

# RENEWABLE ENERGY

## A sustainable energy checklist for green communities

### FACT SHEET



BIOMASS



SOLAR



WIND

Contact Focus on Energy<sup>SM</sup> to learn about renewable energy options for your home, business or organization. Full program details, applications for awards and eligibility requirements are available from the Renewable Energy Information Center. Call 800.762.7077 or visit [focusonenergy.com](http://focusonenergy.com).



COURTESY ENERGY CENTER OF WISCONSIN

**Madison, Wisconsin has made good use of solar hot water systems on its fire stations. At Fire Station #8, the small solar electric panels installed on top of the system power the pumps.**

Cities and towns across Wisconsin are seeking ways to address concerns about global climate change while improving the environment and their local quality of life. Environmentally-friendly or “green” options for communities have long included programs to encourage recycling and the purchase of recycled products, improving public transportation and developing new zoning ordinances that reduce urban sprawl. Recently, many communities have begun to seek strategies for achieving carbon reduction goals as a way of becoming greener. Because fossil energy use is the primary source of carbon emissions, communities are turning to energy efficiency and renewable energy to make their energy production and use more sustainable.

#### WHAT IS SUSTAINABLE ENERGY?

Sustainable or renewable energy can potentially meet the needs of present and future generations without affecting the quality of the environment. The fossil energy resources we currently use are not considered sustainable because of the carbon and other pollutant emissions they contribute to global warming and reduced environmental quality. Therefore, creating a locally sustainable energy supply will mean balancing community needs against

what is produced in the immediate area from renewable sources like solar, wind or biomass. Reducing local needs by using energy efficiently is the essential component of a sustainable energy scenario. Reaching the goal of a sustainable energy future will mean creating a long-term energy plan that will benefit the whole community.

#### HOW DOES SUSTAINABLE ENERGY PLANNING FIT INTO OTHER GREEN COMMUNITY GOALS?

Energy is part of everything we do, so developing sustainable energy strategies will help us achieve other green or sustainable community goals as well. For example, by using energy more efficiently we can reduce the burning of coal for electricity and use less gasoline for transportation. This will not only reduce carbon emissions, it will also increase air and water quality, improving our health and that of the creatures and plants in our forests, air and water bodies. Also, energy efficiency and renewable energy technologies are creating tremendous economic development opportunities in communities of all sizes in the state. These include manufacturing of new equipment, development of biofuels, and growth of businesses that install insulation, efficient lighting or solar panels for homes and commercial buildings.



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*The power is within you.*

## HOW DO COMMUNITIES GET STARTED?

A sustainable energy planning process can be similar to other community-based planning efforts. Two key elements are encouraging broad participation and doing thorough background research on energy needs, resources and technologies. The following planning steps are recommended:

### Assemble an energy planning committee that includes community stakeholders

Participants might include elected officials, city staff, business owners, developers, home owners and renters, landlords, school district staff, utility representatives, environmental organizations, and other interested community activists.

### Create a vision and specific goals

What is the community's sustainable energy dream? Becoming a solar city? Achieving energy self-reliance? Establishing itself as a center for green manufacturing? The vision and goals will determine which energy strategies will ultimately be chosen. Establishing a realistic timeline is also essential for achieving the vision.

### Gather the necessary information about:

- Community energy use, both current and projected
- Energy efficiency opportunities within the community and renewable energy resources available in the area
- Available energy efficiency and renewable energy technologies and solutions

### Assess the options and draft a plan

After assembling information about energy needs, resources and potential solutions, the planning committee will be ready to choose the strategies that meet the community vision and timeline, and to establish a framework for measuring the success of their implementation.

## SUSTAINABLE ENERGY OPPORTUNITIES AND RESOURCES

Focus on Energy provides support to community energy planning through information, facilitation and financial incentives. The following lists offer a quick overview of community energy efficiency opportunities and potential renewable energy resources.

### Energy efficiency strategies:

The cheapest energy is the energy you don't use, and therefore don't have to pay for. That's why efficiency is the number one strategy for achieving sustainable energy in a community. Individuals can take many actions to reduce their use of energy and these will be important within the community plan. There are also strategies available to local government that can create additional savings for the community as well as help individuals save energy in their homes and businesses. (See Checklist below for examples.)

### Renewable energy resources

It's important for municipalities to make an assessment of their local renewable energy resources because any given source of renewable energy may not necessarily be available to every

## ENERGY EFFICIENCY STRATEGIES—CHECKLIST

### Saving energy in local government facilities—walking the talk

- Perform energy evaluations in municipal facilities and infrastructure systems
- Require that new municipal buildings meet energy efficiency standards that exceed local building codes
- Replace inefficient traffic lights with LED traffic lights, and inefficient street lights with efficient, low maintenance models such as LED or Pulse Start Metal Halide
- Install occupancy sensors or motion sensors to turn off lights automatically when areas are not in use
- Plant shade trees strategically to help cool structures and surfaces naturally
- Introduce energy efficiency guidelines into government procurement methods
- Consider district heating and cooling systems when designing new municipal complexes

### Creating a green regulatory environment through codes, permitting and land use

- Review and confirm local building energy codes, and establish reliable enforcement procedures
- Revisit zoning ordinances to encourage efficiency through high density and mixed use development, and to reduce barriers to renewable energy use
- Adopt site development standards that encourage the incorporation of daylighting and energy efficient landscaping in new building plans

### Leadership—bringing the vision to everyone

- Acknowledge and/or reward developers, construction companies, builders and building owners to build/maintain high efficiency buildings
- Provide training about the sustainable energy plan to all municipal staff in order to ensure coordination of strategies among departments
- Encourage community-wide participation in energy reduction goals through public programs and education efforts

community. Even so, every community will likely have several options to explore. The following list outlines the top ten renewable energy applications that can work well for communities and municipalities in Wisconsin, depending on the available resources.

### **Solar energy**

Solar energy is available everywhere in Wisconsin, and solar systems perform well on homes, businesses and municipal facilities. Even though there are more cloudy days in the upper Midwest than there are in Southwestern states and California, the sun can still make a substantial contribution to reducing fossil energy use.

#### ■ **Solar energy for heating swimming pools**

**DESCRIPTION:** Many communities in Wisconsin have an outdoor public swimming pool in a park or at a community center, or they have indoor pools located in high schools or at the local community college. The water for public pools is usually heated by a natural gas boiler, and fuel costs can add up fast. Using solar hot water panels instead to heat pool water can quickly prove economical while also reducing carbon emissions.

**MOST EFFECTIVE APPLICATION:** Solar pool heating is most cost effective for seasonal pools where freeze protection is unnecessary, because solar pool heaters designed for warm weather are less expensive than those used for indoor, year-round pools. However, significant energy savings can also be realized from year-round systems, particularly for pools in new, energy efficient buildings.

#### ■ **Solar energy for heating domestic water**

**DESCRIPTION:** A properly-sized solar hot water system, which uses panels to concentrate the sun's energy for water heating, can provide 40 percent to 50 percent of annual hot water needs in Wisconsin. Even during the cold winter months, the system preheats water before it enters the building's standard water heater, cutting natural gas or electricity use.

**MOST EFFECTIVE APPLICATION:** Any municipal building that uses significant amounts of hot water for showers, laundry or food preparation should be considered a candidate for solar water heating. This might include fire stations, community centers, medical clinics, nursing homes, or schools with athletic facilities. Augmenting an electric water heating system is usually most cost effective, but savings from a natural gas system can also be impressive.

#### ■ **Solar energy for space heating**

**DESCRIPTION:** The sun's energy can be concentrated to heat air as well as water through the use of dark, perforated metal panels mounted on the southern wall of a building. Cool, outside air is heated as it passes through the warm panels, where it collects between the panels and the building wall. Fans collect the warmed air and move it into the building, distributing it through air ducts.

**MOST EFFECTIVE APPLICATION:** This solar technology is most cost-effective for warehouses, garages, and other buildings where heating needs are minimal but consistent or where work activity is sporadic. Building orientation and unshaded solar access are extremely important to the success of this technology, as is the



**Many schools find solar electricity to be a good educational investment. This one generates clean energy for the Cooper School in Milwaukee, Wisconsin.**

building's overall energy efficiency, making this another technology that would be most economically pursued for a new building.

#### ■ **Solar electricity for schools and other demonstration sites**

**DESCRIPTION:** Electricity from the sun is a fascinating idea and solar electric panels capture the public imagination more than any other renewable energy technology. Installations on municipal buildings can demonstrate the community's commitment to clean energy and to reducing the local carbon footprint

**MOST EFFECTIVE APPLICATIONS:** Many Wisconsin cities and towns have discovered the particular value of installing solar electric panel demonstration projects on their schools where teachers and students can use them to learn about sustainable energy. Teaching students about renewable energy through a solar electric project is a highly effective method of teaching the entire community about the potential benefits of renewable energy.

### **Biomass energy**

Biomass sources include organic waste and dedicated feed stocks that can be burned, digested or processed to produce energy. They might be animal manure or food processing waste, wood waste from forestry or industrial sources, or the methane produced by sewage treatment plants or organic waste buried in landfills. Also, a variety of energy crops can be made into heating and transportation fuels. Communities must assess their opportunities to successfully use these biomass energy opportunities.

#### ■ **Methane from anaerobic digestion**

**DESCRIPTION:** Anaerobic digestion is a process where organic wastes are broken down by special strains of bacteria that do their work without oxygen. One of the products of this process is methane gas, which is chemically the same as natural gas. Anaerobic digesters are designed to collect this gas which can then be used for heat or electricity, or it can be cleaned and injected into the natural gas pipeline.

**MOST EFFECTIVE APPLICATIONS:** For municipalities, anaerobic digestion is most often employed at the local sewage treatment plant. The methane is often used to keep the digester at a stable temperature, or to generate electricity. Another potential urban application is at food processing plants where food waste is converted to energy. Anaerobic digesters are also becoming common on large dairy farms in Wisconsin for processing manure.

#### ■ Biomass combustion for heating

**DESCRIPTION:** Where a consistent and high quality source of wood chips or biomass pellets are available, it is often economical to replace a fossil-fueled heating boiler with one that burns wood. Schools and small businesses in Wisconsin have begun taking advantage of the state's available supply of waste wood to cut energy costs. High quality, wood-burning boilers that meet DNR emissions standards are now available, offering a carbon neutral heating option.

**MOST EFFECTIVE APPLICATIONS:** An existing fossil-fueled boiler can easily be replaced with a wood-fired boiler as long as there is space available for storage and management of the wood fuel. The most economical wood boiler installations are those in close proximity to the wood supply, because transportation costs will quickly cut into energy cost savings. Pellet mills, logging operations, milling or other wood product manufacturers, or shipping firms that dispose of wood pallets and packing materials, are all potential waste wood resources within a local area.

#### ■ Landfill gas

**DESCRIPTION:** Landfills continually produce methane gas from the decomposition of organic waste that's buried inside them, even after the landfill is filled and sealed. Many landfill operations relieve the pressure from methane build-up by sinking pipes and "flaring" or burning off the gas. However, this source of methane is now recognized as energy that can be tapped and used to generate electricity, for heating or to be cleaned and injected into the natural gas pipeline.

**MOST EFFECTIVE APPLICATIONS:** Local governments that oversee landfills can take advantage of this very specific renewable energy opportunity. Proximity to an end user or to a natural gas pipeline is a plus.

#### Wind Energy

**DESCRIPTION:** Wind turbines come in all sizes, from residential-scale systems to the giant turbines at utility wind farms. The wind resource in Wisconsin is strongest along the Niagara Escarpment in the eastern part of the state. However, local topography elsewhere may lend itself to the installation of wind turbines, and communities can arrange to measure the potential of windy sites as part of their assessment of local renewable energy resources. Community-scale wind projects have been installed on school district property and at local industrial parks in Wisconsin and other Midwestern states.

**MOST EFFECTIVE APPLICATIONS:** Because they operate most efficiently when located away from buildings and other tall structures that can produce wind turbulence and reduce wind speeds, wind turbines are best located in a rural setting. There are currently no proven turbine designs that perform consistently and economically in urban areas or installed on buildings. Turbine towers must also conform to Federal Aviation Administration regulations regarding their proximity to airport runways.

#### Renewable vehicle fuels

**DESCRIPTION:** Because of its agriculture and forestry industries, Wisconsin's future as a producer of renewable vehicle fuels, such as ethanol and biodiesel from biomass sources, looks promising.

**MOST EFFECTIVE APPLICATIONS:** All local governments can consider dual-fueled vehicle fleets and establishment of biofuel filling stations. For rural communities there are economic development opportunities that might emerge from ethanol and biodiesel made from a variety of crops or organic waste resources such as forest slash or corn stover.

#### Geothermal heat pumps

**DESCRIPTION:** Consistent year-long underground temperatures are what make geothermal heat pumps work well in cold climates. A typical geothermal heat pump employs a closed loop of piping containing a non-toxic liquid that circulates between the building and underground. The heat pump itself uses a refrigeration cycle that transfers heat from the coil in both directions, moving it from the building to the soil underground in the summer, and the reverse as heat in the winter.

**MOST EFFECTIVE APPLICATIONS:** A geothermal heat pump requires a minimum amount of space for the outdoor coil or wells. Therefore, it is more economical to include a geothermal heat pump in the design of a new building rather than to install it in an existing building. One underground loop can support many small indoor heat pump units, making it an ideal choice for schools and other buildings where heating and cooling by zone is desirable.

#### FOR MORE INFORMATION

##### Focus on Energy

Learn more about energy efficiency renewable energy technologies and the financial incentives available from Focus on Energy.

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Focus on Energy works with eligible Wisconsin residents and businesses to install cost effective energy efficiency and renewable energy projects. Focus information, resources and financial incentives help to implement projects that otherwise would not be completed, or to complete projects sooner than scheduled. Its efforts help Wisconsin residents and businesses manage rising energy costs, promote in-state economic development, protect our environment and control the state's growing demand for electricity and natural gas. For more information, call 800.762.7077 or visit [focusenergy.com](http://focusenergy.com).

