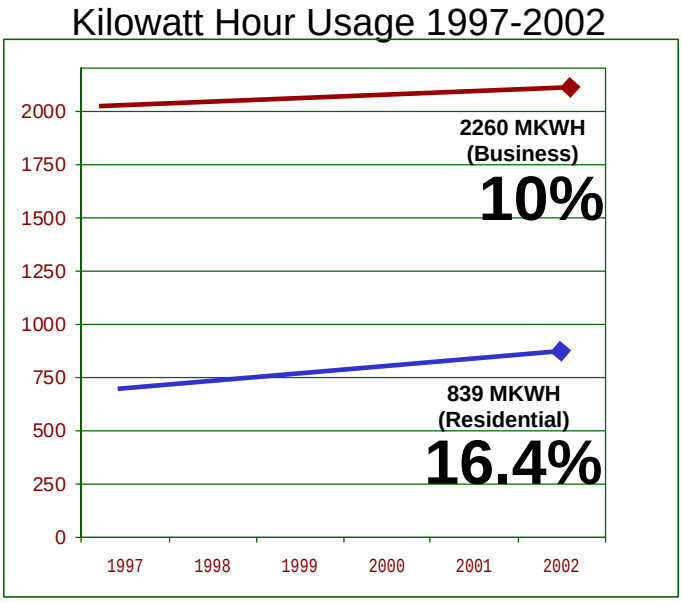

Figure 2.
Kilowatt Hour Usage from 1997-2002 – showing the percentage increase over time, broken out by business and residential customers

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

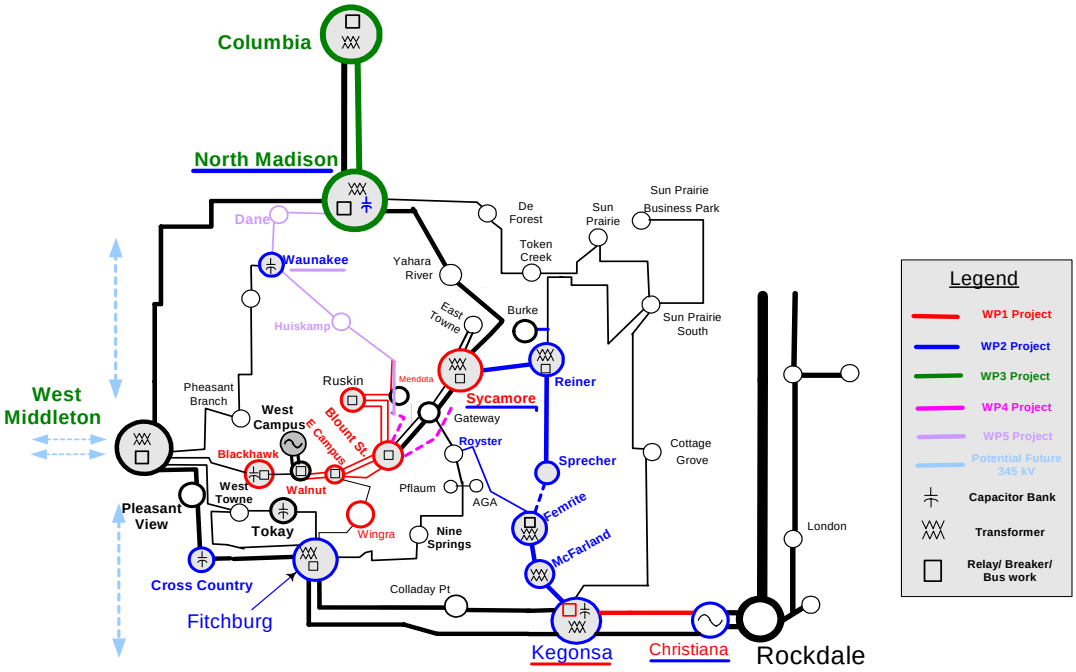

Figure 5.
American Transmission's Proposed New Right-of-Ways

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]

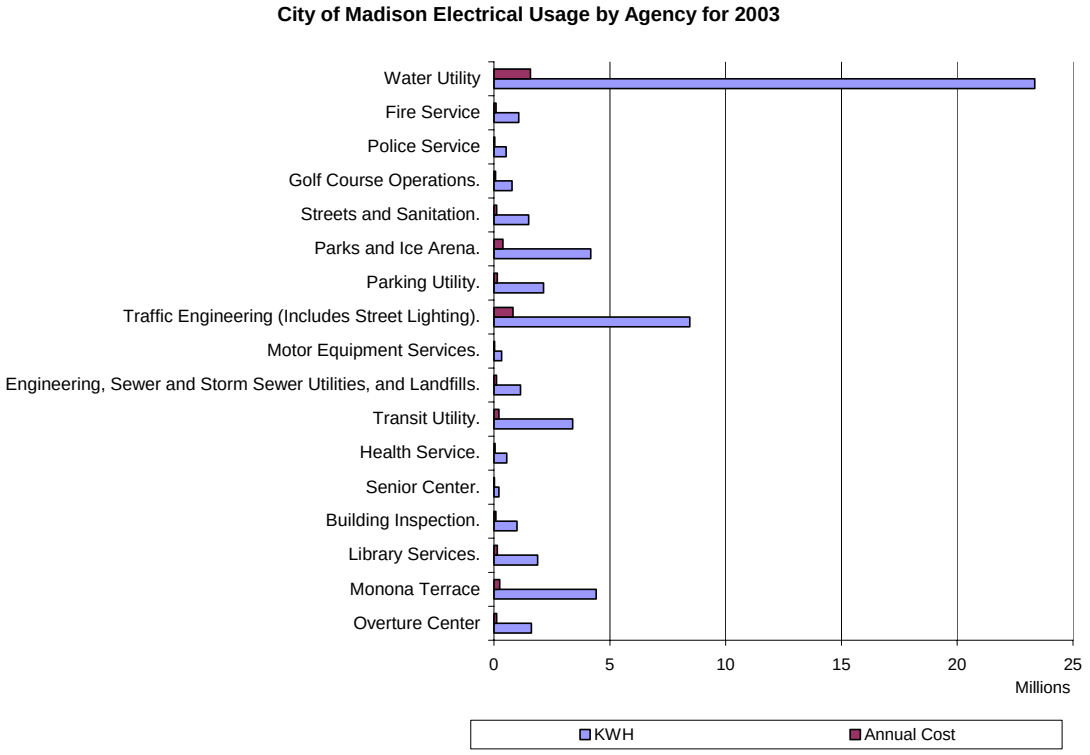

Figure 6.
City of Madison Electrical Usage by kWh and Annual Costs

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.

EXPERIENCE FROM OTHER CITIES: Green-City Programs and Renewable Power Initiatives

The Committee reviewed the experience presented by other cities in the U.S. that had initiated plans to utilize greener energy resources. Many cities are, in fact, aspiring to leadership in utilizing green power. More than 100 cities have vowed to cut greenhouse gas emissions, for example, and these reduction plans often include greater utilization of renewable resources. Some examples:

- Portland, Oregon set a goal of acquiring 10% of City government electric load from renewable energy by 2003 and 100% by 2010;
- San Diego announced a goal of bringing 50 MW of new renewable generation on-line within the city by 2013, on top of 17 MW already available in 2003;
- Chicago's Mayor Daley committed the city, in 2001, to a goal of buying 20% of its electricity from renewable sources within five years. The city is also working to install new models of wind turbines within the city.

Two examples were particularly instructive to the Committee – those of Austin, Texas and of Moab, Utah. Austin provides an example of the "Utility as Aggregator" model for residential participation green-pricing programs and Moab provides an example of a "Community as Aggregator" model.

The City of Austin's municipal electric utility, Austin Energy, established a goal of meeting 35% of the energy needs of its 800,000 customers through renewable energy and energy efficiency by 2020. The utility initiated the GreenChoice green-pricing program in 2000. To date it has purchased 185 MW of wind capacity, 11 MW of landfill gas to energy, and 1 MW of hydropower, and aggressively marketed the program to customers. The program now includes more than 6,800 residential customers, 213 small businesses, and 35 large customers including firms such as IBM and Apple Computer as well as the Austin School District.

This program is notable in several ways. In 2003 Austin Energy sold 355 MKWH through the program, the highest sales for any green-pricing program in the nation. Unusual among utility green-pricing programs, commercial customers in Austin account for the majority of sales (60%). Not coincidentally, it is the only program that offers customers a long-term "fuel-rate" fixed price for renewable power to provide customers a hedge against otherwise rising energy prices.

This fixed-price option is possible because Austin Energy has an unbundled rate structure. All customers pay a per kWh energy rate which reflects utility capital expenses and all non-fuel operations and maintenance. In addition, customers either pay the standard fuel rate or the GreenChoice fuel charge if they are green-pricing customers. That charge of 2.85 cents per kWh is locked in for ten years.

The standard fuel rate has proved volatile in the recent period, growing from 1.774 cents/kWh for residential customers in January 2003 to 2.796 cents per kilowatt-hour in January 2004, partly reflecting the heavy reliance of Austin Energy on natural gas capacity. In contrast, customers on the renewable power option can anticipate stable prices. For a brief period, in fact, energy costs for renewable power customers were less than those for standard customers.

The City of Moab, in Utah, presents an example of a model where the city government has initiated a challenge to its citizens to participate in the purchase of green power through an investor-owned utility – Utah Power.

Moab initially committed to purchase a portion of renewable power for municipal use. In April 2003, Moab launched its Blue Sky Community Challenge with a goal of achieving a customer participation rate of 5% and of having 3% of Moab's total electric consumption provided by renewable power, which would qualify the city as an EPA Green Power partner. All of the power is derived from wind generation provided by Utah Power and costs an incremental $1.95 for a 100 kWh block or 1.95 cents per kWh. Participation reached 5% by June of 2003 and has reached 9% since, consisting of 400 residences and 50 businesses. About 2% of Moab's power is now provided by wind.

Moab's success has encouraged other communities in Utah to join the Blue Sky Challenge including Park City and, in June of this year, Salt Lake City.

THE POTENTIAL OF RENEWABLE ENERGY AND DISTRIBUTED GENERATION TO MEET MADISON'S POWER NEEDS

The Committee discussed barriers to further utilization of renewable energy as well as opportunities for further utilization and for further promotion of renewable power, as well as for increased use of distributed generation – small-scale generators placed near electric load.

Solar Electric Power

Solar electric power remains an expensive source of electricity. The city has partnered with MGE for a canopy solar demonstration project at the Madison Municipal Building parking area that provides both power and shade. There are five other solar installations in the city which provide power for MGE.

While solar power is not expected to provide an option for a great deal of renewable power in the future in the city, it will have some application due to its high visibility, compatibility with other land uses, clean environmental footprint, and capacity value during summer peak conditions. There are several customer-sited installations in the city, some recently facilitated through the state Focus on Energy Program, which provides technical assistance and financial help.

Biomass

Biomass as a renewable energy source includes the burning of materials that otherwise would be waste as well as combustion of dedicated crops grown for energy. The city already receives some power from both MGE and Alliant that is derived from biomass. This includes paper-derived fuel co-fired in the Blount Street Station, the landfill gas-to-energy projects, a small amount of power from on-farm manure digesters, and the wastewater treatment plant in Sun Prairie which is on WPPI's system. The Rodefeld Landfill gas to energy project is in the process of expansion, and MGE plans to utilize more PDF at the Blount Street Plant. There is a limited amount of landfill gas to fuel generation facilities in Wisconsin. There are also currently nine additional manure digester projects underway in the state. Expansion of this source has potential, but, as with other sources, power will have to be transmitted into the city from rural areas.

Hydropower

The city already receives some hydropower through the Alliant system from dams it owns, notably the 29 MW Prairie du Sac unit on the Wisconsin River. Hydropower in Wisconsin, the first source of electric

generation in the state, can be considered to have reached its maximum potential, with very limited possibility for expansion.

Distributed Generation

Distributed Generation (DG) – the use of small-scale generation close to load - is developing a set of technologies with the potential for increased utilization in the future. DG has the advantages of modular applicability and the ability to support the distribution infrastructure. The Committee reviewed a presentation on DG specific to biogas combustion technologies appropriate for landfill gas, wastewater treatment plants, manure digesters, and potential other uses. Technologies include internal combustion engines - a proven technology but with potential environmental limitations, microturbines, and Stirling engines. Capstone, with 30 kW microturbines, are currently being utilized by Alliant at the Sauk County and Glacier Ridge landfills and at the Sun Prairie and Kaukauna wastewater treatment plants. Microturbines produce both electric power and heat which can be utilized.

Stirling Engines are an emerging technology which can utilize heat from an external source to produce electricity. Alliant has been testing a 25 kW Stirling engine in Madison.

Combined Heat and Power

Cogeneration facilities produce both electricity and heat for other uses and have the advantage of much greater efficiencies through utilization of a heat resource that is otherwise wasted. The WCCF will be an example of a modern cogeneration facility. The Committee agreed that other opportunities should be examined, including the potential to have MGE collaborate with the State of Wisconsin and other potential users to utilize waste heat from the Blount Street Plant in the downtown area.

Wind Power

Increased use of windpower was identified as the chief option for enhanced supply of renewable electricity to the city of Madison. Windpower technology has advanced rapidly, costs have declined, and it has become a proven source of energy in Wisconsin. City of Madison residents have accepted windpower and have supported it through the green-pricing programs offered by MGE and Alliant. Both utilities are in the process of expansion of windpower resources.

Utilities are required by regulators to acquire new energy resources on a "least-cost" basis. The incremental cost of most renewable resources up to now has meant that they are unlikely to be approved as new resources unless the incremental costs can be defrayed through voluntary programs. Green-pricing programs were developed

as a means to finance and gain regulatory approval of renewable additions on the basis of voluntary customer participation and contributions. The many green-pricing programs across the nation have been especially valuable in spurring the development of the domestic wind industry. As the industry has developed, windpower's costs have come down. As a market transformation program, green-pricing programs have helped. One can say that green-pricing programs have shown that there is a customer segment that will purchase renewable electricity at a premium. One can also say that green-pricing programs are an effective way of demonstrating utility responsiveness to that customer group. But they did not contribute to the lowering of windpower's costs. For that we can thank European tariffs and policies, which encouraged manufacturers to design turbines that are economic in places that have pretty good (but not great) winds, like Wisconsin. American-style Renewable Standards have also contributed to windpower's declining costs.

MGE and other wind developers have also been able to take advantage of federal tax incentives, particularly the Production Tax Credit (PTC) of 1.8 cents per kilowatt-hour for wind and other renewable energy. The PTC, in effect for ten years from the time of installation, has helped level the playing field between renewables and traditional generation. Unfortunately, Congress has only authorized the PTC for a few years at time. Having allowed the PTC to lapse at the end of 2003, Congress is not expected to reauthorize the PTC until the very end of this session. After a record year in 2003, 2004 shapes up to be a dismal one in the wind industry, owing to the protracted nature of the PTC's reauthorization.

The MGE Windpower Program

MGE's Current Windpower Program

MGE initiated its windpower program in 1999 with the construction of a 17-turbine project in the Kewaunee County townships of Lincoln and Red River. These are 660 kilowatt machines on 65-meter towers, together they comprise 11.2 MW of capacity. The wind farm fulfilled a state mandate that required MGE to add 3 MW of wind capacity, but MGE had already been considering acquiring wind resources and initiating a green-pricing program to give an option to customers and to provide financial support to offset the incremental cost of the power.

MGE green-pricing program has, since 1999, offered customers the option of buying 150 kWh blocks of windpower for an incremental cost of $5 per month, which amounts to a premium of 3.33 cents per kWh. The program has been very successful and has demonstrated the public's support of renewable power. It has been fully subscribed from its beginning. As of the end of year 2003, there were 4,514 participants - 4,423 residential customers and 91 business customers – representing 3.9% of MGE's customer base. This is the highest participation rate of any investor-owned utility in the nation.

MGE Plans for Windpower Expansion

MGE is in the process of acquiring new wind resources. In October 2003, MGE issued a joint Request for Proposals with Wisconsin Public Power Incorporated for a new wind farm and received responses from 16 developers. On July 16, 2004, MGE and WPPI announced they had signed a 20-year Power Purchase Agreement for the energy from 60 MW of windpower to be built in Fond du Lac and Dodge Counties. The proposed Forward Energy Center Wind farm, to be built and operated by Invenergy Wind LLC, will be the largest wind farm east of the Mississippi and will be located on high ground east of Waupun, about 70 miles northeast of Madison. With this additional wind, MGE will have the highest percentage of Wisconsin-based wind energy in it's supply portfolio. MGE will power 5% of its annual energy demand using renewable energy sources.

MGE will contract for 40 MW, WPPI for 20, but there is also the possibility that other utilities will contract with the facility, which could be as big as 200 MW. At 60 MW, about 40 turbines will be installed. MGE and WPPI have expressed a willingness to go forward with the project even if the Federal Production Tax Credit is not reauthorized.

Pending approvals by the WPSC and local governments in the area, the facility is expected to be built by the end of 2005.

When built, the wind farm will incorporate state-of-the-art technology and practices. The turbines used are likely to be much larger than the turbines installed by MGE in 1999, on the order of 1.5 MW apiece rather than 0.66 MW. Economies of scale have led to a declining cost of windpower to the extent that, even with the wind resources in Wisconsin, costs of energy from wind are nearly competitive with other new sources of power if federal tax incentives are available.

The MGE Green-Pricing Collaborative

In response to concerns raised by Renew Wisconsin over pricing and programmatic aspects of the MGE green-pricing program, MGE has formed a collaborative to help in the redesign of its green-pricing program in light of its potential for expansion and the new wind resources which MGE intends to develop and to market through the program.

The current premium for green-power under the program is 3.3 cents per kWh. With the addition of the new wind resources, this cost per kWh is expected to be substantially less, especially if the PTC is reauthorized. If the cost is low enough, MGE may even use some increment of wind power as part of its system mix. Options being discussed by the collaborative include presenting a choice of green-power offerings to consumers: a low-cost wind-power option and a higher cost option that would finance more innovative projects. These might include solar-electric projects, urban renewables and distributed generation, and/or "Community-wind" projects that would involve

smaller clusters of commercial wind turbines owned by communities or smaller investors from the immediate area.

Although wind resources in or near MGE's service territory and Dane County are not equal to those in other parts of the state, developable sites do exist, which may be usable for this model of wind development. Nearby development would have the advantages of high visibility, a sense of "ownership" for consumers supporting them through green-pricing contributions, providing power generated in the local area, and supporting rather than stressing the transmission infrastructure.

The collaborative has also discussed a "fixed-price" option similar to the offering by Austin Energy, although there are obstacles presented by MGE's currently bundled rate structure, and questions as to whether it would, in fact, be as marketable to consumers.

The Alliant Energy 'Second Nature' Program

City residents in Alliant service territory have the opportunity to support green power through Alliant Energy's 'Second Nature' green-pricing program. The program costs consumers the equivalent of an incremental two cents per kWh and is used to support windpower and biomass development - manure digesters and landfill gas to energy facilities. Alliant's windpower comes principally from wind installations in Iowa, but also includes the output from three turbines at the Montfort project in Iowa County. Having announced its intention to develop 100 MW of new wind generating capacity in Wisconsin, Alliant issued a Request for Proposals this spring and is now in negotiation with several developers.

RECOMMENDATIONS OF THE UTILITY INFRASTRUCTURE COMMITTEE

Based on its extensive discussions, the Utility Infrastructure Committee of the Energy Task Force, has reached a consensus on its recommendations to the City of Madison. We are proposing that:

- The City of Madison increase its purchase of renewably generated electricity to 10% of its total demand by 2006 and to 20% by 2010;
- The City issue a Clean Energy Challenge, the goal of which is to have at least 5% of residents participate by buying green power, and to have at least 2% of the overall electric demand of city residences, businesses, and institutions supplied by renewable sources;
- The City establish a Sustainable Design and Energy Commission to continue the work of the Task Force of advising City government, residents, and businesses about clean energy and energy efficiency;
- The City engage in the siting and approval process for new transmission facilities that may be necessary to provide reliable electricity and new renewable power sources to the city of Madison;
- The City continue to identify opportunities where the installation of distributed generation and combined heat and power systems would benefit the community.

Increasing the City's Purchase of Renewable Electricity

Greater participation by city government in the MGE and Alliant green-pricing programs will provide renewable power for city operations and will encourage the continued development and installation of new renewable resources in Wisconsin. It will also set an example for citizens and businesses to follow.

As noted, City government already receives about 3% of its electricity from renewable resources, through the proportion in the utility system mix and through the participation of the transit utility in MGE's windpower program. The Transit Utility currently buys 803 MWH a year at an incremental cost of $26,747.

We are proposing that the City increase its purchase of renewable electricity to a level of 10% of total load by 2006 and 20% by 2010.

Because new renewable resources will be less costly than current resources in MGE's program, the premium cost per kWh is expected to be substantially less than the current 3.3 cents per kWh, probably lower than 2 cents per kWh.

We estimate that, at 2 cents per kWh, the goal of 10% would add no more than $113,032 to the city's annual electric cost, or 2.7%, and that the 20% goal would add no more than $226,064, or 5.4%.

These goals are comparable to renewable purchasing goals established by other cities and being discussed by the Wisconsin Governor's Energy Task Force, which has recommended 10% by 2006 and 20% by 2010. Chicago has set a goal of acquiring 20% by 2006.

The Clean Energy Challenge

We are proposing that City government follow the model established by Moab and other cities and issue a challenge to its residents to support renewable-power through participation in utility green-pricing programs. With city leadership and advocacy we should set a goal for participation and for proportion of total load that will have the City recognized as an EPA Green Power partner.

Sustainable Design and Energy Commission

The City will continue to meet new challenges and opportunities regarding the question of energy generation and use. The Task Force and its Committees feel that the City can continue to take advantage of the enthusiasm and participation of citizens and stakeholders who have come together to deal with these questions by establishing a Sustainable Design and Energy Commission. The Commission would have particular responsibility for continuing in an advisory capacity to the Mayor and Common Council and for championing the City Clean Energy Challenge. It would seek to continue the work of the Energy Task Force and its Committees.

Siting and Approval Process for New Transmission

Transmission enhancements are needed in and outside the Madison area. These enhancements are of concern to the future of the city and its economic base, but may present problematic issues in terms of siting and evaluation of alternatives. City government needs to take an active role in the discussion to ensure the interests of the residents of Madison are fully represented.

Distributed Generation and Combined Heat and Power

Opportunities may well exist for increased cogeneration in the city and for the application of new technologies that would allow power to be generated close to its point of use. These opportunities should continue to be investigated and implemented where possible.

ENERGY CONSERVATION & GREEN BUILDING COMMITTEE REPORT

Mayor's Energy Task Force

This report was written by Sherrie Gruder, University of Wisconsin-Extension and Alexis Karolides, Rocky Mountain Institute. It represents the work of the Energy Conservation & Green Building Committee of the Mayor's Energy Task Force

SHWEC
Solid & Hazardous Waste Education Center
UW Extension

ENERGY CONSERVATION & GREEN BUILDING EXECUTIVE SUMMARY: *Energy Conservation & Green Building Committee*

Background and Purpose

Mayor's Vision

In October 2003, Mayor Dave Cieslewicz articulated his vision for the City at the first meeting of the Mayor's Energy Task Force. His stated premise: "energy is important to the future of Madison from an economic, environmental, and quality of life perspective."

The Mayor's vision is that Madison will be:

- A leading green capital city with reliable, clean energy supporting its economic vitality;
- A national leader in energy conservation and renewable energy.

Mayor's Energy Task Force: Energy Conservation & Green Building Committee

Mayor Dave Cieslewicz established the Mayor's Energy Task Force comprised of experts and stakeholders to help plan for Madison's future energy needs.

The Task Force was formed into two committees—the Utility Infrastructure Committee and the Energy Conservation & Green Building (ECGB) Committee.

The Energy Conservation & Green Building Committee was to develop recommendations to address improving energy efficiencies and conservation in City facilities, identify ways to encourage private industries and residents to conserve, and develop demonstration projects for green building through public-private partnerships.

Energy Conservation & Green Building Committee Mission

To accomplish the Mayor's vision, the ECGB committee crafted a **mission** to guide its work:

> *The Energy Conservation & Green Building Committee will provide recommendations for City government, businesses, and residents to improve the built and natural environment through sustainable practices to create health, economic, and environmental benefits.*

Breaking Ground for a New Approach: Key Recommendations

Madison—A Sustainable City

In order to achieve the Mayor's vision that Madison becomes a green capital city, the Energy Conservation & Green Building Committee recommends the city adopt a Sustainable City Program.

Green cities (and states) make sustainability an overarching concept, integrated into all city activities, programs, and functions. To create this transformation requires sustainability to be integrated into all city departments; sustainability is not an add-on program.

The ECGB Committee recommends that Madison:

(A) Adopt a guiding principle on sustainability;
(B) Establish an Office of Sustainable Development staffed (on a part-time basis) by members of existing city departments; and
(C) Develop both the financial resources and the framework for full-scale implementation of sustainable development.

Madison's (GRE^{2}EN) Commitment— Green building, Resource & Energy-Efficiency, and ENvironment

The GRE^{2}EN Commitment is a set of recommendations and implementation plans to achieve the mayor's vision for Madison to be a national leader in energy efficiency and renewable energy. It encompasses strategies for Madison to:

(A) Lead by example and green its own existing and future buildings and operations;
(B) Enact policies and incentives to promote green building, energy efficiency, and renewable energy in the private sector; and
(C) Facilitate green partner organization programs, educate city staff, businesses, and residents, and communicate successful public and private initiatives.

High Profile Initiatives

In addition, some high-profile memorable initiatives are introduced including:

- Mayor's Award for outstanding green performance;
- Solar Mile on the East Washington Corridor; and
- A green framework: Build Green / Save Green / Power Green / Buy Green / Drive Green / Manage Green with highly visible programs to launch each.

The outcomes of these programs will be a Green Capital City with enhanced economic vitality, human well-being, and environmental quality.

INTRODUCTION

Background

A green or "sustainable" city is one with a healthy balance between the environment, the economy and social good. Recognizing that a healthy environment underpins the economic and social well-being of Madison, the city can ensure these benefits by basing its policies and programs on an overriding commitment to green the city. The recommendations of the ECGB committee provide a blueprint for Madison to become a green city by using energy efficiency and green building as a launch pad.

There are already multiple environmental initiatives that are part of Madison city government including a Global Climate Change Action Plan, the EnAct Program, and Clear Air Action Days, but they don't pervade across all city departments or sufficiently address some of the major energy issues impacting our community. We have an opportunity to green all city operations from Madison's energy supply, its buildings, and the products and equipment it purchases.

What is Sustainability?

A widely accepted definition of sustainability is "meeting today's needs without compromising the ability of future generations to meet their own needs."

"Our Common Future*", 1987, widely known as "The Brundtland Report" of The World Commission on Environment and Development.

Based on current trends, Madison Gas & Electric (MGE) estimated that customers will double conservation efforts in the next ten years. Energy conservation measures over the last 15 years have saved 368,000 megawatt-hours or 96 megawatt-hours of peak demand (which is equivalent to the electrical needs of 52,500 houses or the entire energy use of the University of Wisconsin, Madison). However, the *next decade's currently projected savings are not adequate to offset the projected increase in electrical demand due to expected growth*.

In order to lessen the need for new centralized fossil-fuel burning power plants, Madison's mayor is leading the city to take a much more proactive approach than it ever has before, to significantly improve energy efficiency in all aspects of city, business, and citizen activities, *and* to promote the development of clean, renewable, and distributed energy solutions.

One of the biggest opportunities to both reduce energy use and to create a greener city is to implement green building practices that address the design, construction, remodeling, operation, and even the demolition of buildings. In the US, buildings consume more than 36% of our energy, produce more than 30% of our greenhouse gas emissions, and generate 30% of our solid waste (40% in Dane County). Moreover, how we design our buildings affects people's health, comfort, and productivity, especially since we spend 90% of our time inside them.

The City of Madison currently owns and operates more than 200 buildings of varying size and structure. A majority of these buildings

are utilized for equipment storage, general maintenance, and public recreation. The remaining are used for administrative offices (17), community/convention/clubhouse centers (12), fire/police stations (12), libraries (3), and parking ramps (5). The City also leases a small number of buildings (e.g., City-County Building and five branch libraries). Currently, there are $8.2 million in projects under construction, many of them retrofits and remodels, with another ten projects in the design phase and as many future projects planned.

The Energy Conservation & Green Building (ECGB) Committee recognized that an effective approach to reducing Madison's energy use and enhancing its building practices must:

- Address both changes in end-user behavior and changes in city policy;
- Involve city government, businesses, and residents;
- Provide a framework of specific tools and methods;
- Lead to cycles of actions that take us closer to our goals; and
- Include measurements and reports to gauge and accelerate improvement.

The following diagram (Figure 1) provided a framework for the ECGB Committee to approach its task:

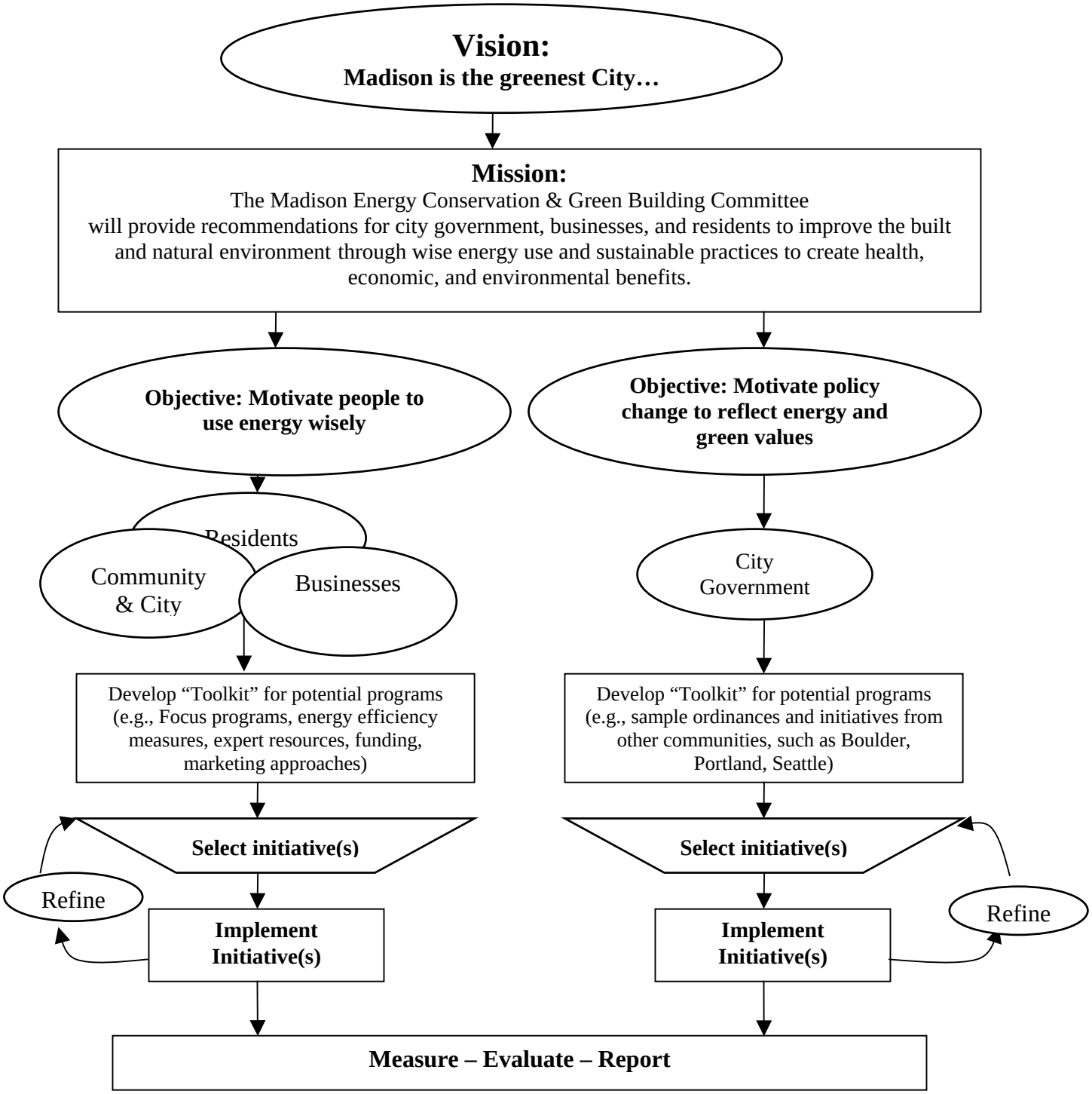

Figure 1.
Madison Energy Conservation & Green Building Committee Working Framework

Principles underlying the ECGB Committee recommendations are:

- Use energy more efficiently and achieve lower costs through the application of energy management and energy conservation technologies;
- Balance, in a sustainable manner, economic development and quality-of-life issues within the ecological context;
- Develop and implement innovative approaches to the management and delivery of Madison energy and environmental services; and
- Prevent, rather than correct, pollution and other environmental problems whenever economically feasible.

Benefits of Energy Efficiency and Renewables, Green Building, and "Whole Systems" Design

Energy Efficiency and Renewable Energy Flows and Benefits

Energy use is associated with almost every aspect of our community from the building and maintenance of city infrastructure such as buildings, street lights and traffic signals, public water supply wells and pumping stations, and wastewater pumping stations, to powering a myriad of business, industry, and residential activity.

Energy efficient strategies reduce energy consumption over standard practices for the same or better services. In buildings, this can include such strategies as optimizing solar orientation, window glazing, insulation, daylighting, and thermal mass, and installing occupancy and daylighting sensors, set back thermostats and variable speed drive equipment. In purchasing, this includes specifying Energy Star appliances from computers to refrigerators, energy saving lighting, systems, services, and products.

To truly achieve a green city, energy conservation must be addressed, not just in end-use devices such as air conditioners, but also in the building design and social behaviors (e.g., wearing suits in summer). After efficiency measures have been implemented, services, such as lighting and cooling, can be supplied through clean, renewable energy sources. Through green building design and construction, lower energy costs can be achieved over the life of the building.

Proven renewable energy technologies, such as solar, wind, and biomass, provide power sources that can reduce the volatility in electric utility bills for the City and its residents because these forms of fuel do not fluctuate in costs. Renewable fuels also provide numerous environmental benefits, create high quality local jobs, and reduce Wisconsin's energy imports. Buildings and infrastructure with an optimal combination of energy efficient and renewable energy strategies enjoy lower life cycle costs, saving money over the life of the project.

To this end, the city can strive to achieve the following **energy goals recommended by the ECGB Committee**: (1) decrease summertime peak electrical load; (2) reduce base electrical load; (3) decrease natural gas consumption; and (4) promote renewable energy sources.

There are multiple benefits to promoting energy efficiency for the environment, the community, and for economic growth. The U.S. Department of Energy has documented that a dollar spent on energy efficiency measures generates 57 to 84 cents *more economic activity* than does a dollar spent to pay energy bills. Figure 2 illustrates how energy is linked to economic development.

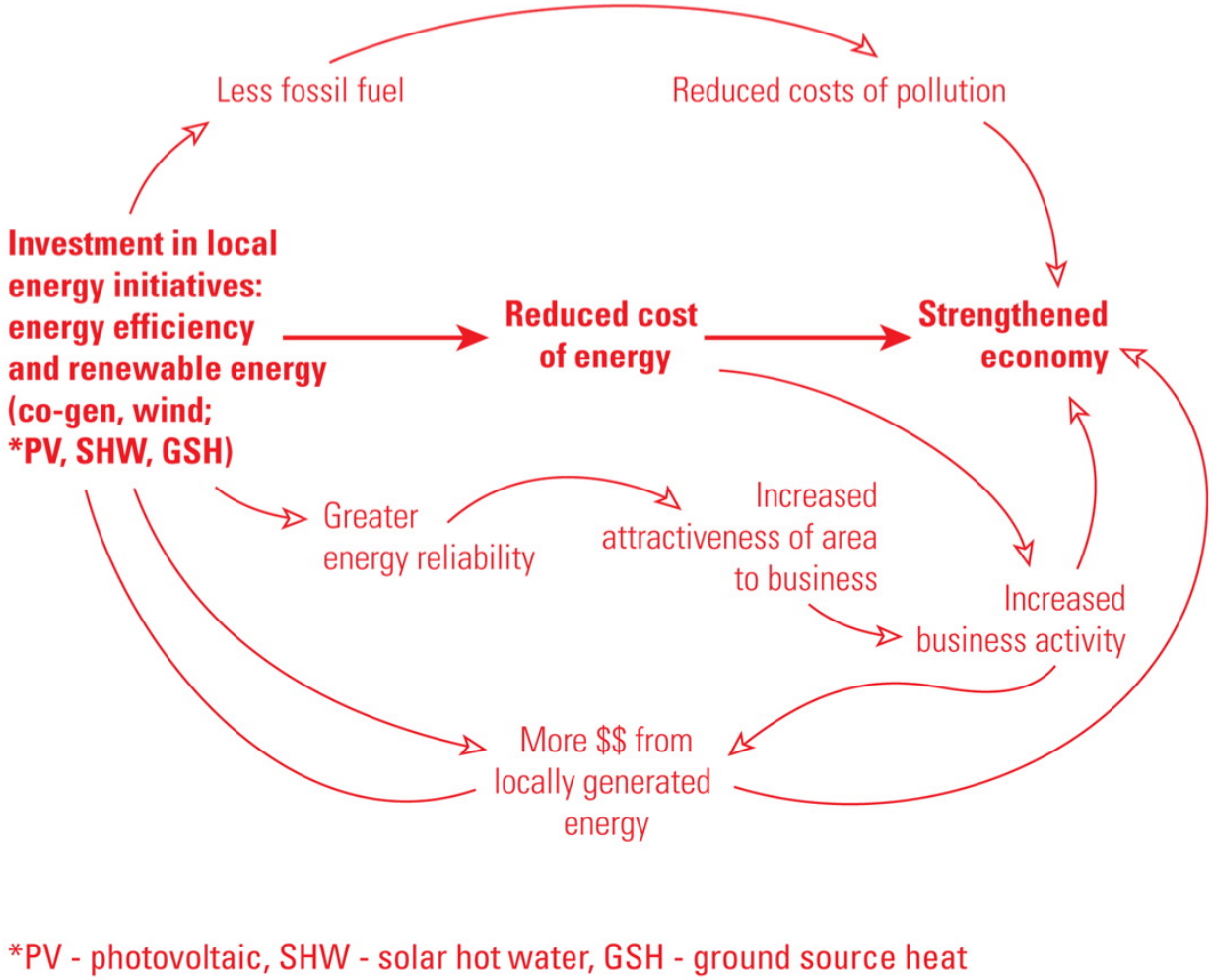

Figure 2.
Economic development from energy-saving initiatives

Green Building

Most people understand the benefits of energy efficiency and renewable energy. The benefits of green buildings are less evident because most don't have first-hand experience owning and using green buildings. The best way to achieve energy efficiencies in

buildings demands an integrated view, which is embodied in green building design.

Green building is a whole building integrated design and construction approach that optimizes the site's energy, water, and materials, and improves indoor environmental quality and occupant comfort. Green building advances the triple bottom line of community, environment, and economy by enhancing human culture, well-being and productivity, protecting or enhancing the natural environment and providing economic advantage through lower life cycle costs. A well-designed green building will approach an ideal of sustainable design. According to the World Bank, "To say that a development is "sustainable" means, at least that its patterns of production and consumption can be reproduced indefinitely without doing irreparable damage to essential natural ecosystems."

Green real estate development has more than a single face. For one project, the most visible "green" feature might be energy performance; for another, restoration of prairie ecosystems; for yet another, the fostering of community cohesion and reduced dependence on the automobile. More significantly, though, green development is about the integration of all these features and many more. It is about solution multipliers, whereby one feature provides multiple benefits in reducing a project's impact on the environment.

—From "Green Development," *Rocky Mountain Institute*

The LEED™ Green Building Rating Standard

The LEED™ Green Building Rating System has been adopted nationwide as the guideline for sustainable building by federal agencies, state and local governments, and interested private companies. LEED™ (Leadership in Energy and Environmental Design) is a feature-oriented rating system where credits are earned for satisfying specified green building criteria. The five major environmental categories of review include: Sustainable Sites, Water Efficiency, Energy and Atmosphere, Materials and Resources, and Indoor Environmental Quality. Certified, Silver, Gold, and Platinum levels of green building certification are awarded based on the total credits earned.

Green buildings frequently require fewer resources than their conventional counterparts. This can have multiple benefits. A well-designed building can obviate the need for large, conventional heating and cooling systems, offsetting green design costs. This can result in comparable initial construction costs and reduced operational and maintenance costs over the life of the finished structure. A green building also tends to generate less waste, reducing tipping fees. Indoor environmental quality is a priority in green building, which includes good air quality. Therefore, green buildings are less likely to exhibit "sick building syndrome," reducing liability

from employee lawsuits while enhancing worker productivity. These factors increase the value of green buildings, which can result in greater demand, higher rents or sales, and market stimulus to increase the supply of green buildings. Figure 3 illustrates some of the inter-relationships of building green on the economy and environment.

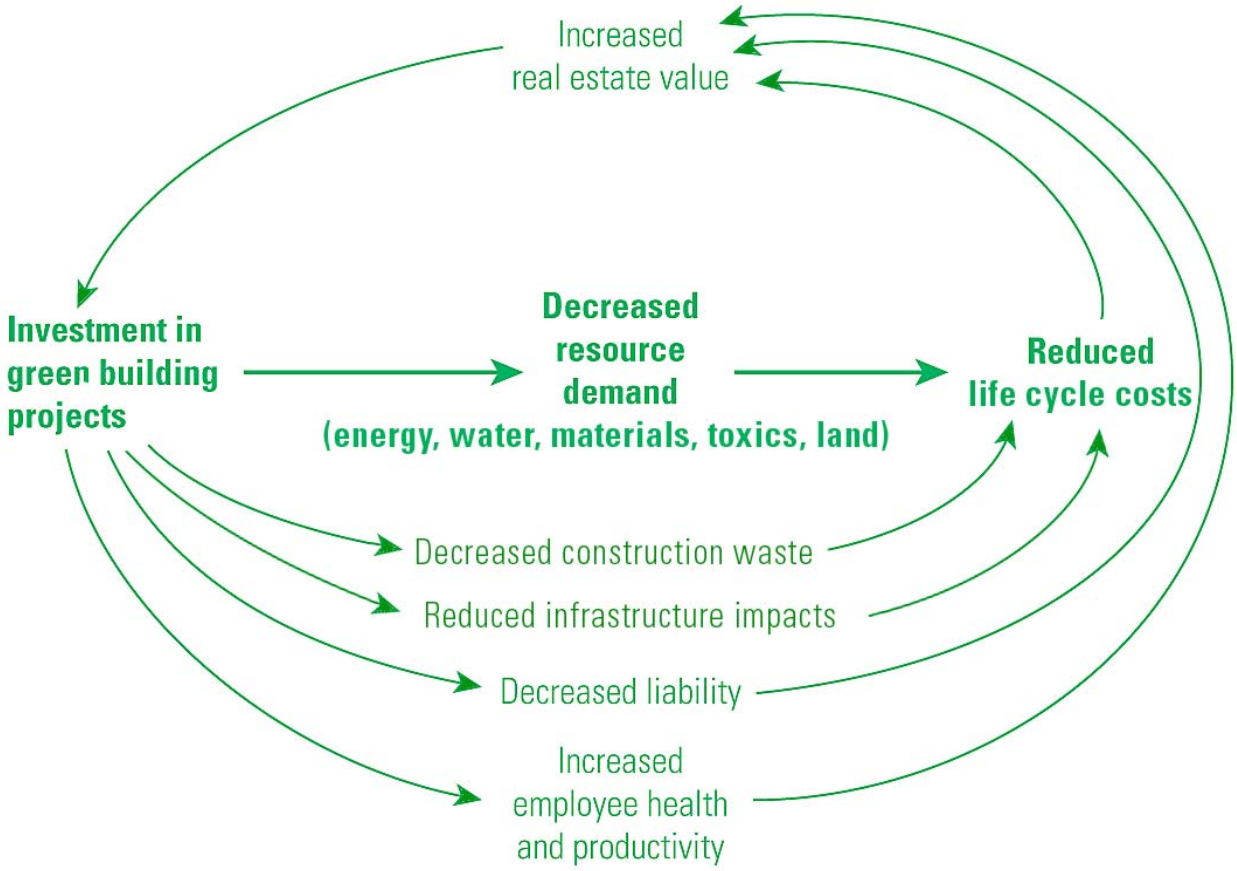

Figure 3.
Economic, Environmental and Health Impacts of Green Building

Whole Systems Sustainable Design; The Integrated Approach

Sustainable design requires us to consider the flow of energy and material through our community. We must also figure out how we can use that energy and materials in ways that can be sustained over many years, without compromising the ability of future citizens in our community to live productively and safely.

Whole-systems thinking is a process through which the interconnections between the systems are actively considered. Solutions are sought that address multiple problems at the same time by considering all elements of the complete or whole-system to seek a

balance. Some refer to this process as the search for "solution multipliers."

Complex planning and design today requires many disciplines or departments to work together to inform the process. The traditional approach is for these various disciplines to have purview over limited, specific project types and topics that they handle independently of other departments. Design challenges are handled in a linear fashion as discrete tasks, passed on from one discipline or department to the next.

By contrast, integrated design is a process through which the disciplines come together from the outset to actively consider the interconnections between systems and to seek solutions that address multiple problems at the same time. Tremendous opportunities exist to implement a teamwork approach to integrate Madison's staff and work to incorporate a whole systems approach to capitalize on the synergies and achieve the maximum environmental, economic and social value.

Applying whole-systems sustainable design techniques to maintenance, repair or upgrades of existing city infrastructure can yield multiple benefits that previously may not have been recognized. This provides benefits toward the triple bottom line (economy, environment, social equity) now and for future generations. For example, the city could apply whole-systems design considerations to the restoration of Madison's watercourses and lakes. This includes daylighting any streams that currently run through culverts as roads and culverts are replaced, providing bio-filtering drainage swales for stormwater management when roadway stormwater systems are being replaced, promoting rain gardens and other techniques which are integrated into property landscapes to reduce or eliminate run-off from properties, and enhancing riparian zones around the lakes and rivers. These actions could provide the interrelated benefits described graphically in Figure 4 on next page.

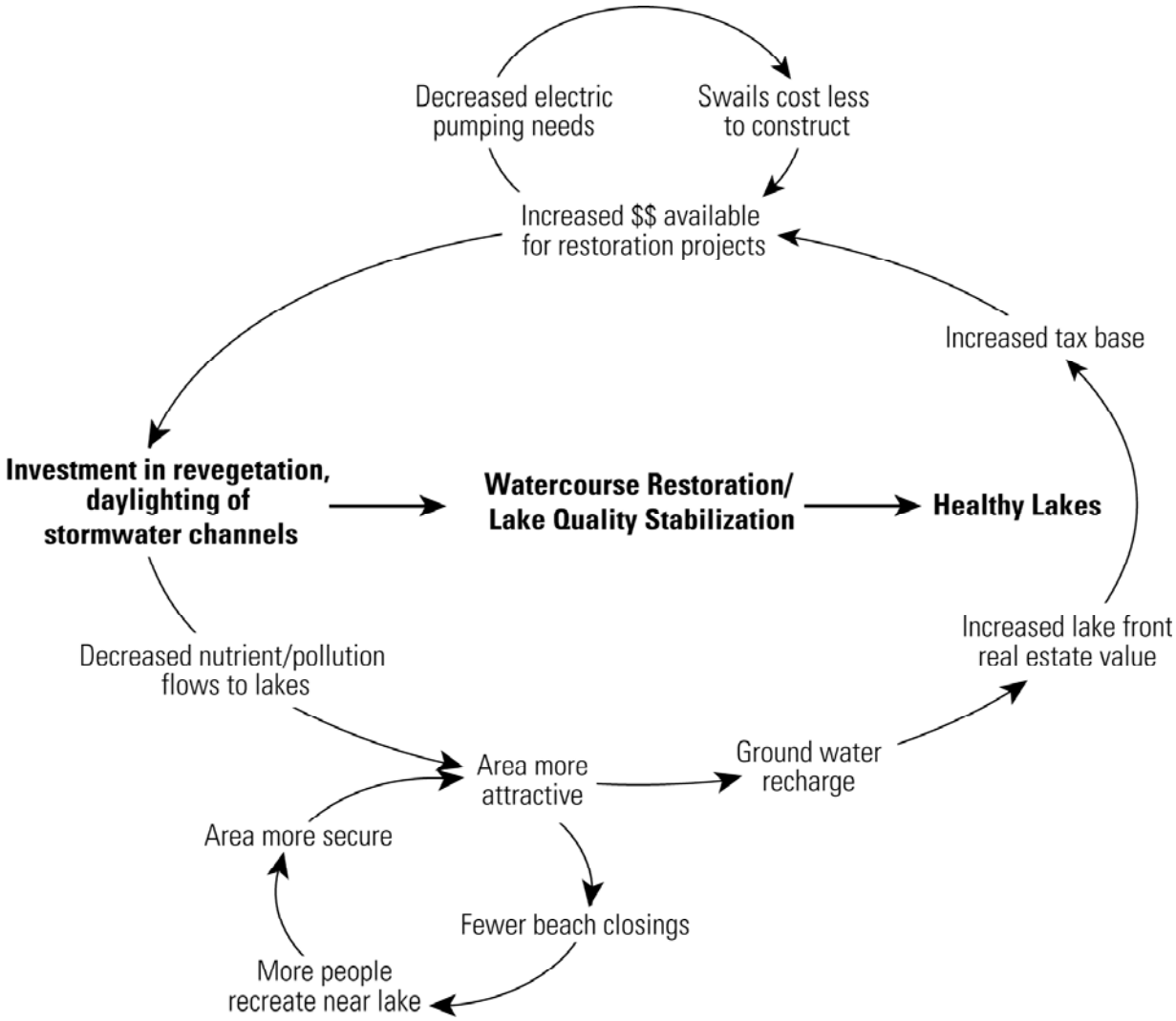

Figure 4.
Benefits of whole-systems sustainable design techniques

Sustainable Cities

Communities around the world are using the principles of the Earth Charter, Agenda 21[3], and other principles and highlighting the integration of environmental integrity, social and economic justice, democratic processes, and respect and care for the community of life.

[3] Agenda 21, United Nations Conference on Environment and Development (www.un.org/geninfo/bp/enviro.html), Rio de Janeiro, Brazil, 1992.

Some of the sustainable city programs across the US and the world include: San Francisco[4], San Jose[5], Portland[6], Pittsburgh[7], and New Orleans, Montreal and Toronto, Canada, London and Cambridge[8], England, Vienna, Austria[9], Lyon, France and Sao Paulo, Brazil. By working to become a sustainable city, Madison would join a global movement.

Agenda 21 Preamble:

"Humanity stands at a defining moment in history. We are confronted with a perpetuation of disparities between and within nations, a worsening of poverty, hunger, ill health and illiteracy, and the continuing deterioration of the ecosystems on which we depend for our well-being. However, integration of environment and development concerns and greater attention to them will lead to the fulfillment of basic needs, improved living standards for all, better protected and managed ecosystems and a safer, more prosperous future."

[4] Sustainable City, Working toward a sustainable future for San Francisco; http://www.sustainable-city.org

[5] City of San Jose Sustainable City Strategy; www.ci.san-jose.ca.us/esd/sustainablecity.htm

[6] Portland Office of Sustainable Development; www.sustainableportland.org

[7] Sustainable Pittsburgh http://www.sustainablepittsburgh.org/

[8] Cambridge Sustainable City; www.cambridge.gov.uk/sustainablecity

[9] Network of Urban Forums for Sustainable Development; www.urban.nl/Network%20of%20Urban%20Forums/introduction.html

RECOMMENDATIONS SUMMARY TABLE

I. Establish a Madison Sustainable City Program

A.	**Adopt a Guiding Principle on Sustainability** • Adopt specific performance measures and goals.
B.	**Commit to sustainability by establishing an Office of Sustainable Development with interdepartmental representation and cooperation. Reorganize across existing departments to integrate sustainable development into all city functions and decisions. The Office of Sustainable Development will report directly to the Mayor**
C.	**Develop financial resources for full-scale implementation of sustainable development**
1)	*Identify and develop funding sources for the city's Office of Sustainable Development*: 1st staff member 2005; 2nd staff member 2006.
2)	*Pursue additional funding options for support of city sustainability programs.*
D.	**Adopt a green framework for all Madison operations:** **Build Green**—green building; **Save Green**—energy efficiency; **Power Green**—renewable energy; **Buy Green**—city purchasing; **Drive Green**—alternative fuel fleet, public transit, Community Car, etc.; and **Manage Green**—recycling, environmental performance, environmental development, brownfields redevelopment, green meetings and events, green hotline and webpage.
E.	**Develop policies and programs that promote sustainable development planning: e.g., efficient use of water across the city and throughout the cycle of use (freshwater demand, sewer and greywater, and stormwater); transportation planning; urban heat island effects; low impact development; smart growth.**
F.	**Develop annual reporting requirements for the city and for each department to measure progress in implementing the Madison Sustainable City Program.** • Deliver annual state of the environment report.

II. Madison's GRE^{2}EN Commitment (Green Building, Resource & Energy Efficient Environment)

A.	**Change City Buildings and Operations**
A1.	**Impact City's Existing Building Infrastructure**
1)	*Develop Municipal Pilot Projects* to showcase energy efficiency, renewable energy, and green building practices. Use LEED™ for Existing Buildings—LEED™-EB—and Advanced Buildings Guidelines for the energy portion of LEED™ as a guideline and standard. • Measure, track, review, report.
2)	*Upgrade existing building stock and infrastructure*: reduce energy consumption, change to green operations (e.g., buy Energy Star), decrease water use, sustainable site and landscaping maintenance. • Mayor announces City Energy Challenge to city departments to reduce energy use by 10% by 2010. Mayor challenges other units of government to reduce energy (e.g. 100% Energy Star schools). • Evaluate existing municipal buildings including civic, office buildings, and community based housing, and develop benchmarks and targets using LEED™-EB and Energy Star. o Major retrofits—as they arise, apply LEED™-EB. • Implement rapid payback upgrades (upgrades with the biggest savings) and programs that lower peak demand, which lowers energy use when demand is highest. • Utilize "Focus on Energy" program for moderate payback opportunities. • Contract with solar water heating utility. • Utilize Focus on Energy co-funding and support to implement high demonstration value renewable energy projects. • Install urban off-grid solar electric systems for applications where bringing in power is costly (e.g., bus shelter, walkway lighting, etc.) and for security applications (e.g., critical street lights, etc.).
A2.	**Impact New City Buildings**
1)	*Adopt LEED™ green building rating system for new buildings.* • Municipal: Write Requests for Proposals for municipal projects that stipulate LEED™ green building certification for projects of $1+ million (exceptions for cost) and an integrated design approach in the early design phases of all projects. Initially meet certified level, increase over time.
2)	*Develop Municipal Pilot Projects* to showcase energy efficiency, renewable and green building practices. Use LEED™-NC: New Construction and the Advanced Building Guidelines for the energy portion of LEED™ as a standard, and register and certify the projects. • East side police station. • Private Sector Initiative with public cooperation - Project: 90-unit multifamily and commercial mixed use; The Nelson Group. • Consider a renewable energy demonstration on a new city building.

A3.	**Upgrade Operations**
1)	*Invest Resources for full-scale implementation of energy conservation and green building practices* • Include funding for green building in capital budget packages for new construction and renovation projects. • Shift budgeting focus for buildings to life-cycle costing and assessment rather than first cost. By considering first costs together with operation and maintenance costs over 30 years, decision-makers will have a realistic cost comparison over the life of the building of the actual building cost to the taxpayers. • *Provide managerial, technical, and financial support for operations and maintenance (O&M);* o Options: increase staff for facilities management, subcontract out, current management staff and subcontract. o Maintenance software purchase, remote monitoring. o Include purchasing and leasing guidelines and listings that incorporate life-cycle costing.
2)	*Develop cost effective green building and energy efficient operations and maintenance standards* that are performance based and results oriented. Adopt state and other relevant effective guidelines (e.g., daylighting standard, construction, and demo material specifications.)
3)	*Measure progress by City departments—track environmental, energy, and economic performance (new and existing buildings).*

B.	**Change Policies Impacting the Private Sector**
B1.	**Adopt a High Performance Green Building Rating System for New Buildings Receiving Public Funding**
1)	Commercial mixed use: require Tax Incremental Financing (TIF) projects use LEED™ program beginning 2006. Incentivise other developers to build green.
2)	Low-income and community-based public housing: City supported projects mandatory by 2006, incentivise developers of other types of commercial projects to build green.
3)	Residential (1–2 family): Phase in Wisconsin Green Built Home by 2007 at minimum green guide level for all publicly funded projects. Work with Dane County early to make this countywide. Incentivise higher achievement. Encourage all developers to build green through voluntary incentives.
4)	Planning documents (Plats, PUD's, staff generated plans): require low-impact development. Create low-impact guidelines and then quickly phase in practices.
B2.	**Examine Zoning, Permits, Codes, Procedures, etc.**
1)	Identify requirements that don't support green design.
2)	Eliminate city policies that create economic disincentives to green.
3)	Streamline the lengthy approval process for existing buildings and infill to encourage green, high performance building. Also, assign staff (case worker) contact to move the green projects through.
4)	Amend ordinances- current old ordinances provide no latitude to staff for discretion.
5)	Develop a more comprehensive dark skies and efficient outdoor lighting initiative.

B3.	**Examine overall process of City building procurement and design activities and make changes to ensure benefits of integrated design in buildings**
B4.	**Provide green building, energy efficiency and renewable energy incentives**
1)	*Institute full cost accounting* for all departments citywide. Allow operational savings, like energy savings, to go back to individual department budgets. This provides an incentive to reduce costs so there will be more funding for services and programs.
2)	*Permitting expedition, exemptions, or relaxation* of some requirements, with priority for green projects as pilots.
3)	*Provide financial incentives* to offset some of incremental costs (see Appendix C Govt. Green Building Programs, including Portland's G-rated matrix, Santa Monica incentives, etc.).
4)	*Establish City preference for doing business with firms that implement green practices*, similar to minority business preference.
5)	*Reward efficient energy and water users.*
6)	*Increase permit fees for standard construction* while reducing fees for green projects where applicable.
7)	Staff technical assistance: *City hire LEED™ accredited professional* to educate other city staff and aid developers.
8)	*Adjust stormwater utility fee*—reduce fee if using a cistern, etc. Evaluate rates to ensure efficiency is rewarded. Fee-bate. (See page 66.)
9)	*Tax Incremental Financing (TIF)* would include green building using LEED™ standards as TIF eligible expense.
B5.	**Track Benefits: Benchmarking.** Required: information reporting from private sector (new buildings). • Use TIF projects from between 2004–2007 to provide data - data collection for benchmarking tied to permit requirements. • Use same number of non-TIF projects and compare.

C.	**Work Collaboratively: educate, communicate, facilitate.**
C1.	**Develop green building, energy efficiency, and renewable energy technical assistance and outreach tools, including a training program for City departments, public officials, residential and business communities, and private sector partners**
1)	*Educate City Staff.* • Hold developer/City staff and officials sustainable development workshop.
2)	*Educate stakeholders in business community.* • Mobilize partners: formally collaborate with a diverse group of private businesses, associations, utilities, nonprofits, and colleges (including the University of Wisconsin) to cooperate on energy efficiency and green building. Encourage them to: o Create and participate in EnAct for business.

	o Reduce summer peak demand by commercial customers. o Utilize "Focus on Energy" and renewable energy program services and co-funding.
3)	*Educate Residential Community.* • Reduce summer peak demand through new initiatives. • Implement city appliance turn-in program, encouraging people to get rid of old inefficient appliances.
C2.	**Facilitate and Endorse Partner Organization Programs** • Launch neighborhood grocery and convenience store energy efficiency program. • Expand participation in EnAct for homes. • Utilize Focus on Energy Efficiency and Renewable Energy program services and co-funding.
C3.	**Marketing and Communications**
1)	Communicate successes-public, local government, private, staff • Publicize results of pilots; and • Document pilots in process -video teaching tool/resource.
2)	Provide marketing for developers that design, build, and retrofit energy efficient green buildings; help with advertising and promotion. • Showcase firms demonstrating leadership to increase profile for green projects. • Create industrial and commercial sector leadership groups.
3)	Initiate Mayor's award, and other methods for recognizing Sustainable City participation as well as outstanding performance and achievement.
C4.	**Develop Madison Hallmark: Solar City**
1)	Create a Solar Mile on East Washington Avenue Corridor.
2)	Identify other opportunities for renewables where city development is occurring and incorporate high visibility solar demonstrations. • A good potential opportunity is Villager Mall on Park Street.

RECOMMENDATIONS AND IMPLEMENTATION PLANS

I. Establish a Madison Sustainable City Program

A. Adopt a Guiding Principle on Sustainability

What (Description of recommendation): Develop and adopt a guiding principle on sustainability. Sample guiding principle (for reference only): *In recognition that all decisions have environmental implications and that a healthy environment is integral to the long-term economic interests of the City of Madison, the City will ensure that each of its policy decisions and programs are guided by an overriding commitment to sustainability so that existing decisions don't compromise the ability of future generations to meet their needs.*

Why (Reason for recommendation): A guiding principle that encapsulates Madison's vision and long-term goals to integrate and balance environment, economy, and community provides a basis from which to evaluate whether decisions and policies are beneficial to Madison in both the short and long term.

How (Implementation strategies): Construct the guiding principle with input from Madison stakeholders so that it satisfies the goals and visions for the city that are shared by families, businesses, City officials, ethical/faith groups, etc. Sustainability, at its core, is a participatory, dynamic process.

The "teeth" of the guiding principle are specific performance measures and goals to be developed by the Office of Sustainable Development, described below. These should be changed or be augmented over time as long as they continue to enhance the guiding principle.

Sample performance targets and goals include: specific targets for emission reductions; specific percentage reduction in summer peak energy use; specific number of buildings qualifying for the Department of Energy Energy Star program and/or number of buildings achieving the U.S. Green Building Council's LEED™ rating; specific percentage reduction in energy demand growth rate; specific percentage of waste recycled or recycled product (such as paper) procurement; percentage of Energy Star equipment purchased; specific measure of economic health such as employment rate, local business success rate, etc.

B. Establish an Office of Sustainable Development

Invest in sustainability by establishing an Office of Sustainable Development with interdepartmental representation and cooperation. Reorganize across existing departments to integrate sustainable development in all city functions and decision-making. The Office of Sustainable Development will report directly to the Mayor.

What: Consisting of interdepartmental representatives and a director, the purpose of the Office of Sustainable Development (OSD) is to integrate sustainability goals into all city functions and decision-making. To accomplish this, the functions of the OSD include applying a sustainability lens to:

- Assess where the City is by overseeing benchmarking, tracking, life cycle costing, policy and code analysis;
- Develop processes and procedures (e.g., for full cost accounting);
- Develop standards and incentives;
- Provide education and community outreach coordination such as: educating staff City wide, creating a Sustainable City Information Clearinghouse to provide information on the city's green activities and programs with links to those of partner organizations and agencies (see partner organizations listing Recommendation C.2), and working with partner organizations on targeted initiatives;
- Oversee the Madison Sustainable Design and Energy Commission (to be created) that has experts, citizen and business members, to add the community stakeholder perspective.

Why: The City of Madison has a traditional municipal structure where departments operate as individual silos each responsible for their own programs. Sustainability is a whole systems approach that recognizes interconnections. By integrating aspects of City operations that are part of a system, the City will be able to capitalize on the synergies and achieve the maximum environmental, economic, and social value.

Currently, sustainability measures are scattered throughout City departments and there is little consistency among departments on how or whether they are implemented. There is no person coordinating green city initiatives and related budget development, and there is no single source for information nor an entity to consider the effects that a decision or policy can have on many different aspects of the city.

How: It is recommended that a representative from each City department become part of the OSD and spend a percentage of their time working to collaborate, develop and implement the office's goals and programs. One full-time OSD staff as the office director is recommended by 2005, and a second staff member, a shining star among the departmental representatives, by 2006.

C. Develop Financial Resources for Full-Scale Implementation of Sustainable Development

What: Develop budget, target funding sources and fund the OSD.

Why: As policy review and clearinghouse and outreach programs develop, the office will need, in addition to its interdepartmental

representatives, at least two full-time staff members to manage programs and information. This is minimal and consistent with start up staffing for other cities' sustainability offices.

How: Funding sources for the office itself could include fees and other mechanisms. Fees identified include: fees on construction and remodeling including:

a. Commercial (68 projects) -- increase the permit fees by 25% to raise $100,000;
b. Mechanicals on commercial projects (865 projects) -- increase permit fees by 10%;
c. Building permit application fee increase 25% over current $0.18 per square foot with Energy Star or green projects receiving a rebate;
d. Apply weatherization inspection standard requirement to single-family, owner-occupied homes built prior to 1992 (like state weatherization requirement on residential income properties built prior to 1982). If not certified, impose a $25 fee per sale, transfer at closing;
e. Also, consider a surcharge on home closing costs, increasing appliance pickup fees, and surcharges on stormwater and water bills.

Solar Bond

Dedicated bonds to fund solar and energy efficiency installations that are paid off through energy savings from projects over time. Benefits of this fiscal policy include energy savings, hedge against utility increases, reduced use of fossil fuels, and local job creation. Solar bonds have been passed in San Francisco and Honolulu.

Other sources for the Office include an energy efficiency/renewable energy bond issue (see Solar bond text box), a City foundation (similar to the Schools Foundation) that could create an energy fund, and lease purchasing financing.

Funding for OSD programs include sources such as: grant money[10], Focus on Energy, a water utility surcharge, block grant funding, manufacturer/distributor donations for demonstration of green products and technologies, and project financing mechanisms that advance green goals, such as performance contracting, shared savings, lower-cost energy-efficient mortgages, etc.

D. Adopt A Green Framework For All Madison Operations

Build Green — *green building*
Save Green — *energy efficiency and conservation*
Power Green — *renewable energy*
Buy Green — *city purchasing*
Drive Green *— alternative fuel fleet, public transit, Community Car, etc.*

[10] Potential grant source, The Ash Institute Innovations in American Government Program; eligible to apply after 12 months success, $100,000 award

Manage Green — *recycling, environmental performance, environmental development, brownfields redevelopment, green meetings and events, green hotline and webpage*

What: A green framework is an organizational tool that provides a simple, consistent, and transparent structure to the green aspects in all Madison operations. This framework makes it easy for the OSD to apply the sustainability guiding principle universally and consistently, and provides a one-stop information source for the City's green operations and programs. The green framework includes policies, standards and programs to build green, save green (addressing energy efficiency), power green (addressing renewable energy), buy green (addressing city purchasing), drive green (addressing an alternative fuel fleet, multimodal public transit, etc.), and manage green (addressing recycling, environmental performance, development and brownfield redevelopment, green events, a green hotline and webpage). The framework is not hierarchical; each part informs the whole.

Why: Many green programs, policies and initiatives already exist in Madison, but currently there is no easy way for the public to access them or for City departments to know what other departments are doing, nor is there standardization of the city's internal green programs.

How: Using the green framework, under each category the OSD will:

- evaluate what programs already exist and what programs need to be developed or augmented;
- provide its cross-disciplinary perspective to program design; and
- give City departments and the public a point source to access information.

The OSD, as an interagency department, will standardize the City's internal green programs (such as purchasing programs, recycling programs, etc.) across departments.

E. Develop Policies and Programs That Promote Sustainable Development and Planning

What: Policies and programs that directly promote sustainable development and planning. Identify the various, independent City initiatives that are part of a larger system and coordinate them in a systems approach to maximize their environmental, economic and social good. Examples include policies that address freshwater demand, wastewater treatment/reuse, and stormwater management; City/regional transportation policies, urban heat island reduction programs, low-impact development, and "smart growth" policies.

Why: By integrating aspects of City operations that are part of a system, Madison will be able to capitalize on the synergies and achieve the maximum environmental, economic, and social value.

How: The OSD will inventory, identify and work with staff to develop policies and programs that promote sustainable development.

F. Develop Annual Reporting Requirements for the City

What: City departments will be required to measure progress in implementing the Sustainable City Program. The OSD will also acquire data indicating the level of the city's environmental health (air quality, lake water quality, etc.).

Why: Indicators can help us focus on pressing problems, celebrate successes, and make smarter decisions. People are motivated by feedback. Studies have shown that simply providing a homeowner with an energy use meter will cause them to reduce their consumption as compared to people who do not have a meter. Feedback will also allow the OSD to adjust programs and incentive structures, fix "leaks" and other maintenance problems, concentrate on the most critical issues, etc.

How: The OSD can set up monitoring programs that will periodically assess city energy use, air quality, solid waste production, the city's stormwater quality and quantity, etc. The information collected can then be used to inform ongoing policies and priorities and to produce an annual "state of the environment" report. To generate a sustainability report requires additional measures that reflect Madison's social and economic health along with the environmental factors.[11] Consideration of the linkages between the results is also important. The Smart Communities Network Measuring Progress report of sustainability indicators used by several cities can serve as a basis for establishing Madison indicators.[12]

[11] United Nations Indicators of Sustainable Development
http://www.un.org/esa/sustdev/natlinfo/indicators/isd.htm

[12] Smart Communities Network; http://www.sustainable.doe.gov/measuring/melocal.shtml

II. GRE²EN Commitment: Green building, Resource & Energy Efficiency, and ENvironment (GRE²EN)

A. Change City Buildings and Operations

A1. Impact Madison's Existing Building Infrastructure

A1.1) Municipal pilot projects to showcase energy efficiency, renewable energy and other green building practices

What: Recommended pilot projects include:

- Madison Municipal Building (the 6th highest energy user of the City, with MGE showing a $89,820 energy bill in 2002);
- Monona Terrace Convention Center (high visibility, newer building that might achieve LEED™-EB fairly easily and inexpensively);
- Dudgeon School (historic building, with high community profile and use);
- Four City parking garages w/ highest energy use (parking garages can be particularly wasteful with lighting energy so lighting retrofits could quickly provide sizeable dollar savings);
- City-County Building (partner with the county).

Why: Pilot projects demonstrating early program success and practical "how to" solutions will provide credibility to the program and encourage ardent participation. Targeting the Madison Municipal Building impacts staff, gets them involved and experienced, and requires annual review for US Green Building Council.

How: Require that LEED™ for Existing Buildings (LEED™-EB) be met, at the certified level at minimum initially, but raise the level over time. Use the *Advanced Buildings Guidelines* for the energy portion of LEED™. Measure and monitor over time, review, and report building performance results, as compared to similar existing buildings that have not been retrofitted to meet LEED™-EB.

A1.2) Municipal Building stock and infrastructure: green upgrades

What: Implement the following types of green building and operational measures: energy consumption reduction, green housekeeping (nontoxic chemical use), water use reduction, and green site and landscape maintenance.

Why: The majority of Madison building stock is already built and often contains older, less-efficient technologies than exist today; therefore, existing building stock provides the largest opportunity for energy and resource savings.

How: Take several specific measures to reach this goal:

- Initiate a "City Energy Challenge" by the Mayor to City departments and encourage each department to reduce its energy use by at least ten percent by 2010 by using its own creativity and new resources to innovate increasingly more rigorous ways to achieve energy savings;
- Evaluate municipal building stock (including civic, office and community housing) using LEED™-EB and Energy Star in order to establish base case benchmark levels from which to improve upon as buildings are retrofitted. Set targets. As major retrofits are required, apply LEED™-EB;
- Mayor challenges other units of government to reduce energy (e.g. 100% Madison schools meeting Energy Star performance standards.) This could be achieved by hiring Energy Service Companies to do turnkey retrofits or by issuing bonds to hire private engineering firms to audit and recommend upgrades whose energy savings would pay back the bonds;
- Implement rapid payback upgrades and demand management to lower peak demand. Use low-cost energy management tools such as computer power management, vending machine controllers, exit sign light changeouts to LED bulbs, and lighting occupancy sensors and dimmers. Implement water efficiency mechanisms such as aerators, low-flow shower heads, and energy efficient pre-rinse spray nozzles;
- Contract with the solar water heating utility for high hot water use sites such as city pools;
- Utilize Focus on Energy co-funding and support to implement high demonstration value, renewable energy projects such as capturing biomass energy at landfills, using solar water heating in city-owned residential buildings, and using solar electric power at key high-visibility locations as an educational tool;
- Install urban off-grid solar electric systems for applications such as remote bus shelter locations or street lights where connecting to the grid is costly.

A2. Impact New City Buildings

A2.1) Adopt the LEED™ green building rating system for new City buildings

What: Write Requests for Proposals (RFPs) for municipal projects over $1 million that require the project achieve at least the "certified" level of LEED™ for New Construction (LEED™-NC). Increase the required certification level over time. For buildings of at least 20,000 square feet of conditioned space but costing less than $1 million, require the design team use Advanced Buildings E-Benchmark to achieve at least 30% better than code energy performance.

Why: Although the highest practical green, energy and resource efficiency levels should be the city's eventual goal (and do not

necessarily require more than a two percent premium over conventional construction[13]— Appendix E), starting at a LEED™ certified level should give the design community and contractors time to become familiar with the required green building strategies and technologies.

How: By writing competitive RFPs for the large projects, the first buildings to have the LEED™-NC requirement will attract professionals experienced with green building (possibly nationally based firms) who will be motivated to build some of Madison's greenest projects. The rest of the Madison design community will meanwhile have access to Madison's and industry associations' green building outreach and education programs (described elsewhere in this report) to help them meet Madison's increasing standards for green buildings.

A2.2) Municipal pilot projects to showcase energy efficiency, renewable energy and other green building practices

What: Recommended pilot projects include:

- Madison East Side police station;
- The Nelson Group's First Street, 90-unit, mixed-use multifamily housing/commercial project (a cooperative private/public sector project); and
- a renewable energy demonstration on a new city building.

Why: Pilot projects serve as tangible examples demonstrating early program success and practical "how to" solutions. This provides credibility to the program and an education opportunity for City staff and the public, and encourages ardent participation.

How: Require that LEED™ for New Construction (LEED™-NC) be met, at least at certified level initially, but raise the level over time. Monitor (over time), review, and report building performance results, as compared to similar existing buildings that have not been retrofitted to meet LEED™-EB. Track the impediments in the City process along the way and compare the upfront and life-cycle economics of this project to standard construction. Demonstrate the feasibility of green technologies.

A3. Upgrade City Operations

A3.1) Invest resources

What: Create the means to achieve full-scale implementation of energy conservation and green building practices.

[13] Kats, Gregory, *The Costs and Financial Benefits of Green Building*, *A Report to California's Sustainable Building Task Force*, October 2003 www.cap-e.com/ewebeditpro/items/O59F3481.pdf

Why: Funding commitment is the most powerful way to assure program success, even though it may simply be a commitment to *shift* funds from operational to construction budgets, rather than needing to raise new funds. By shifting to building life-cycle costing and assessment rather than separating construction budgets (capital costs) from operational budgets, decision-makers will have a realistic cost comparison of the actual long-term cost of a building to the taxpayers.

How: Earmark funding for green building (such as additional fees) in capital budget packages for new construction and renovation projects.

- Shift to life-cycle costing and assessment so that city operational savings can help fund higher green design and technology costs, if necessary.
- Finally, provide managerial, technical and financial support for greening City operations. This *may* involve increasing staff for facilities management or sub-contacting services or a combination; purchasing maintenance software for remote monitoring; and/or the OSD providing purchasing and leasing guidelines that incorporate life-cycle costing to City departments.

A3.2) Develop green building and energy efficient operations and maintenance standards

A3.2.1) Performance-based standards

What: Standards should be cost effective and performance based.

Why: Performance-based standards focus on results while encouraging individual creativity in the methods of achieving those results.

How: The OSD should determine practical targets for everything from departmental energy and water use to percent of waste recycled rather than discarded.

A3.2.2) Full cost accounting

What: Institute full cost accounting for all City departments so that operational expenses are charged to each department's budget.

Why: If departments are rewarded for innovative reductions in their operational costs by getting use of the saved dollars for programmatic expenses, they will be much more apt to develop the innovations.

How: OSD work with City Comptroller's Office to develop the full cost accounting methodology and plans for the shift. Contact other cities that have successful full cost accounting programs, such as Phoenix, AZ, so as not to reinvent the wheel.

A3.3) Measure progress made in each City department
What: Track environmental, energy and economic performance for new and existing buildings.

Why: While there is general consensus on the environmental and social benefits of sustainable design, there is consistent concern over the lack of accurate financial and economic information surrounding those benefits. Sustainable buildings generally incur a "green premium" above the costs of standard construction. These costs should be weighed against the benefits associated with green design. The benefits, such as energy and water savings, pollutant avoidance, and health and productivity gains, can be assessed through a life cycle cost (LCC) methodology. LCC necessitates that performance be tracked over time.

How: see IF. under the Sustainable City Program.

B. Change Policies Impacting the Private Sector

B1. High Performance Building Rating System: Publicly Funded New Buildings

What: Adopt LEED™ Green Building Rating Program for new commercial and multifamily buildings receiving public funding; require Wisconsin Green Built Home for residential buildings receiving public funding, according to the timeframe below:

- Commercial: Require TIF projects to use LEED™ beginning 2006. Incentivise other commercial projects to build green;
- Low-income Housing and Community Based Public Housing: City supported projects mandatory by 2006, Incentivise other commercial projects to build green;
- Residential (1-2 family): Phase in WI Green Built Home by 2007 for public funding projects at minimum green guide level;
- Planning documents including Plats, PUDs and staff generated plans, require low-impact development practices by 2007.

Why: The US Green Building Council's (USGBC's) LEED™ rating system is the national standard, although there are other green building programs and, therefore, will make the greenness of Madison's buildings universally meaningful across the US. Also, it is recognized and used by the design and building industries, so there are trained professionals available. Also, the USGBC provides auditing and certification to "prove" that the building is as green as it claims. (See Appendix C for listing of cities and states that require the LEED™ Green Building Rating Program)

How: RFPs for publicly funded buildings will require LEED™ certification and public funded residential buildings will be required to meet WI Green Built Home according to the timeframe above. OSD can develop some sample specification language for green building to

provide to developers. Work with Dane County and other local governments early to make these practices countywide. Quickly phase in low-impact development practices as a requirement for all PUDs, plats, and staff-generated plans.

B2. Zoning, Permits, Codes and Procedures

What: All policies, codes and procedures must be carefully evaluated by the OSD and individual City departments to assure that they incentivise what the City wants (green buildings, energy and resource efficiency, clean water and air, minimal noise and light pollution, etc.)

Why: Many codes and policies, written for a particular purpose at an earlier time, are now creating "perverse" incentives, such as making it less expensive or more convenient to create waste, pollution, and energy-inefficient designs.

How: Eliminate policies that create economic *dis*incentives to green practices. Create new policies that make green practices more economical and more convenient (for instance, evaluate the possibility of charging for water use based on monthly usage). Handle codes and policies with education and outreach to provide familiarity with green practices. Streamline the approval process for green, high performance buildings and infill projects. Develop new codes where necessary to protect the environment (such as a "dark skies" initiative).

B3. Overall Process of City Building Procurement/ Design

What: Examine the overall structure of building procurement and design so that the necessary changes can be made to assure the benefits of integrated building design.

Why: Like codes and policies, sometimes building procurement and design practices create impediments rather than incentives for integrated green design. For instance, designers are usually not rewarded for greater energy or resource efficiency in their designs, and life cycle operational savings are usually not factored into equipment and materials purchase decisions.

How: Establish a working committee of committed design practitioners, builders and developers to join staff in evaluating the codes, testing and implementing this over the course of a few years. This collaboration began at the developers' workshop on 24-25 June, 2004.

B4. Green Building, Energy Efficiency, Renewable Energy Incentives

What: Provide financial incentives for green projects to offset some incremental costs. Prioritize green projects by relaxing some of the permitting requirements or lowering the fees or by giving temporal priority to green projects (the fee reductions could be recouped by charging more to non-green projects). Institute preferred vendor arrangements for firms that implement green practices; provide incentives for water efficient homes, such as residential block rates or rebates for usage reduction compared to the prior year. Reduce stormwater utility fee for residents and businesses that collect rainwater in cisterns or other on-site systems. Use "fee-bates" as applicable.

Why: Incentives can be effective. They are likely to encourage creativity and continual improvement.

How: The City should provide outreach, education, and support to make these incentives successful. Communication with the developer community will be essential as will hiring a LEED™ accredited professional to educate City staff and aid developers.

Fee-bates: *Using fee-bates is an example of providing encouragement and dissuasion upon private sector decision-making. A fee-bate is a blend of a fee and rebate, a non-industry-specific strategy that imposes fees on polluters and provides a rebate to non-polluters. For example, when you bought a new car, you would pay an extra fee if it were an inefficient clunker or, alternatively, get a rebate if it were energy-efficient. The neutral point would be placed so fees and rebates balanced—it is neither an inflationary measure nor a disguised tax. This strategy has been proposed to reduce the consumption of water and other resources, and as a way to improve the energy efficiency of new buildings. Fee-bates have been used to help stimulate the growth of green power production when technologies are new and implementation costs may be particularly high.*

B5. Benchmarking

What: Require new publicly funded private sector buildings to provide data on energy and resource use.

Why: Feedback is an important motivator and will also provide required information to help the City meaningfully adjust its private sector incentives.

How: Use TIF projects from the period between 2004 and 2007 to provide performance data. Compare this data to similar non-TIF projects.

C. Work Collaboratively: Educate, Communicate, Facilitate

C1. Outreach and Training for City Staff, Residents and Businesses

C1.1) Educate City staff

What: The City will endorse, facilitate, and provide training in green building, energy/resource efficiency, renewable energy, and sustainable development for its staff.

Why: City staff must be able to green their own operations as well as advise and assist the business and residential communities.

How: LEED™ - Accredited new hire or OSD member should provide, working with partner organizations, in-house training; City staff should be encouraged to attend leading seminars and conferences and the 24-25 June Madison Developers' Workshop.

C1.2) Educate business community stakeholders

What: Mobilize and collaborate with a diverse group of private businesses, associations, utilities, nonprofits, the University of Wisconsin and other higher education institutions. Encourage local libraries to augment their energy/green building collections.

Why: An educated and supported community will carry forth the sustainable city goals, providing great leverage to the City's own programs.

How: Encourage partner groups to:

- Start an EnAct for business program;
- Encourage businesses to reduce summer peak demand by installing lighting dimmers, installing solar applications, instituting nighttime AC setbacks, etc.;
- Utilize Focus on Energy Efficiency and Renewable Energy program services. Focus on Energy services and incentives opportunities include: solar water heating for condominiums and apartments, point-of-purchase education, and the annual tour of solar/sustainable businesses.

C1.3) Educate and provide outreach to residential community

What: Encourage residents to reduce summer peak demand and overall energy use.

Why: Transmission and distribution systems typically run at less than 50% capacity. The benefits of reduced consumption are greatest at peak power times. These benefits include: avoided congestion costs, reduced pollution, and reduced power quality and power reliability problems. Green buildings tend to reduce peak consumption even more than they reduce overall demand.

How: Example tools include:

- Education;

- Contests;
- Home cooling initiative;
- AC/ dehumidifier turn-in program;
- Incentives for purchasing Energy Star appliances;
- Encourage local businesses to provide point-of-purchase education on energy/resource use of products;
- Summer Survivor media event (Appendix F.);
- Set-back Saturday;
- Cooling tune-up;
- City turn-in programs for old, inefficient appliances such as window AC units, old refrigerators and freezers, etc.

C2. Facilitation and Endorsement of Partner Organization Programs

What: A multitude of organizations in Madison provide a wide range of excellent programs for saving energy and greening buildings. These "partner organization" programs include MGE, EnAct for homes program, Focus on Energy Efficiency and Renewable Energy programs and others.

Additional program ideas for possible implementation over time are listed in Appendix G.

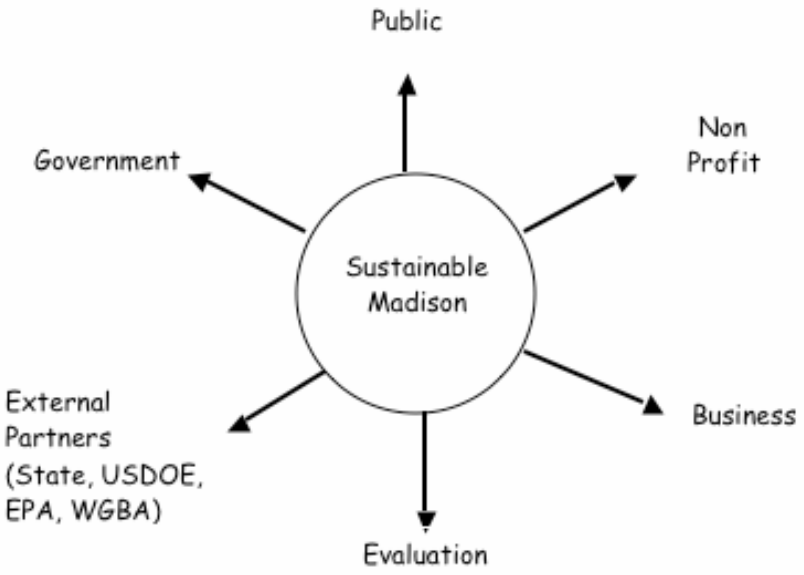

Figure 5.
Work Collaboratively

Why: The City can reap tremendous leverage for its goals by encouraging these partner groups to develop new programs that promote the Mayor's vision, and to continue and strengthen their existing programs that already complement it (Fig 5).

How: City promote, facilitate and launch some "quick win," highly visible and measurable, high-leverage partner programs in the first two years in order to garner excitement and jump-start its green agenda. Launch early successes in each of the areas under the green framework to emphasize both the Sustainable City and GRE^{2}EN Commitment programs. Recommended "quick win" programs are described below.

Highly Visible Programs Launch Initiative

Build Green

- Partner with a developer of a private sector new commercial, mixed-use multifamily project as a pilot project using the LEED™ Green Building Rating Program as an example for the development community.
- Green an existing building- the Madison Municipal Building as a LEED™-EB pilot and use signage to make the upgrades transparent to the staff, elected officials, and public.

Save Green

- Promote a "Cooling Turn-Up Program" in the summer that encourages the public to turn up their air conditioner's thermostat a degree or so.
- Create a "City Energy Challenge" to reduce energy consumption, and host a "Sustainable City Pledge." Aim for 7000 resident and business pledges by 2007.
- LED Christmas lights could be used on City streets to demonstrate the technology and their superior performance.
- The City could host a citywide "Appliance Turn In Program," such as a "Coolest Loser Refrigerator Contest." This could potentially be tied in with the City's normal appliance pickup and library watt-meter program. Spring slogan could be "Turn in your old avocados" and fall could be "Turn in harvest golds."

Power Green

- Install solar-powered LED bus shelters on E. Washington Avenue's soon-to-be Solar Mile as a visible statement of the City's commitment.
- Assist school districts in acquiring solar-thermal technologies to heat their pools. A similar assistance program might also be made available to big hot water users, like health clubs.
- Integrate solar energy systems into Parade of Homes. Work with partners including builders, Green Built Home, Madison Area Builders Association, and Focus on Energy.

Buy Green

- Promote and facilitate a citywide "Light Bulb Change-Out" program--change a light, change the world program. Work with EnAct and area retailers to promote the CFLs change-out and provide mechanisms for tracking the program's results. In addition, work with Meals on Wheels, and similar programs, to distribute and install CFLs, targeting the elderly, and low- and moderate-income people.
- Promote the sale of Energy Star appliances. Work with Focus on Energy, EnAct and area retailers. Funds could potentially be raised through a "City Solar Bond."

Drive Green

- Promote a citywide two-week "Car Free Challenge." Use the challenge to promote the mass transit, cycling and city bike paths, Community Car programs, etc.
- Acquire some City cars and buses that operate on alternative fuels (e.g., hybrids, biodiesel).

Manage Green

- Energy education signs and kiosks that publicize citywide energy use and resulting emissions promote successes and share energy-saving tips. Possible locations include: the Madison Municipal Building, State Street, East High School, and a neighborhood location—retaining and relocating the school and neighborhood kiosks on an annual basis.
- To reward City energy consumption reductions, a share of the energy bill savings might be allowed to remain at the site or department that generated the energy savings.

Market Green

- Promote the above-mentioned items during the first day of each season (e.g., Daylight Savings Day) as a reminder to, for example, have your air conditioner serviced or your heating unit and ducts cleaned.
- The City could sponsor a "Summer Survivor" mini TV series or other summer peak educational activities to engage people in energy issues during summer peak periods (Appendix E).
- Create or update City web pages to promote these initiatives and provide current updates.

In addition to working with partners to develop specific programs, there are a number of additional partners and approaches to keep the program in the public eye.

Communication Strategy Partners:

1. Media;
    a. Weekly column or editorial TV, papers/home section;
    b. Long-Term- Wisconsin Green Building Association Award - Wisconsin Sustainability & Energy Efficiency Leadership Award-apply for state recognition and for national awards.

2. Madison Area Builders Association (MABA) -educating members about green City direction – also multi-family;
3. Commercial Lenders-Target for education on green building;
   a. Educate them and work with Home Savings, Anchor Bank, Associated, Johnson Bank, 1st Business, M & I and others to develop incentives/educate. Invite them to developer workshop.
4. Madison, Commercial Brokers Group;
   a. Educate (includes some developers)
5. WHEDA funds multifamily;
6. 1st time home buyers;
7. IFMA – Madison Chapter;
8. AIA, IIDA, ASHRAE;
9. TEC – executive council of CEO's;
10. SHRM – Society of Human Resource Managers, IEQ;
11. Madison City Cable;
12. WHA – public television;
13. UW – Student Project;
14. Sierra Club;
15. EnAct (see glossary);
16. Sustain Dane.

C3. Marketing and Communications

C3.1) Communicate successes of pilot projects

What: Publicize results of pilots.

Why: The City can multiply the impacts of the pilot projects by using them to both educate and motivate its own staff, the private sector, and community. Pilots serve as viable models of a subset of environmental solutions.

How: Identify and develop a project to use as a lead marketing item. Document pilots while in process to enhance educational benefit. Provide websites and lobby displays describing green building features. Create videos for teaching tools. Get the media involved in weekly updates. Develop a range of case studies.

C3.2) Provide marketing for developers that design, build and retrofit energy efficient green buildings

What: Showcase firms demonstrating leadership.

Why: This will increase the profile of green projects.

How: This could be done by sponsoring tours of sustainable/solar homes and businesses or by a formal green business retailer recognition program, including a program logo window sticker.

C3.3) Initiate Mayor's Award (and other broader recognition)

What: Recognize sustainable city participation as well as outstanding performance and achievement in green, energy efficient efforts.

Why: Celebrate successes so Madison businesses, residents, and City staff recognize the importance of the efforts.

How: Give awards and recognition for different areas and levels of achievement.

C4. Develop Madison Hallmark: Solar City

C4.1) Solar Mile on East Washington Corridor

What: Madison's "Solar Mile," a sustainable energy corridor as part of the East Washington Avenue revitalization.

Why: To herald Madison as a showcase of sustainable energy and design and an as inspiration to our community, businesses, and the world.

How: There are a number of ways of integrating solar energy into the different building types on this corridor from car washes to homes. Some initiatives include:

<u>City</u>

- Photovoltaic (PV) powered bus stop lighting;
- PV powered traffic lighting;
- PV powered parking meters;
- Tracking PV system in front yard of East High School;
- PV power pedestrian lighting at East High and/or other City property (the park where the Yahara River goes under East Washington);
- Solar hot water pool heating at East High School.

<u>Business</u>

- PV awning over South Facing windows (e.g., EVP Coffee, car dealerships, etc.). Solar hot water heating for large commercial, hot water needs (car wash, laundry, etc.);
- PV power (perhaps off grid) business signs using LED lighting. Can be less costly than connecting signs to grid if parking lot trenching is needed;
- PV power lighting of car dealership parking lots;
- PV powered food cart;
- PV on new condo developments;
- Solar thermal on new condo developments.

<u>Residential</u>

- Rooftop PV;
- Rooftop solar hot water.

Ideas for solar art and other aesthetic applications are included in Appendix H.

C4.2) Identify other opportunities where city development is occurring, including Villager Mall on Park Street, and incorporate high visibility solar demonstrations.

CONCLUSION

This report outlines a two-part strategy for achieving Mayor Dave Cieslewicz's vision for the City of Madison—a vision shared by many Madison citizens—namely that Madison will become a leading green capital city with reliable, clean energy supporting its economic vitality, and, in particular, a national leader in energy conservation and renewable energy. A significant number of prominent, forward thinking cities (cities as diverse as Austin, TX, Santa Monica, CA, Portland, OR, New York, NY and Chicago, IL, whose programs are summarized in Appendix C) share these goals and are fostering energy conservation, green building and operations, and use of renewable energy. This is part of a global movement toward sustainable development, as every region in the world faces the need to protect and enhance its natural resources and ecological life support systems so that future generations can continue to meet their needs.

Greening Madison will benefit all aspects of the "triple bottom line"—economic vitality, environmental quality and both overall community diversity and individual human well-being. Both businesses and residents will share in these benefits.

Madison is already nationally recognized as a great place to live, work and recreate. The Mayor's vision and his commitment to achieving it provide the opportunity for Madison to innovate ways to enhance the city's best aspects, while making it shine in exciting new ways. For instance, visitors driving into the heart of the city along East Washington Avenue might soon see an array of solar cells symbolizing Madison's commitment to clean, reliable energy, and a strong local economy.

The two-part strategy involves: first, making sustainability an overarching concept, integrated into all City activities, programs and functions by creating a cross-departmental Office of Sustainable Development with an overarching guiding principal on sustainability. Second, establishing a set of implementation plans to: (a) green the City's own buildings and operations; (b) promote private sector energy efficiency, renewable energy and green building; and (c) facilitate green partner organization programs, educate; and communicate.

By implementing its commitment to energy conservation and renewable energy, Madison will enjoy reliable energy powering city commerce, fewer costly power outages, more money in the local economy, reduced dependence on central power plants and transmission lines (and therefore more freedom from the associated security, reliability and cost fluctuation problems) and finally, new business opportunities. The City's green building and operations strategies will also have profound effects on Madison, which could include new business opportunities, a healthier environment, enhanced human health and quality of life, more productive work

environments in Madison buildings, reduced city infrastructure costs and maintenance problems, and enhanced city identity and pride.

Appendix A: Glossary

Advanced Buildings E-Benchmark is a benchmarking tool that focuses on energy and indoor air quality. It can be used for the energy portion of LEED™ and is most suited to buildings 20-80,000 square feet. It includes strategies for all climate zones and many different building types. A particular attraction of this program is that it offers both a set of performance-based metrics and a set of prescriptive benchmarks, so that users can choose which criteria to use.

Agenda 21 is a 300-page plan for achieving sustainable development in the 21st century adopted at the United Nations Earth Summit in Rio de Janeiro, Brazil in 1992. The summit was convened to address urgent problems of environmental protection and socio-economic development.

Brownfield is a site on which development may be complicated by the presence of pollutants, contaminants, or other hazardous materials from previous land use. Reinvesting in these sites will help to restore the natural ecosystem and reduce growth pressure on undeveloped open land, or "greenfields."

CFL (Compact Fluorescent) is a small fluorescent bulb designed to replace the incandescent bulbs typically used for most residential purposes. CFL's are a similar size, approximately four times as energy-efficient, and 8-12 times as long lasting.

Cistern refers to a water holding tank that is typically used to store collected rainwater. Cisterns can be either buried or above-ground.

Clean energy refers to renewable energy, as well as some of the fossil fuel technologies which have particularly low emissions. For example, the new generation of advanced gas turbines have much lower emissions levels than other fossil fuel technologies.

Co-gen or Cogeneration is a type of power system which generates and utilizes both electricity and heat. While heat is a by-product in all electric generation from fossil fuels, it is often wasted. Cogeneration employs this heat productively, offsetting the need for other heat sources.

Dark skies initiative aims to educate about the detrimental effects of light pollution and to publicize solutions. Light pollution obscures views of the night sky for people, telescopes and migrating birds, causes glare, and wastes energy. The most practical solutions for good lighting design use efficient fixtures and put light only where it is needed, lighting surfaces, not volumes.

Ecosystems are communities of organisms and their environment that function together as a whole. An ecosystem can be large (a whole forest) or small (a pond).

EnAct For Homes creates Environmental Action Teams in neighborhoods, community organizations and workplaces empowering Madison area and Dane County residents to take actions in their daily lives to reduce the environmental impact of their households. http://www.enactwi.org

Energy conservation is using less energy. This can be a result of an energy efficient technology or life style change. Examples include turning off lights when leaving the room, riding your bicycle to work, and programming the thermostat to a few degrees lower in the winter and higher in the summer.

Energy efficiency is providing better services with less energy, or doing more with less. Energy efficiency measures include superinsulating your house and using Energy Star appliances.

Energy Star is a program run by the US Environmental Protection Agency. It certifies appliances and homes that meet strict energy performance standards. It also offers tools and resources to plan home improvements for energy efficiency. "EPA's Energy Star program has a host of technical and marketing tools to assist local governments in saving energy and saving money, available at www.energystar.gov."

Fee-bates are a revenue-neutral program designed to move a market toward some goal. Fee-bates are proposed to improve automobile efficiency by adding a tax to vehicles with low fuel efficiency and returning the funds in the form of rebates to purchasers of highly efficient vehicles. It has also been proposed for lowering water consumption and stimulating the clean energy market.

Focus on Energy is a public-private partnership offering energy information and services to energy utility customers throughout Wisconsin. The goals of this program are to encourage energy efficiency and use of renewable energy, enhance the environment, and ensure the future supply of energy for Wisconsin.

Full cost accounting is a method that city departments (and others) can use for evaluating the true costs of different choices. The analysis incorporates costs that accrue to the community but are not typically integrated into the department's budget. Implementing such a procedure can help the city better account for the benefits of green measures. For instance, a department choosing to construct a green building would normally only see the additional capital cost of doing so. Making this department responsible for the full cost of its building choices would allow this department to realize the benefits of energy

and water savings, and pollutant avoidance, rewarding them for making choices that are in the best interest of the whole city.

Green building or sustainable design is a whole building integrated design and construction approach that optimizes the site and energy, water and materials efficiency; and improves indoor environmental quality and occupant comfort.

Green housekeeping (nontoxic chemical use) is using cleaning products that do not endanger the health of the people cleaning (or inhabiting) a building. Avoiding the many common cleaning products that contain harsh toxic substances can keep the building clean and make it a safer place for everyone.

Green roof is simply a roof planted with vegetation. In cities where open space is scarce, green roofs provide a holistic solution to a range of concerns: stormwater runoff, urban heat island effect, air pollution, noise mitigation, habitat and green space creation, and aesthetics.

Greenhouse gas is the term used to describe the category of gases that enhance the earth's natural greenhouse effect, causing global warming. The most common of these gases are carbon dioxide (CO_2), and methane (CH_4).

Greywater is all "slightly used" water from the home, including sink, dish, laundry, and shower water. After minimal filtering, greywater can be reused for other purposes, including irrigation and toilet flushing. This helps to reduce strain on sewer and septic systems and lower potable water use. When used for irrigation, the nutrients found in greywater act as a fertilizer for plants.

Infill development occurs within urban areas instead of expanding out into undeveloped land. This helps to increase density, keep people closer to municipal infrastructure, and protect green spaces around urban areas.

LED lighting is a technology that uses light-emitting diodes (LEDs) in place of incandescent or fluorescent lighting. LEDs are highly efficient and can last 1,000 times as long as incandescent bulbs, greatly reducing maintenance costs. For this reason, they are being employed today in many traffic signals and exit signs. Though currently more expensive than other lighting types, they are expected to become cost-competitive within a few years.

LEED™ accredited professionals are experienced building industry practitioners who have demonstrated their knowledge of integrated design and their capacity to facilitate the LEED™ certification process on the LEED™ Professional Accreditation exam. The accreditation program recognizes expertise in green building and LEED™ to help

meet the growing demand from the public and private sectors for green buildings.

LEED™ Green Building Rating standard has been adopted nationwide as the guideline for sustainable building by federal agencies, state and local governments, and interested private companies. LEED™ (Leadership in Energy and Environmental Design) is a feature-oriented rating system where credits are earned for satisfying specified green building criteria. The five major environmental categories of review include: Sustainable Sites, Water Efficiency, Energy and Atmosphere, Materials and Resources, and Indoor Environmental Quality. Certified, Silver, Gold, and Platinum levels of green building certification are awarded based on the total credits earned.

Life cycle cost (LCC) shifts budgeting focus for buildings from first cost to a total life cycle cost analysis. By shifting to building life-cycle costing and assessment rather than separating construction budgets (first costs) from operational budgets, decision-makers will have a realistic cost comparison of the actual long-term cost of a building to the taxpayers.

Low Impact Development (LID) is an innovative stormwater management approach with a basic principle that is modeled after nature: manage rainfall where it falls using uniformly distributed decentralized micro-scale controls (e.g. bio-swales). LID's goal is to mimic a site's predevelopment hydrology by using design techniques that infiltrate, filter, store, evaporate, and detain runoff close to its source.

Mixed use is a type of development that combines residential, commercial, and/or office uses, into one development or building. This type of development accommodates a human-scaled community where a person can get to the store, work, and entertainment on foot.

Non-attainment zone for air quality is a label placed on areas where air pollution levels persistently exceed the national ambient air quality standards by the EPA. Regions that continue to achieve non-attainment status may be denied Federal assistance if the acceptable air quality is not achieved.

Off the grid indicates that a building or development is not tied to the central power transmission system; and therefore produces all of its power on site. A correctly designed off the grid system insulates the building community from fuel price volatility and grid instability.

Photovoltaics (PV) are a source of clean renewable energy that converts the sun's light energy into electricity. Peak PV output usually coincides with the large mid-day demand loads, making it an effective way to reduce strain on the electrical grid. Property value added by PV systems is tax free in Wisconsin.

Performance contracting is an innovative financing strategy that rewards project designers based on future energy savings. This strategy provides an incentive for engineers and architects to design systems that are as efficient as possible.

Planned Unit Development (PUD) is a type of planning approval which allows exemption from certain zoning restrictions. A PUD is only permitted when it can be shown that the allowance will result in public benefit that would be unachievable under regular zoning.

Raingardens are an integral part of a stormwater management system. They are designed to capture and retain stormwater runoff instead of whisking it away into a conventional gutter system. Using a vegetated raingarden allows the water to naturally percolate into the aquifer system; replenishing the ground water source. Raingardens can also be designed to be aesthetically pleasing.

Renewable energy is derived from resources that are regenerative or for all practical purposes cannot be depleted. Proven renewable energy technologies, such as solar, wind and biomass provide power sources that can improve the reliability and security of the existing electricity grid, while decoupling energy cost from rising energy costs, providing numerous environmental benefits, creating high quality local jobs, and reducing Wisconsin's energy imports . Buildings and infrastructure with an optimal combination of energy efficient and renewable energy strategies enjoy lower life cycle costs.

SHWH (solar hot water heat) solar thermal energy to heat domestic water sources through a fluid to fluid heat exchanger. In addition, SHWH can be used for radiant or forced air heat. The SHWH"s only visible component is the solar collector which can be integrated into a building's roof to resemble a conventional skylight. Many Wisconsin municipalities offer a rebate on the installation of SHWH's.

Sick building syndrome (SBS) is used to describe any acute health or comfort effects that appear to be linked to time spent in a building. Americans are estimated to spend 90% of their lives indoors allowing SBS to take a considerable toll on the occupant's health. Several of the primary causes of SBS, including chemical and biological contaminants and improper ventilation, are linked to both building design and material selection.

Smart Growth is a development strategy intended to discourage sprawling developments by promoting healthy communities that encourage economic development and jobs through the creation of strong neighborhoods with transportation choices. Smart Growth initiatives typically favor policies that strengthen the existing infrastructure over those that extend it to service sprawl.

Solar bond issue is a method of financing currently expensive solar technology by combining its financing with the financing of technologies with short pay-back periods. The bundled financing allows for investment in more expensive energy technology such as solar through the quick payback realized from other technologies such as energy efficiency measures. This strategy was enacted successfully in San Francisco in 2001.

Sustainability means meeting today's needs without compromising the ability of future generations to meet their own needs. A sustainable development is a development whose patterns of production and consumption can be reproduced indefinitely without doing irreparable damage to essential natural ecosystems. Sustainable development is achieved through adhering to the triple bottom line; environment, economy and social equity.

Swale is a gently sloping, vegetated depression in the land which can be used to transport storm water. The vegetated lining of the swale slows and filters the storm runoff, avoiding some of the non-point source pollution associated with typical impervious storm water systems.

TIF (tax incremental financing) is an economic development tool used widely in the state of Wisconsin. The TIF program is intended to remove some disincentives for infill development by freezing tax assessment on property and issuing bonds for municipal improvement. Entry of new businesses increases the tax base and the increment is used to pay off the bonds. When the bonds are paid off, the full value of the properties is assessed for tax purposes.

The Triple bottom line refers to community, environment and economy. By enhancing human culture, well-being and productivity, protecting or enhancing the natural environment and providing economic advantage through lower life cycle costs, green development protects the triple bottom line.

Urban Heat Island Effect (UHIE) refers to the 2-10 degree temperature increase in urban areas that is caused by replacing natural vegetation with asphalt and concrete for roads, buildings, and other structures. The UHIE propagates the formation of atmospheric smog, can negatively affect human health, and can increase energy use for cooling. The UHIE can be reduced by choosing high-albedo (reflective) roofing and green roofs, choosing light colored construction materials for roads, driveways, and other paved surfaces, and by planting shade trees near buildings and roads.

Whole-systems thinking is a process through which the interconnections between the internal systems are actively considered. Solutions are sought that address multiple problems at the same time by considering all elements of the complete or whole-system to seek a balance. Some refer to this process as the search

for "solution multipliers." Whole systems designs are created in a highly interactive interdisciplinary design setting that involves all of the concerned parties.

WI Green Built Home is a voluntary green building initiative that reviews and certifies homes that meet sustainable building and energy standards. The program is implemented in partnership with the Madison Area Builders Association in cooperation with other participating builders associations, leading utilities and organizations that promote green building. www.greenbuilthome.org

Appendix B:
Madison Gas & Electric Generation Facilities

Prepared by MGE

Blount Generating Station

Located in the heart of downtown Madison, MGE's Blount Generating Station (BGS) provides a critical 200 MW of electric power for the Madison area. Only about 15% of the electricity used by area residents is produced within the metropolitan area. Of that 15%, over 90% is produced by Blount, making it a crucial facility for maintaining local power reliability.

Even though the plant is over 100 years old, it is part of an innovative program of the Wisconsin Department of Natural Resources designed to promote superior environmental performance - an Environmental Cooperative Agreement to achieve higher environmental standards than required by regulation. Through this 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 land-filled; these fuels reduce mercury, sulfur dioxide and nitrogen oxide emissions;
- implemented an environmental management system consistent with the ISO 14001 international standard;
- installed state-of-the-art boiler controls and retrofitted burners to improve the plant's overall efficiency and combustion and reduce emissions;
- created a Customer 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 (PDF);
- 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.

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

Fueled by natural gas and using 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. Co-generation is substantially more efficient than a conventional power plant. When in co-generation mode, WCCF will be nearly 70% efficient in energy use compared to conventional power plant efficiencies of 30-35%.

By combining electric and heating purposes in one facility, emissions are reduced, less fuel is used, and less space is needed for construction. Specifically, nitrogen oxide emissions will be reduced by up to 150 tons per year or up to 80% compared to separate electric generation and heating/cooling facilities. Carbon dioxide emissions will be reduced on average by 50,000 tons per year or approximately 15% less than separate facilities.

The city of Madison, and others, have also entered into Memoranda of Understanding with MGE and the University of Wisconsin to offset the emissions from WCCF and create environmental benefits. Provisions of these Memoranda include: use of low-sulfur diesel fuel as backup for the plant and as 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 water used by the plant from local lakes; and a photovoltaic/hydrogen fuel cell demonstration project.

Appendix C:
Government Green Building Programs Inventory

Compiled by: University of Wisconsin Extension Solid and Hazardous Waste Education Center and Flad & Associates
Last Update: June 30, 2004

Jurisdiction	Program	Policy Vehicle	Application (M/C/MF/R/I)	Participation (M/V)	Performance Standard	Extent of Jurisdiction*	Incentive Options	Funding Sources	Operational Staff	Comment
Alameda County, CA	Alameda County Green Building Practices	County Admin-istrative Code	M	M	LEED™ Silver at a minimum	All county projects except for traditional public works projects (see comments)			County administrator's office & other designated compliance officials	Within 12 months of ordinance's adoption, the director of public works shall submit proposed regulations for green building practices in traditional public works projects
	Alameda County Green Building Guidelines: Home Remodeling & New Home Construction	Guidelines	R	V	Green Points--need a minimum of 50 to be considered a "green home"	Residential development--professional contractors and homeowners			Alameda County Waste Management Authority and Recycling Board	
Arlington County, VA	Arlington County Green Building Incentive Program	County program	C / MF / R	V	LEED™	All types of development	A density bonus that ranges from a minimum of .15 Floor Area Ratio (FAR) for a LEED™ Certified project to a maximum of .35 FAR for a Platinum project.	Green Building Fund--site plan developers who do not commit to achieving a LEED™ rating contribute to the Fund at a rate of $0.03 per square foot.	Arlington County Planning Division & Environmental Planning Office	
	Arlington County Green Home Choice Program	County program	R	V	Arlington Green Home Choice Certification Award requires 175 points -- builders use county provided scoresheet to tally points	Residential	Front-of-the-line plan review, lawn signs indicating participation in the program, attendance at County-sponsored seminars, and recognition as "green" builders.	see above	Arlington County Planning Division & Environmental Planning Office	
Arlington (town of), MA	Arlington (town of) By-laws	Town By-laws	M	M	LEED™ Silver at a minimum	New town buildings				

Participation
M = Mandatory
V = Voluntary

Application
M = Municipal
MF = Multifamily
I = Industrial
C = Commercial
R = Residential

*Indicates whether the guideline or policy extends beyond buildings to include issues such as land use & zoning, transportation, municipal waste recycling or pollutant levels

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Austin, TX	Austin Energy Municipal Guidelines	Guidelines	M	V		All public projects greater than 5,000 gsf			Austin Energy--a community-owned electric utility & a department of the City of Austin	
	Austin Energy Commercial Green Building Program	City program	C	V		Any commercial building owners and designers	Resources and technical assistance provided to design teams; Smart Growth Matrix credit; Financial bonus		see above	
	Austin Energy Multifamily Green Building Program	City program	MF	V		Any multifamily building owners and developers	Sustainability consultation; facilitation of links to incentives for resource & energy conservation; marketing assistance; SMART housing compliance, consulting, review.		see above	
	Austin Energy Residential Green Building Program	City program	R	V	5 star rating system rates buildings in six areas: energy efficiency, testing, water efficiency, materials efficiency, health & safety, community	New and remodeled homes by builders, architects, or designers that are members of the Green Building Program			see above	
Battery Park, NY	Hugh L. Carey Battery Park City Authority Residential Environmental Guidelines	Guidelines	R	V	Guidelines that are modeled after LEED™ and tailored for residential homes and local concerns	Residential	Tax Credits	NYSERDA	Hugh L. Carey Battery Park City Authority	
Berkeley, CA	Berkeley Green Building Program	City Policy	M	M	LEED™ Silver at a minimum (when economically feasible)	Municipal		Sustainable Devlopment fee from Solid Waste & Permitting fee increases		

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Boulder, CO	Boulder Green Building Practices	City ordinance	M	M	LEED™ Silver at a minimum	New or significantly renovated municipal facilities				
	Boulder Green Points Building Program	City ordinance	R	M	Green Points	All new residential buildings and remodels & additions over 500 sf				
Bowie, MD	Bowie, MD Green Building Resolution	City Resolution	M	M	LEED™ Guidelines and Green Building, Low Impact Development, Waste Management, and Conservation Landscaping principles on a project-by-project basis	Municipal facilities, City-funded projects, and infrastructure projects				
Chicago, IL	Chicago Standard	The Chicago Standard--City Policy	M	M	LEED™	Munipal buildings--design, construction, renovation			Director of sustainability reports directly to the Mayor. Department of General Services--Architecture, Engineering and Construction Management	
	Green Homes for Chicago	City Program	R	V	Home Energy Rating System	City of Chicago residential			Chicago Department of Energy and Housing	Affordable housing: developers buy abandoned property from the City for $1 in return for keeping it within a capped price & incorporating green & solar energy features

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Chicago, IL continued	Chicago Green Bungalow Initiative	City Program	R	V		Bungalow owners in the City of Chicago	$1,000 voucher for purchse of qualifying energy efficient appliances	Chicago Department of Environment	City of Chicago staff	4 Chicago bungalows were rehabbed using geothermal heating, solar panels and other green technology and kept within $150,000 for the cost of the homes. A report was written to provide a guideline to bungalow owners
	Chicago Green Building Awards Program	City Program	R / C / MF	V	Projects evaluated based on how well the buildlng integrates systems, uses energy efficiently, provides a healthy environment for occupants, is sensitive to natural surroundings, and minimizes the environmental impact of materials, construction, and operation	City of Chicago	Award and publicity			
Cook County, IL	Cook County Green Building Oridnance	County Ordinance	M	M	LEED™ Silver at a minimum	All County building projects			County Department of Capital Planning & Policy	Projects must earn a minimum of 8 credits in the LEED™ Energy & Atmosphere category for best life-cycle returns. Renovation and retrofits of current County buildings will also use LEED™ -EB when practicable.
Dallas, TX	Dallas Green Building Ordinance	City Ordinance	M	M	LEED™ Silver at a minimum	Municipal buildings larger than 10,000 s.f.				

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Dane County, WI	Dane County Green Building Policy	County Policy	M	M	County Guideline	All County new construction, remodels and additions to buildings--a guideline for construction planners, engineers and contractors for Dane County			Dane County Public Works	Focuses on: exceeding all governmental environmental standards, resource efficiency during life and construction of facility, minimizing toxic materials, seeking renewable energy sources, create healthy environments, design facilities for long term, protect and restore environment
	Wisconsin: Green Built Home	None	R	V	Green Built Home Checklist -- homes must earn 50 points and meet prerequisites to be certified. Green Guide given to homeowners of GBH certified homes.	New and remodeled residential	Reviews and certifies homes that meet sustainable building and energy standard	Madison Area Builders Association, utilities, product distributors, and organizations that promote green building	Wisconsin Environmental Initiative in partnership with Madison Area Builders Association	Home buyers and builders can work together to select home features from the Checklist. In addition to basic requirements that each home must meet, builders choose from a wide variety of features that conserve energy and natural resources.
Eugene, OR	Eugene Sustainability Resolution	City Ordinance	M	M	LEED™, at Certified level	All city general funded new construction projects				The City is looking into requiring a higher level of LEED™ certification based on cost-effectiveness

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Frisco, TX	Frisco Green Building Policy	City Policy	M	M	LEED™	Municipal				Considering requiring LEED™ certification also for commercial projects
	Frisco Green Building Program	City program	R	M	EPA Energy Star	Single family residential			Comprehensive and Environmental Planning & Development Services/Inspections departments	Focus on energy efficiency, water conservation, IAQ and C&D recycling
Kansas City, MO	Kansas City Green Building Policy	City Policy	M	M	LEED™ Silver at a minimum	All new City buildings				
King County, WA	King County Green Building Initiative	County Policy	M	M	LEED™	All new county construction in the pre-design and design phase; certain structures such as bus shelters and restroom facilities may be more limited in their ability to apply LEED™, and in those cases are encouraged to use LEED™ principles as much as is practicable			The County Green Building Team: staff with expertise in project management, architecture, landscape architecture, design, engineering, resource conservation, and budget analysis from the following departments: Natural Resources and Parks, Transportation, Development and Environmental Services, Finance, Construction and Facilities Management, and Budget Office.	

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Long Beach, CA	Long Beach Green Building Policy for Municipal Buildings	2010 Citywide Strategic Plan	M / C / MF / R	M / V	LEED™ Certified & LEED™ Silver for new projects over 7,500 sf of occupied space	City owned property: new construction, remodel and tenant improvements mandatory; privately owned buildings on a voluntary basis	Expedite plan checks / zoning for voluntary private developments seeking LEED™ certification		Existing City Staff	This is a LEED™ compliance policy with minimal impact on private sector. Mayor's Award for Green Building is the major private sector effort.
Los Angeles, CA	Los Angeles Green Building Requirement for Municipal Projects	City Policy	M	M	LEED™				Task force & city staff / architect	32 new libraries part of '98 bond project. Private sector program by sanitation bureau.
Marin County, CA	Marin County Building Energy Efficient Structures Today (BEST)	County policy	C / MF / R	V	Depends on incentive program--most relate to CA Title 24 (energy efficiency standard)	Residential and Commercial	Permit fast tracking, technical assistance, Energy Efficient Building Incentive Program, Wood Stove Rebate Program, PG&E Rebate, CEC Rebate		Community Development Agency	
	Marin County Green Building Guidelines: Home Remodeling & New Home Construction	Marin County-wide Plan & Develop-ment Code	R	V	Marin Green Home Rating System	Residential development			Community Development Agency	
New York, NY	New York High Performance Building Guidelines	Guidelines	M	M	LEED™, BREEAM	City construction projects		NYSERDA, Mayor's Office of Grants Administration, Robert Sterling Clark Foundation, Energy Foundation, New York State Council on the Arts, Design Trust for Public Space	City of New York Department of Design and Construction Office of Sustainable Design	

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Oakland, CA	Oakland Sustainable Design Guide	Guidelines	M / MF / C	V	Title 24 / LEED™ / BREEAM / MN S.D.G.	Buildings, Transportation, Recycling				This is a hybrid of the Minnesota Sustainable Design Guide with commentary to make it specific to Oakland, CA.
Omaha, NE	Omaha, NE Metropolitan Community College Green Building Program	Board of Governors Policy	Institutional	M	LEED™	All new Metropolitan Community College construction projects and sites				
Pleasanton, CA	Pleasanton Commercial and Civic Green Building Ordinance	City Ordinance	M / C	M	LEED™, Certified level	All covered commercial construction projects over 20,000 s.f. (excluding historic structures and structures within the downtown specific plan area)		condition of approval on any design review or planned unit design review approval issued for a covered project		Commercial projects are encouraged, but not required to be registered with USGBC although they still must meet the LEED™ certificaiton requirements. This is evaluated as a condition of approval on any design review or PUD review approval.
Portland, OR	Portland Supplement: LEED™	City Policy	M / C	M	LEED™	Buildings only	The Oregon Office of Energy expanded the state Business Energy Tax Credit (BETC) to include LEED™ Silver and higher rated buildings.			New construction and major renovations of all city owned facilities are required to achieve the Certified level of LEED™. LEED™ certification is also required for all publicly financed (over $200,000 in PDC financing) private sector projects larger than 10,000 square feet.

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Portland, OR continued	Portland: Greening Portland's Affordable Housing	Guidelines	M / MF	V / M	LEED™	City or city funded multi-family projects.	Established a preformance-based grant program; improved access to existing loans and rebates; created a LEED-based Business Energy Tax Credit (BETC).	Portland leveraged limited City resources and existing City conservation programs in launching G/Rated (program is also detailed in this inventory--see below). They also created private sector partnerships and raised over $300,000 in grants and sponsorships.	Office of Sustainable Development's Green Building Division has 4 staff: program manager, green building specialist, architect and PR/outreach coodinator	The guidelines are broken up into 6 major categories: enhanced design and site, energy conservation, water conservation, conserving materials and resources, enhanced indoor air quality, and operations and maintenance. Developers seeking funding through RFP process must demonstrate a commitment to meet thresholds for strategies in each category to qualify. There are additional critera in each category for use on a voluntary basis.
	Portland: Green Building Program - G/Rated	Green Building Resource	M / C / MF / R	V	LEED™	New construction and major city or city-funded remodels.	Established a preformance-based grant program; improved access to existing loans and rebates; created a LEED™-based Business Energy Tax Credit (BETC).	Portland leveraged a 1 time City fund and existing City conservation programs in launching G/Rated. They also created private sector partnerships and raised over $300,000 in grants and sponsorships.	Refer to above description of Office of Sustainable Development	

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Portland, OR continued	Portland: 1990 Energy Policy	City Compre-hensive Plan	M / C / MF / R	M	89 objectives in goal areas including City operations, building energy efficiency, transportation, telecommunications, energy supply, waste reduction and recycling.	The policy extends beyond buildings to include issues of land use & zoning, transportation, municipal waste recycling or pollutant levels.	Financial incentives, educational programs, etc.	For every dollar of City general funds invested, about $2.50 was raised through state, federal, regional, and local agreements or private corporations.		
Portland, OR; Multnomah Co.	Portland Local Action Plan on Global Warming	City & County Plan	M / C / MF / R	M	Established a goal of reducing greenhouse gas emissions to 10 percent below 1990 levels by 2010.	Buildings, transportation, telecommunications, renewable energy resources, waste reduction and recycling, and forestry and carbon offsets.		City of Portland & Multnomah County	The City of Portland Office of Sustainable Development and Multnomah County Department of Sustainable Community Development	The City and County coordinate Portland-area efforts to reduce greenhouse gas emissions and assist other local government agencies with complementary programs and policies.
San Diego, CA	San Diego Sustainable Building Policy	City Policy	M / C / MF / R / I	M / V	LEED™ Silver at a minimum for municipal projects	Mandatory: all new City facilities and renovations over 5,000 sf; Voluntary: Private developments	Expedite ministerial & discretionary process for projects meeting certain criteria			
San Francisco, CA	San Francisco Green Building Program (including the Resource Efficient Building Program--REB)	City Admini-strative Code	M / C / MF / R	M / V	Mandatory for Municipal projects only-Goals and objectives evaluated for compliance after 4 years of project	City projects: improved environmental efficiency required, i.e.water & energy conservation, fluorescent lamp recycling, indoor air quality, recycling, construction & demolition waste.			City inter-agency Resource Efficient Design Task Force	Also as part of the program, City employees receive green building training; Public receives green building information & resources
	San Francisco Green Building Guidelines: Home Remodeling & New Home Construction	Guidelines	R	V		Residential development--professional contractors and homeowners			City and County of San Francisco's Department of the Environment	

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San Jose, CA	San Jose Green Building Policy	City Policy--initiated from San Jose 2020 Comprehensive Plan	M / C / Institutional / High Rise	M	"San Jose LEED" based on LEED™ and local standards and priorities. LEED™ Certified level at a minimum for all City projects over 10,000 sf	All new construction and major retrofitting projects for all City facilities and buildings over 10,000 gsf. Does not apply to infrastructure or buildings serving specialized functions	Available for efficient and alternative energy & water technologies		Environmental Service Department (ESD)	
San Mateo County, CA	County of San Mateo Sustainable Building Policy	County Policy	M	M	Highest practicable LEED™ rating	All new construction and additions greater than 5,000 s.f.			Interdepartmental Green Building Committee	
	San Mateo Countywide Sustainable Buildings Guide	Guideline	C / R / MF	V	Checklist	Commercial, residential and multifamily				
Santa Barbara County, CA	Santa Barbara County Green Building Guidelines	Guidelines	M / C / MF / R	V		Buildings only		Funded by a grant from the California Integrated Waste Management Board	Developed by The Sustainability Project. Administered through the Santa Barbara County Solid Waste and Utilities Division	
Santa Monica, CA	Santa Monica Municipal Code Ch 8.108: Green Building Standards	Municipal Code initiated from Santa Monica Sustain-able Cities Program	M / C / MF	M		Building envelope, space-conditioning, lighting and service water-heating systems of all new buildings and existing buildings whose repair, alteration or rehabilitation costs exceed 50% of their replacement cost				

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Jurisdiction	Program	Policy Vehicle	Application (M/C/MF/R/I)	Participation (M/V)	Performance Standard	Extent of Jurisdiction*	Incentive Options	Funding Sources	Operational Staff	Comment
Santa Monica, CA continued	Santa Monica Municipal Code	Municipal Code	M / C / MF / R	M	Green features of various codes listed in one resource to facilitate builder compliance	Private developers				Codes in: siting and form, landscape, transportation, envelope & space planning, materials, water systems, construction management, energy
	Santa Monica Green Building LEED™ Grant Program	City program	C / MF / R	V	LEED™	All new construction or major remodel of commercial, affordable housing, mixed use, and multi-family residential properties are eligible for LEED™ grants	Green Building Grants awarded to LEED™ projects (awards increase with level of certifcation). Grantees required to provide verification of LEED™ registration, execute a Letter of Agreement with the City, and receive their City building permit before any grant funds are released.	50% comes from excess user utility rate taxes set aside during California's energy crisis when rates were higher than usual. The remaining funds come from a water efficiency initiatves fund and from unrefunded construction and demolition waste deposits (those that don't adhere to the C&D recycling ordinace don't receive deposits back)		
Scottsdale, AZ	Scottsdale Green Building Program	City program	MF / R / C	V	Projects are rated in the following areas: site use, energy, indoor air quality, building materials, solid waste, water	New Private residential and commercial developments and remodels	Development process assistance, construction job site signs, directory of participating builders and designers, certification (green building inspections), recognition of builders and designers on city web		City staff	Additional resources offered include: lecture series, workshops, and special events, homeowner's manual (explanation of features),

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Jurisdiction	Program	Policy Vehicle	Application (M/C/MF/R/I)	Participation (M/V)	Performance Standard	Extent of Jurisdiction*	Incentive Options	Funding Sources	Operational Staff	Comment
Seattle, WA	Seattle Sustainable Building Policy	City Policy	M	M	LEED™ Silver at a minimum	City and city funded building projects.	A Mayor's Award is presented for projects achieving a LEED™ rating level higher than Silver.	Seattle capital construction budget.	The City of Seattle created an interdepartmental "Green Building Team" with representatives (13 in all) from each of the following departments : Office of Sustainability and Environment ; Seattle Public Utilities; Seattle City Light; Fleet and Facilities Department ; Office of Housing; Department of Design, Construction and Land Use; Seattle Public Utilities.	
	Seattle Built Green Incentive Program	City program	MF	V	Developers of new construction or major remodels who wish to qualify for funding need to meet the criteria described in LEED™ 2.1, or LEED™ Pilot programs - LEED™ CI, or new LEED™ pilots as they are introduced.	Voluntary program for private sector construction multi-family projects.	Green buildings can qualify for funding based on point system (more funding for more points). Additional, optional incentives: technical assistance, charette facilitation assistance, assistance with mazimizing financial assistance	Seattle City Light and Seattle Public Utilities	Seattle City Light and Seattle Public Utilities	For those seeking funding, Multi-Family Checklist or Built Green Communities Checklist must be filled out. Applicants must document installation, complete a Built Green Evaluation form, provide two years utility costs and operations data, and provide photos and data about the project and green features including utility bills.

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Seattle, WA continued	Seattle LEED™ Incentive Program	City program	C	V	LEED™	Voluntary program for private sector construction projects	Incentives are individually negotiated. Minimum basis is $15,000 for projects that commit to achieving a LEED™ Certified rating and $20,000 for projects that commit to achieving a LEED™ Silver rating.	Seattle City Light and Seattle Public Utilities.	Seattle City Light and Seattle Public Utilities.	Projects must be registered with the USGBC. Required project documentation the same as that in the Seattle Build Green Incentive Program.
Suffolk County, NY	Suffolk County Green Building Initiative	County Resolution	M	M	LEED™	All County building projects of $1 million or more				This resolution has not yet successfully passed through County legislature--current plans are to reintroduce it in the next legislative session
Triangle J Council of Govern-ments	Triangle Region Public facilities: High Performance Guidelines	Guidelines	M	V	Point system based on LEED™ for goal setting, self evaluation, and data collection purposes	Public buildings owned by local governments and schools in the region served by Triangle J Council of Governments in North Carolina (Chatham, Durham, Johnston, Lee, Orange, and Wake counties)				
Greater Vancouver Region, BC	Greater Vancouver Regional District	Resolution	M	M	LEED-BC™	All new Greater Vancouver Regional District facilities			Greater Vancouver Regional District staff	

Appendix D:
Santa Monica Sustainable Cities Program; an example of sustainability indicator development and use

www.csis.org/e4e/Mayor12OConnor.html

Mayors' Asia Pacific Environmental Summit

Summit Proceedings

Santa Monica Sustainable Cities Program

Mayor Pam O'Connor
Santa Monica, California (USA)
February 2, 1999

Good morning. I am honored to join with you leaders from all over the planet who are working to keep your communities livable by making them sustainable.

A few days ago at the China-U.S. Mayor's Conference, Mayor Li Shu of Changchun reminded us of the Chinese proverb -- "do not drain the pond to catch the fish."

In my community, Santa Monica, California, we are striving to be sustainable -- to meet our current needs without compromising the ability of future generations to do the same.

Let me begin by telling you about Santa Monica. We are part of the Los Angeles metropolitan region - surrounded by the City of Los Angeles on 3 sides and with the Pacific Ocean as our western boundary. Our population is 89,000 in a land area of 8.3 square miles. Our local economy is based on tourism, high technology, entertainment and multimedia businesses, healthcare and professional services. Santa Monica is a built out city, so our development pattern is one of controlled growth with infill development and major remodels. Our Sustainable City Program has been developed to move Santa Monica towards sustainability, and towards an even more livable city. The underlying premise of these efforts is to address root causes of problems rather than only treat the symptoms -- to provide methods for evaluating long-term impacts of decisions B and to recognize that problems and solutions are interrelated.

We view our Sustainable City Program as a process, and we have a broad definition of environmental issues. For example, goals include production of affordable housing. Affordable housing was included because our program was put together with the help of local residents, businesses and stakeholders who worked together to provide a vision of livability with specific guiding principles. A coordinated program was developed to avoid "piecemeal" responses to issues, to secure formal environmental policy commitments from City Council and staff, and to define where the City should be headed and to identify milestones along the way.

Policy goals include the areas of resource conservation, transportation, pollution prevention and public health protection, and community and economic development. Sixteen indicators were

selected by our Environmental Task Force and city staff with public input. Each indicator relates to principles and defines major goals. Indicators are numerical and measurable. In 1994 targets were established for the year 2000 using 1990 data for baseline comparisons. Targets are aggressive but realistic "best guesses." A progress report is presented to the City Council every two years. Our second progress report for 1996-1998 is due later this year.

These reports include: progress towards indicator targets; detailed analysis of programs and policies related to sustainability and livability; accomplishments and obstacles along with specific recommendations.

The first detailed review of Santa Monica's Sustainable City Program found: significant progress had been made toward 8 targets; little or no progress had been made toward 4 of the targets; inadequate data to measure 4 targets; and policies and programs remained subject to "piecemeal" implementation. City research projects and initiatives resulted in indicator adjustments in the areas of stormwater, hazardous materials, energy and open space.

The progress report findings also stimulated city responses including development of: a vehicle management program, bus line service improvements, computer tracking of purchases, development of a city energy plan, and a city tree inventory as part of a community forest plan.

Currently, Santa Monica is undertaking three major initiatives: the purchase of 100% "Green" electricity for all city facilities by May (1999); 75% conversion to clean fuel vehicles by 2000; implementation of sustainable construction guidelines for public and private projects by July (1999).

What lessons have we learned from our efforts:

- we found that adopting measurable targets creates accountability and overcomes inertia
- it's necessary to perform regular and rigorous evaluation of targets B and it is sometimes necessary to modify indicators and targets
- and we learned the importance of emphasizing overall cost-effectiveness of sustainability programs to demonstrate their direct link to a healthy local economy.

And we have fun projects in our solar powered Ferris wheel -- the world's first! Part of the Pacific Park Amusement Park on the Santa Monica Pier, the Pacific Wheel is powered by a 43-kilowatt photovoltaic system.

Photovoltaic cells are located on rooftops around the park and produce over 71,000 kilowatt hours of electricity a year. Energy produced during times of full sun runs the Ferris wheel and excess energy provides electricity to the rest of the park. Pacific Park saves $7,000 a year in reduced energy costs while the system eliminates CO2 emissions.

Although we struggle with implementation issues and obstacles, as a community Santa Monica is committed to creating a sustainable city. Environmental and livability issues cross boundaries to include local, regional, and global impacts. We are your global neighbors B and we want to be good neighbors.

(Information on the Santa Monica Sustainable Cities Program is available on the City's web page)

Appendix E:
The Wall Street Journal, Green-Building Benefits Outstrip Extra Costs

WSJ.com RealEstateJournal
THE WALL STREET JOURNAL *Guide to Property*

Green-Building Benefits Outstrip Extra Costs

Oct 8, 2003

By SHEILA MUTO
Special to RealEstateJournal.com

It still costs more to construct green buildings, but the financial benefits of green-building design are more than 10 times the average cost premium, according to a report commissioned by a California government task force.

A few years ago, California's State and Consumer Services Agency established the Sustainable Building Task Force, a group comprised of representatives from more than 40 California state-government agencies, as part of its charge to implement an executive order issued by Governor Gray Davis in 2000 that established sustainable -- or green -- building as a primary goal for state construction projects. The order sought to create state facilities "that are models of energy, water and materials efficiency; while providing healthy, productive and comfortable indoor environments and long-term benefits to Californians." The taskforce commissioned this $100,000 report to assess the costs and financial benefits of constructing green buildings in California.

"Whenever there's talk about sustainable or green building, the guys with the green eyeshades -- the budget types -- even in the private sector all wonder what it costs," says Arnie Sowell, undersecretary of the State and Consumer Services Agency, who serves on the taskforce. "Our state Department of Finance was concerned specifically about that, and this report now tells them that as long as we get things done early on in the process, they can make very sound investments in energy and water efficiency and improved air quality and know that ... there will be a true cost savings on the operation and maintenance side. What may have surprised folks is just how minimal the initial upfront investment needs to be before it pays off."

Based on a review of the construction costs of 33 green buildings in the U.S. including Ash Creek Intermediate School in Independence, Ore., and the Botanical Garden Administration office building in Queens, N.Y., and factoring in the cost of energy, water and waste disposal among other things in California, the report found that it costs nearly 2% more on average -- or $3 to $5 a square foot -- to construct a green building than one using conventional methods, but that cost premium yields savings of more than 10 times the initial investment -- or $50 to $75 a square foot -- during the life of a building, conservatively assumed to be 20 years. The cost of conventional commercial construction in California was estimated at $150 to $250 per square foot.

"There's a five-year lag between reality and perception," says Greg Kats, the report's principal author and a principal at Capital E LLC, a Washington, D.C.-based consulting firm that advises clients on clean energy and green buildings. "Five years ago, green buildings were unusual, expensive and it was unclear what the benefits were" and cost anywhere from a 5% to 15%

cost premium for green buildings, he says. "Now, materials and design processes have become standardized, and more people know how to do it."

Released late last week, the report also found -- as expected -- that an integrated design and commissioning process was the most cost-effective. "If you take a conventional building and add piecemeal green technologies or design strategies, you end up with a substantially more expensive building," says Mr. Kats. "The more expensive green buildings are those that had late change orders."

The report concludes that constructing green buildings to the "gold" level -- the third highest designation -- set by the U.S. Green Building Council that certifies buildings as green under its three-year-old Leadership in Energy and Environmental Design, or LEED, program makes the most financial sense. The council, a Washington, D.C.-based nonprofit association of architects, planners, researchers and other green-building experts, evaluates buildings by assigning points based on their location, building materials, water usage, energy performance, design innovations and indoor environmental quality. The points determine the level of LEED certification: basic certification, silver, gold and platinum.

While the California report cites several studies that indicate increased productivity and health gains for those who work or learn in green buildings, it fails to evaluate the performance and health issues at the 33 buildings surveyed.

That's what Roger Platt, a senior vice president at the Real Estate Roundtable, a Washington, D.C., lobbying group, who served as an adviser to the authors of the report, wanted to see. "If you're a developer, you want brokers to have something to say about your buildings. It's great to say that corporations in your building are more likely to have greater productivity from workers and fewer sick days," he says. "That's where a lot more [research] work needs to be done."

"What makes a lot of sense for government and what it does with its money doesn't totally carry over for what investors that have to answer to shareholders and banks and whatnot find as the best thing to do with their money," adds Mr. Platt. Still, if the federal and state governments "lead by example with green-building practices, it has a positive effect in creating economies of scale for manufacturers of green-building products. That's very valuable."

And the state's Mr. Sowell expects that will remain. Even a potential administration change in California's state capital as voters went to the polls yesterday to decide whether to recall Gov. Davis will have little impact on the state's green-building efforts, he says. This report "proves that making investments in green-building practices is good for the bottom line. No matter what administration is in place, reducing our operating and maintenance costs in relation to the buildings we build is significant."

-- Ms. Muto is a national real-estate writer for The Wall Street Journal. Her "Bricks & Mortar" column appears each Wednesday exclusively on RealEstateJournal. She is based in the Journal's San Francisco bureau.

Link to the article: The Costs and Financial Benefits of Green Building, *Executive Summary,* Gregory H. Kats: www.cap-e.com/ewebeditpro/items/O59F3481.pdf

Appendix F:
Energy Saver Survivors TV "Show" to address Summer Peak and Motivational Marketing

Prepared by: Sonya Newenhouse, Margaret Mooney, Niels Wolter, Joanne Kelley, Barbara Smith, Jim Mapp and Ellen Rubinstein

What: Energy Saver SURVIVORs - How low can you go?
"Come to Madison, Wisconsin this summer for a reality TV show in energy conservation when three tribes compete to win new appliances, a bike, a push lawn mower, a Community Car membership and a compact fluorescent retrofit for their home. Think we're kidding? NOT!—Energy conservation is serious business and we have the competition to prove it..."

When: July and August 2004

Who: Our local CBS will (we hope) host 8 short morning news Energy Savor Survivor segments. Each spot will flash a website that has oodles of resources and pictures of tribe members doing energy saving actions, and the site will provide a place for the audience to vote for their favorite tribe.

Segment 1: A call for Tribes. A tribe must comprise of 3 households in a neighborhood and must fill out an application of why they should be chosen. They must demonstrate that they have fun, save money and that it's "easy being green." Tribes examples: East side Tribe; West side Tribe, Fitchburg Tribe, Sun Prairie Tribe, and Town of Dunn Tribe. The first segment would explain the purpose of the Survivor series, to reduce electric summer peak demand and show area residents examples of how to save energy and save money collectively. We would also tie this in with the Clean Air Coalition education campaign to reduce ozone in summer peak.

Segment 2: The challenge starts. Tribes are chosen and start with the first contest—How to make dinner with as little electricity and gas as possible. The rest of the tribe members enjoy the dinner and comment on the nice bees wax candle atmosphere etc, etc.

Segment 3: Another challenge—sleeping and entertaining without using air conditioning. This segment could get "steamy" and could include taking a dip or a canoe ride in our beautiful lakes.

Segment 4: Another challenge—retrofitting a home with as many compact fluorescents as possible. Tribes get all different types of bulbs, and notice how some light fixtures work better than others etc.

Segment 5: Another challenge—how quickly can a tribe mow a lawn (relay race) with a push mower, without getting sweaty. Side commentary occurs, about how easy and quiet it is.

Segment 6: Another challenge—find a way to get to work with as few single occupancy vehicle miles traveled as possible.

Segment 7 and 8: More challenges.

Appendix G:
Additional Low Cost Energy Saving Programs

Prepared by Barbara Smith

Initiative	
Information	
ENERGY STAR web banners on city pay site	Banners downloadable from www.energystar.gov. Everyone who pays a bill with the city through web site would see this banner.
TV Public Service Announcements (PSA), particularly for peak messages. PSAs inside buses. Print PSAs	WYOU, George Dreckman, CA models. Encourage residents to take simple actions to save energy at home and work. Showcase city's actions to inspire, set expectations. Concerts on the Square programs, other city-connected print publications
Large student landlords energy information drive	Include CFLs or coupons, energy info, to students upon new occupancy
Summer information campaign drive to discourage excessive AC	More creative mechanisms to deliver energy messages. Require energy information to be attached to rental leases in the city. Signs in public bathroom stalls. Etc. More cultural acceptance of no-AC
Energy & the Three R's	Integrate energy info into all recycling events. Get folks turning in electronics to consider ENERGY STAR replacements. Get energy info to compost bin purchasers. Integrate city sticker appliance recycling into early appliance turn-in programs.
Madison Parks Energy Education.	Park reservations should include energy info. Post energy info in park shelters. Add markers at trailheads explaining how you save the environment by home actions.
Beef up library program	More lendable materials, such as 10-pack of various CFLs to try, temp sensor for refrigerator, humidity meter, LED holiday lights, occupancy-sensitive power strip, LED garden light, watt meters, and lots of info on how to use.
Energy programs on City Cable Channel and School District Channel	Mayor's Report, Senior Beat, etc. Work with youth and others to make new documentaries on city activities

Energy in Ozone Action Day	Faxes are sent to major employers the day before a bad-air day. Work to make sure energy actions are included on these, increase firms getting these messages. Start web site where individuals can sign up to get personalized e-mails. Work with UW Healthy Homes Partnership.
Inventory neighborhood cooling centers	Inventory neighborhood resources for vulnerable people, encourage this as alternative to individual AC.
New neighbor energy info welcome packet	Create packet of energy information for all new residents of Madison, tenants and owners. Leave on move-in day.
Add energy education to afterschool programs	Make city funding contingent on energy education. Involve day camps, scouts. Grow our own energy people.
Events, Contests and Promotions	
Gardener Energy Outreach	Encourage vendors to add CFL "bulbs" to flower bulb sales. Add permanent energy information to displays. Put outdoor CFL and LED choices beside popular solar garden lights. Partners are Olbrich, Arboretum, native plant groups, nurseries, mulch program.
Extended pool hours on hottest days, sprinkler events, etc.	To discourage individual AC use.
Coolest loser refrigerator contest	Humorous quest, help ID high use (and ugly) refrigerators and freezers in homes and businesses. Prizes are coupons for Energy Star models. Helps purge secondary refrigerators & freezers too.
Partnership with sports team	Contest to have sports star plant your tree was called "King in Your Court" in Sacramento. Print ads with players, announcements during games. Half-time giveaways.
Give a Little, Get a Latte	Promo with coffee retailer. Used to encourage sign-ups for specific energy efficiency programs.

Nightburners, other reward programs, especially for kids. Neighborhood Energy Watch Teams.	Reporting program for office buildings lit up like Christmas trees at night. Non-punitive information provided to offending businesses to help them change their ways. SF has StreetFacts program giving hand-held computers to volunteers who monitor street cleanliness. We could tweak for energy opportunities.
Vampire / Phantom themed event for Halloween	Watt-meters to find and destroy phantom load. Power strips. Promote 1W standard for electronics (such as battery chargers, cordless phone chargers). House analysis and tours.
Contest to design bookmarks, calendars, T-shirts, etc.	Energy-themed bookmarks for the library, schools, etc.
City sponsorship of energy-related arts events	Such as climate humor show that visited UW Madison May 2.
Al fresco fun awards	Awards & publicity for individuals, families who make the most change. Similar to "car free challenge." Increase cultural acceptance of no AC. Target hard-to-reach groups to try no-AC nights.
Mayor's bike tour of virtual power plant	Visit EE sites in city. Invite public and media. Go to public buildings and other interesting showcases. Show tax money is used wisely. Talk about the savings, cleaner air, and local job creation.
Energy door prizes at city events	Give away ENERGY STAR items, but more importantly build awareness, endorsement of city. Dane Dances, etc.
Exhibits & Displays	
Alternate parade of homes	Get energy efficiency features more prominently showcased in homes in this tour.
Photo exhibit at city hall, Muni building	Showcase what the city has done that is cutting edge. Have "art opening" type event to kick it off
Energy kiosk	Outdoor kiosk as in European cities, but to give interactive energy info, rather than air pollution info
Photo exhibit at airport of local environmental technology firms that are cutting edge.	Local mfgs of national stature such as Middleton theater lighting co., dehumidifier mfgs., Subzero, etc.

Museum exhibit on history of appliances, highlighting modern choices. Mini-exhibits. Student union exhibits on energy.	Also highlight Wisconsin's contributions to modern appliances. There's a long list of mfg. From the state who make EE stuff. State historical society, Veterans museum (LED lighting soldiers use today), Children's Museum. Zoo, etc. Inform, inspire & motivate students and alumni to use latest technology. Union South, MATC
Energy "Exploratorium" for new technology	Concept is museum exhibit / technology showroom combo. Place to see latest in LED lights, etc. UW School of Engineering, UW Research Park, etc., Promega.
Energy Innovators All-Star Business Award Dinner	Awards, recognition for the industry that is energy efficiency in Madison. Consider business incubator. Chamber of Commerce, UW Research Park, UW, ECW, MGE, etc.
Human Resources	
Tap professors, grad students, and tech college students to do projects to research and evaluate opportunities for the city	
Volunteer energy aid	Volunteers can help with installing CFLs in neighborhoods, etc. We need to regularly request such assistance. United Way, Morgridge Center for Public Service, Retired Senior Volunteer Program, etc.
Public works Employment	Involve entry-level workers in installing pre-rinse nozzles in restaurants, installing CFLs, doing simple lighting audits, simple weatherization techniques. Have them shadow Focus staff as part of training. Partner with youth employment programs.

Appendix H:
Solar Art and Other Aesthetic Applications

Source materials from Niels Wolter

1

2

3

4

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1. Solar streetlight
   Alt Technica -- New York, NY
2. Freezer cart for selling ice cream
   Alt Technica -- New York, NY
3. Solar parking meter
4. Solar streetlight to meet dark sky ordinances *Alt Technica -- New York, NY*
5. Solar awnings for shading and electricity
   Chicago Center for Green Technology
6. Solar sandbox shading structure

AGENDA #_____

City of Madison, Wisconsin

A RESOLUTION_____

DECLARING CITY OF MADISON'S INTEREST IN TAKING A LEADERSHIP ROLE IN PROMOTION OF SUSTAINABLE ENERGY BY PROMOTING BOTH ENERGY EFFICIENCY AND RENEWABLE ENERGY FOR THE CITY OF MADISON FACILITIES AND THE COMMUNITY**.**

Drafted By: Utility Subcommittee of the Energy Task Force

Date: April 14, 2004

Fiscal Note: The goal of purchasing 10% of the city's annual electrical energy in 2006 from renewable sources would add $113,032 to the annual budget and the goal of purchasing 20% from renewable sources in 2010 would add $226,064 assuming a $0.02/kWh premium in cost, assuming current usage levels and not considering conservation savings.

SPONSORS: Mayor Cieslewicz

Presented_____
Referred BOE, BPW, and Board of Water Commissioners
Rereferred_____
Reported Back_____
Adopted_____ POF_____
Rules Suspended_____
Public Hearing_____

APPROVAL OF FISCAL NOTE IS NEEDED
BY THE COMPTROLLER'S OFFICE
Approved By

_____
Comptroller's Office

RESOLUTION NUMBER _____
ID NUMBER _____

WHEREAS, a sustainable energy supply is critical to the well-being of our society;

WHEREAS, energy efficient technology and renewable energy electricity sources are economically viable and available;

WHEREAS, City of Madison facilities, street lights and traffic signals, public water supply wells and pumping stations, and wastewater pumping stations are major users of energy totaling 56,516,110 kWh in 2003 with an annual cost of $4,202,607.22;

WHEREAS, City of Madison's procurement of renewable power consists of an aggregated load of sufficient size to potentially have influence in the electricity marketplace on the development of clean and renewable resources;

WHEREAS, Renewable electricity generated from "zero emission" sources such as solar, wind, and low-impact hydro have fewer adverse environmental consequences than fossil fuel generated power;

WHEREAS, the City of Madison has worked in partnership with Madison Gas and Electric Company on the development of a photovoltaic canopy spanning parking spaces at the Madison Municipal Building to demonstrate and evaluate the performance of solar technology;

WHEREAS, the Transit Utility of the City of Madison has purchased 803,232 kWh per year of wind power paying a premium of $0.0333/kWh, which represents 1.42% of the City's total annual electrical power purchase;

WHEREAS, approximately 1.5% of Madison Gas and Electric's regular system power is supplied by renewable sources, so the City of Madison is now receiving a total of about 3% of its electricity from renewable generation:

WHEREAS, the purchase of additional renewable power provides impetus to Madison Gas and Electric Company and Alliant Energy Company to increase renewable power generation;

WHEREAS, American Transmission Company (ATC) is in the process of enhancing the electric transmission system in the City of Madison and in Dane County, in order to provide greater access to regional generation sources, including renewable generation;

WHEREAS, The City of Madison expects that the additional cost associated with purchasing renewable energy will be small relative to the total cost of energy purchases by the City and expects that the price premium associated with each additional kilowatt-hour of renewable electricity will be substantially less than that currently being paid;

WHEREAS, Energy efficiency is the cornerstone of sustainable energy system and energy efficiency not only reduces energy consumption but also saves money and prevents pollution. Madison's efforts have already resulted in significant savings including retrofitting of streetlights and traffic signals with more energy efficient fixtures. Madison recognizes that additional programs and retrofits will achieve further energy savings;

WHEREAS, the Energy Conservation and Green Building Subcommittee of the Mayors' Energy Task Force has identified numerous ways in which the City could encourage the principal of sustainability through changes in city buildings and operations as well as through policies that would impact the private sector;

NOW THEREFORE BE IT RESOLVED, That the Mayor and City Clerk are hereby authorized to enter into contracts with Madison Gas and Electric Company and Alliant Energy Corporation to purchase a portion of the City's power from renewable sources; and,

BE IT FURTHER RESOLVED, that the City of Madison's purchasing goals for renewable power are hereby established as 10% for 2006 and 20% for 2010; and,

BE IT FURTHER RESOLVED, That the City of Madison will encourage community participation in renewable power programs through a Madison Clean Energy Challenge, the goal of which is to persuade 5% of the city's electricity consumers to participate in the challenge and to be recognized as an EPA Green Power Partner by having consumers purchase 2% of their electricity from renewable sources; and,

BE IT FURTHER RESOLVED, that the City of Madison will investigate opportunities to increase sustainability and efficiency for City facilities, and privately owned buildings in Madison. The Madison Clean Energy Challenge will include promotion of these opportunities and provision of other energy efficiency information, such as the benefits of compact fluorescent lighting, of choosing energy efficient appliances and of prioritizing energy efficiency in new building design and construction; and,

BE IT FURTHER RESOLVED, That the City of Madison be engaged in the siting and approval process for the transmission infrastructure that is necessary for providing access to renewable resources and electric reliability; and,

BE IT FURTHER RESOLVED, That the City of Madison will continue to identify opportunities where the installation of distributed renewable energy and combined heat and power systems would benefit the community; and,

BE IT FURTHER RESOLVED, That the City of Madison establish a Sustainable Design and Energy Commission charged with the oversight of the Madison Clean Energy Challenge, implementation of programs to encourage sustainable practices and the greening of City facilities and infrastructure, and to advise the Mayor and Common Council regarding sustainable design and energy issues.