



2009

**Wisconsin Energy Independent
Community Partnership**

**25 x 25 Plan for Energy
Independence**

Report completed by:

City of Evansville

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Overview

Introduction

The Wisconsin Office of Energy Independence (OEI) administers energy programs to assist Wisconsin to profitably and sustainably promote energy efficiency and renewable energy resources. The goal of the Wisconsin Energy Independent Community Partnership administered by the OEI is to effectively increase energy independent assessments for Wisconsin communities. Currently, there are many communities across the State of Wisconsin interested in implementing and adopting renewable energy and energy efficient projects. This program will assist 10-15 communities that could be potential pilots or models for completing an energy independence assessment, allowing the community to then move forward with energy efficiency and/or renewable energy projects.

Definition

Energy Independent Community (EIC) – a community that is willing to set a goal of “25 by 25” to increase our energy independence, and promote a sustainable energy policy for the State of Wisconsin

Objectives

The objectives of the Wisconsin Energy Independent Community Partnership are to:

Increase the use of renewable energy and renewable fuels by 25% by 2025 in communities across the State of Wisconsin.

Increase and promote public awareness regarding the benefits of increased energy conservation, energy efficiency, and renewable energy use by counties and municipalities around the state. These benefits include and are not exclusive to: clean air and water, intelligent land management, rural and urban economic development, as well as state and national energy independence.

Eligible Participants

Applicant must be a Wisconsin county, city, village or town that has shown willingness to improve the community's efforts related to energy conservation, efficiency and potential renewable opportunities. Applicants, if they are responsible for their own municipal water, sewer, or electrical system, must be in compliance with all appropriate state and federal regulations.

What was measured? Why?

Energy usage data was gathered for municipal buildings, infrastructure (water treatment, outdoor swimming pool, and outdoor lighting), and fleet vehicles. The information was used to calculate a current (2008) municipal energy use baseline of 12,472 MMBtu. Using an estimated annual growth rate for municipal usage of 1.4%, the 2025 estimated energy use baseline of 15,797 MMBtu was determined. The 25 x 25 goal is therefore that 3,949 MMBtu of energy be generated from renewable sources. If energy efficiency and/or energy conservation projects are undertaken, the energy use baseline will be reduced by the resulting energy savings, and the 25% goal of renewable resource usage will be lower.

Reducing dependence on use of fossil fuels is the main goal of developing a 25 x 25 energy independence plan. Reduction of greenhouse gas emissions to minimize the local impact on global warming is also an important component of a 25 x 25 plan. Evansville 2008 baseline energy usage produced an estimated 3,646,412 pounds of carbon dioxide. The estimated 2025 energy use baseline generates an estimated 4,618,535 pounds of carbon dioxide. As implementation of specific 25 x 25 projects occurs, greenhouse gas reductions can be calculated.

Discoveries/Surprises

An important result of calculation of a municipal energy baseline was identification of how municipal energy use was occurring, and consequently, how greenhouse gas emissions are generated locally. The discovery of Evansville's significant proportion of energy consumption by municipal vehicles (34%) was a surprise. While recognizing that communities vary in infrastructure requirements and facility and vehicle needs, a comparison of the EI pilot communities showed our community distinct in the portion of energy use attributable to fleet. Further exploration of the data showed that vehicle fuel costs were also 34% of total 2008 energy expense and generated approximately 18% of carbon dioxide emissions.

Calculation of the annual total municipal energy costs was illuminating. In 2008, the cost was determined to be \$333,427. While energy costs had been identified by department in the annual budget process, costs had not been aggregated. In this era of tight governmental budgets, selected energy efficiency, energy conservation, and renewable projects can significantly reduce these costs with corresponding positive budget impacts.

Another discovery was the lack of detailed energy data in certain areas. There was incomplete information on fuel usage for individual vehicles, and some fuel invoices did not include the gallons of fuel purchased. Certain buildings or lights were not individually metered, while other metered structures included data from multiple sources. An example is the outdoor community swimming pool. Accurate monitoring of a multi-phase solar heating project at the pool that commenced in 2005 was not possible because the pool meter also included a public works garage located near the pool. This situation has been rectified and current data can be used to measure renewable energy savings.

During the process of analyzing and drafting a 25 x 25 plan, it became evident that smaller communities lack many of the renewable options available to larger governmental units. For example, methane digesters at waste water treatment plants are not feasible for a community of 5,000 residents. Similarly, large-scale wind is too costly for a small community. The result is difficulty in accomplishing significant renewable resource generation at the local level. Energy efficiency and conservation projects are much easier to implement.

A pleasant discovery over the past year has been citizen buy-in and acceptance of local energy planning and initiatives. The Evansville community continues to grow its interest in and commitment to sustainability as evidenced over the years by the strong support for and attendance at the annual energy fairs.

Total Projects Considered

The Energy Independence Team began by identifying ten priorities for consideration in development of a 25 x 25 plan for municipal energy use. The Team reviewed the city capital improvement plan for possible projects. Discussion with city department heads identified other potential opportunities. The original ten unranked priorities were:

1. 2009 waste water treatment plant upgrade, with renewable components.
2. Street light upgrades to LED lights.
3. Improvements to public works facility, with possible renewable components.
4. 2009 upgrade of south loop from single phase to three phase line.
5. New vehicle purchases, including exploration of purchase of hybrid "sky-lift" off road bucket/digger/derrick unit and hybrid bucket truck.
6. 2009 energy efficiency possibilities in remodel of old fire station for relocation of police department.
7. Construction of West Side Park shelter/bathroom.
8. Upgrade to variable speed pumps at lift stations.
9. City Hall tuckpointing and other energy reduction measures.
10. Planting/landscaping in city parks and other city areas to reduce mowing and decrease run off.

The Team also developed decision rules to assist in analyzing the priorities and guiding the decision-making in ranking and refining the identified priorities. The guidelines for analyzing potential energy projects are included in the appendices.

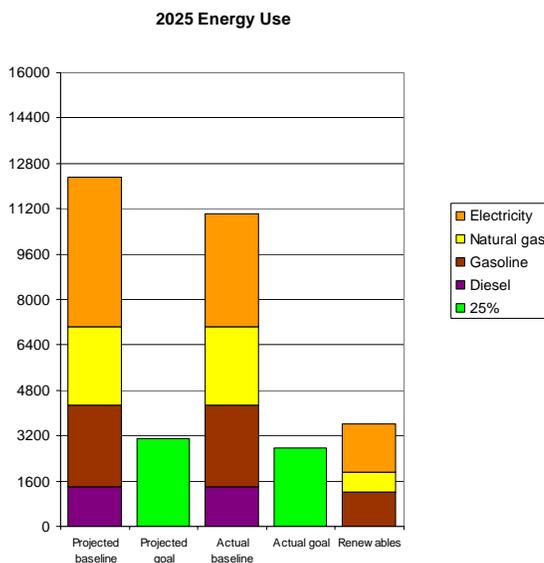
Pathways to 25 x 25

The projects identified by the Energy Independence Team, along with some already implemented or in-process activities, will meet or even exceed the 25 x 25 goal.

Evansville is fortunate to be a member/owner of WPPI Energy. In 2009, WPPI Energy achieved the Wisconsin 2015 renewable portfolio standard of 10% six years early. Ten percent of all electricity supplied to member communities is generated from renewable sources. Therefore, 10% of municipal electricity purchased in Evansville is generated from renewables. Since 42% of municipal energy consumption is electricity, 4.2% of energy use is currently generated from renewable sources. Should future legislation raise the renewable portfolio standard to 25% by the year 2025, 10.5% of Evansville municipal use would be generated from renewable sources.

A solar heating project at the municipal outdoor swimming pool has been completed. It is a high visibility renewable energy installation in the community.

The waste water treatment plant upgrade, with its many energy-saving features, is underway. The 100 kW wind turbine has been ordered and foundation work for the turbine has begun. The upgrade will produce annual energy efficiency savings of 170,000 kWh, as well as renewable generation of 1,781 therms from the geothermal system and 139,318 kWh from the wind turbine. Installation of two future 100kW turbines would provide an additional 278,636 kWh of renewable energy annually.



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Percent of 25% goal achieved: 132%

Measures

		Name	Savings-to-investment ratio	Savings	Installed cost before incentives	Incentive amounts	Present value cost with incentives	lbs CO2
10%	R	Wisconsin RPS Purchased renewable electricity	--	397 kWh	--	--	--	672
0	R	LED street light replacement	#DIV/0!	0 kWh	-	--	-	-
On	E	Wind turbines	0.05	111938 kWh	181,790.00	181,790.00	-	189,399
On	R	Solar for municipal pool	1.42	139318 kWh	425,000.00	308,977.00	116,023.00	235,726
On	R	Public works biomass burner	0.51	1078 therms	18,000.00	-	18,000.00	12,621
On	R	Public works lighting upgrade	6.58	4330 therms	10,000.00	-	10,000.00	50,696
On	E	2nd wind turbine	1.25	38666 kWh	31,231.00	6,700.00	24,531.00	65,423
On	R	3rd wind turbine	1.03	139318 kWh	425,000.00	300,000.00	107,875.00	235,726
On	R	WWTP upgrade	0.61	139318 kWh	425,000.00	300,000.00	93,000.00	235,726
On	E	Geothermal at WWTP	0.06	170000 kWh	7,000,000.00	3,400,000.00	3,495,600.00	287,640
On	R	Fleet adoption of biofuels	0.05	1781 therms	250,000.00	-	242,750.00	20,852
On	R	VFDs for lift stations	1.23	9744.57 gallons unleaded	1.00	-	1.00	190,409
On	E		1.26	66892.2 kWh	76,000.00	-	76,000.00	113,182

Total: 8,766,021.00 4,497,467.00 4,107,779.00 1,334,481

Baseline lbs CO2: 4,630,152
New lbs CO2: 3,295,671
Reduction: 29%

The above graph shows a plan that exceeds the 25 x 25 goal, with the current 10% renewable portfolio standard and projects listed in the accompanying chart.

A second phase of the LED street light upgrade that would retrofit historic-style lights with LED lamps is not included in the analysis. Inclusion of the additional street light upgrade will positively impact the 25 x 25 plan results above.

It is noteworthy that carbon dioxide reductions are also greater than 25% with the illustrated plan.

Projects Selected – Explanation

Refinement of the ten identified priorities to a list of five project priorities that would reach the 25 x 25 goal was influenced by a number of factors. Some of the deciding factors were assessment of current/upcoming projects for energy saving components, reducing operating costs, reducing carbon footprint, and “2-fers” such as removal of environmental toxins while improving energy efficiency (replacement of mercury vapor street lights with LED street lights is an example). The decision priorities drafted by the Energy Independence Team are included in the appendices.

The five selected projects are:

1. Waste water treatment plant upgrade, including 100 kW wind turbine at site. Two additional locations identified for future 110 kW turbines.
2. Upgrade well and lift station pumps to high efficiency variable frequency drive models.
3. Public works building efficiency retrofits, including lighting and heating.
4. New vehicle purchases that incorporate energy efficiency improvements. Hybrid technology, biofuels, etc. considered for all municipal vehicles.
5. Street light upgrades to LED lights.

The waste water treatment plant upgrade was included in the 2009 capital budget. Work on this project commenced late this summer. Many energy efficient features were included in the project design, including energy-efficient pumps and a vertical loop reactor. Renewable energy components of the upgrade include a geothermal heating/cooling system for the headworks building and installation of a 100 kW wind turbine at the site. Two additional sites for future turbines were identified.

Recent relocation of the public works department into a former grocery store presented energy efficiency improvement and renewable energy possibilities. A lighting plan including off-grid solar light pipes and highly-efficient fluorescent lighting will greatly reduce energy use and substantially lower building electricity costs. A project to heat the public works garage with a biomass burner, using emerald ash borer-diseased wood and other wood debris, is likely to occur in 2010.

Upgrading pumps to highly-efficient variable frequency drive models is a good project for energy use and energy cost reductions. One of the city well pumps has been in operation for more than 50 years. This project has a good financial payback.

Purchasing vehicles with better efficiency is a priority in light of baseline analysis. The city purchased a neighborhood electric vehicle for the water & light utility for

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~~short, local trips. Two new snow plow trucks and a police department SUV are~~
currently-owned flex-fuel vehicles. New Crown Victoria police squads come standard with flex-fuel capability and will be purchased according to a replacement schedule. Additional options for fleet improvements will be researched. One example is potential purchase of a plug-in hybrid electric vehicle for use in meter-reading in the rural areas of the water & light utility in view of smart-grid technology that may eliminate manual meter-reading.

Street light upgrades are a highly visible energy efficiency project that provides substantial energy cost savings. With project funding, upgrading 320 street lights to LED technology will save 111,938 kWh annually. An additional 71 ornamental historic-style street lights will be converted to LED lamps when appropriate retrofits become available. Our utility is currently testing one model. Financial payback is poor without an outside funding source.

Narrative – Potential Renewable Feedstocks

The Evansville area has a number of renewable energy sources and feedstocks that can contribute to local energy independence efforts.

Wind

Sites for three 100 kW turbines at the waste water treatment plant have been identified and included in the 25 x 25 plan. One turbine will be installed in 2010.

A community wind project has been proposed by WPPI Energy/EcoEnergy in the Town of Union. The project would include three 1.5 MW turbines that would be connected to the Evansville Water & Light utility and would provide the equivalence of annual electric consumption of approximately 1,350 average homes. A test tower is currently monitoring wind speed. Soon-to-be-completed Public Service Commission rules for smaller wind projects will impact the future feasibility of the plan.

A 100 MW wind farm has been proposed in the Town of Magnolia by EcoEnergy. A measurement tower is currently monitoring wind speed. Economic conditions will determine future feasibility of the project. Transmission and distribution would not be handled by the Evansville Water & Light utility.

Solar

Solar panels currently provide partial heat for the outdoor municipal swimming pool. While no specific additional solar projects have been identified, the permanently open locations of the wastewater treatment plant and the public works facility could be possible sites for future solar energy generation.

Biogas (landfill, agriculturally-based)

Larson Acres, with an expanded dairy herd of more than 5,000 cows, would be a likely location for a methane digester that could feed energy into the Evansville Water & Light utility.

Biomass

Evansville has been designated Soybean Capital of Wisconsin by the Wisconsin Soybean Association. Agribusiness is a strong local economic driver, with tremendous biomass opportunities. Agrecol, a rural Evansville business, currently produces fuel pellets from plant waste.

Identified in the 25 x 25 plan is a biomass burner at the public works garage that would use emerald ash borer-diseased wood and other local wood debris.

Possible use of a biomass burner to heat a portion of the water and light utility facilities will be researched.

Existing Unknowns – Necessary Information for Future

There are a number of variables that can impact implementation of the 25 x 25 plan. Having options to adapt to changing circumstances is important to achieving energy independence. Some of the “unknowns” are:

- Future government action and legislation, specifically state rules for community wind projects, increases in renewable portfolio standards, and action on carbon constraints.
- Adequate sources and availability of funding for cutting-edge energy projects that are not financially feasible for communities independently. Examples are wind projects and LED street light upgrades.
- Future global energy demand with impacts on energy costs. The dynamics of energy projects and energy policies may change with the global political and economic climate.
- Changes in technology, e.g. new lighting technologies and smart grid and smart metering development, that may increase energy efficiency.
- Development of biofuels, including new sources and appropriate economics. Evansville has experienced first hand the volatile biofuels market as the financial feasibility of the proposed North Prairie Productions biodiesel facility collapsed.
- Local availability of biofuels. Working with local fuel suppliers to increase availability of alternative fuels is necessary to take advantage of flex-fuel technology.

The Energy Independence Team will monitor future actions and development relating to these and other issues and will recommend revisions and adjustments to the 25 x 25 plan.

Action Steps – Immediate & Long - Term

There are a number of administrative activities that will occur in 2010. Baseline municipal data will be entered into the Energy Star Portfolio Manager. This program will be used to monitor future energy use of facilities and results of selected energy projects and other energy efficiency/conservation activities.

Detailed energy audits of all municipal facilities will occur in 2010. The goal is to capture the efficiencies of improving building envelopes, encouraging proper use and maintenance of equipment and appropriate use of lighting, etc. Increasing energy efficiency will reduce municipal energy costs.

In 2010 the mayor plans to undertake a second community challenge to increase business and residential participation in renewable energy purchase programs. Evansville businesses and residents currently purchase blocks of clean energy totaling 928,800 kWh of renewable energy annually.

Discover Wisconsin is filming a 30-minute television show about Evansville. One of the film shoots will occur at the April 23, 2010 Energy Fair to showcase community commitment to energy independence and energy education. This is a great opportunity to promote energy independence activities.

On a long-term basis, the Energy Independence Team will continue to meet regularly to monitor 25 x 25 plan implementation/results and promote energy projects involving local businesses, school district, and residences. The Team will update and revise the 25 x 25 plan as needed. The Team will search for funding sources to undertake additional projects.

The following action steps for 25 x 25 projects have been identified:

1. Complete the wastewater treatment plant upgrade and first wind turbine installation in 2010.
2. Complete the public works facility lighting and heating retrofits in 2010.
3. With adequate funding, complete the LED street light upgrade of 320 lights in 2010. Upgrade 71 ornamental historic lights with LED retrofits when feasible by 2020.
4. Upgrade well and lift station pumps by 2013.
5. On an ongoing basis, encourage local availability of biofuels, monitor current development of biofuels, and carefully consider purchases of fleet vehicles in terms of energy efficiency and alternative fuel capability.
6. Secure funding for and install two additional 100 kW turbines by 2025.

Energy Independence Team Members

The Energy Independence Team is the most important component of a successful 25 x 25 plan. Plan implementation and community-wide energy projects will be spearheaded by the Energy Independence Team. Much consideration was given to selection of team members.

Evansville already had a small group, the Evansville Initiative, committed to promotion of renewable energy projects. Originally organized nearly a decade ago to advocate for energy-saving features in the design of a new high school, the Evansville Initiative accomplished a successful building referendum that included a geothermal heating/cooling system in the building design. Energy efficiency improvements of existing facilities were also included as part of the project, with additions to two buildings, boiler replacement, and installation of new windows. The group continued to advocate for additional renewable energy initiatives in the community and was successful in receiving a grant to fund the first phase of a solar heating project at the outdoor public swimming pool. All active members of the Evansville Initiative were asked and agreed to join the Energy Independence Team.

The Evansville Team has fifteen members representing a cross-section of the community and its organizations. The members are:

1. Dane Albright-original Evansville Initiative member, community renewable energy supporter.
2. Butch Beedle-middle school teacher, coordinator of annual community energy fair.
3. Steve Carlson-principal engineer in energy consulting firm, original Evansville Initiative member.
4. Heidi Carvin-school district administrator, Evansville Initiative member.
5. Sandy Decker-mayor, Evansville Initiative member, Team leader.
6. Georgia Duerst-Lahti-professor at Beloit College, retired school board member, original Evansville Initiative member.
7. Scott George-Evansville Water & Light superintendent.
8. Fred Juergens-retired alderman, Evansville Initiative member.
9. John Morning-Chamber of Commerce president.
10. Alicia Rankin-WPPI Energy service representative for Evansville.
11. John Rasmussen-retired water & light foreman, performed municipal energy audit and data/information gathering.
12. Janis Ringhand-retired mayor, current alderwoman, original Evansville Initiative member.
13. Jodi Sam-city staff member, Team scribe, and performed data entry/monitoring.
14. Dave Wartenweiler-Evansville Public Works superintendent.

15. Kendall Wethal-small business owner using solar energy, community renewable energy supporter.

During the development of the 25 x 25 plan, the Energy Independence Team met monthly on the first Tuesday at 7:00 a.m. An additional December meeting was held on December 8 to view a presentation of the project assessment program by Sean Weitner of the Energy Center of Wisconsin.

The Energy Independence Team has agreed to continue meeting on a regular basis to monitor implementation and results of the 25 x 25 plan. It will also identify and promote additional energy projects in the future. City staff will work with Alicia Rankin of WPPI Energy to monitor energy use with the EPA-designed Energy Star Portfolio Manager. Jodi Sam will become the city resource person for consumer and business energy programs and incentives. The Energy Independence Team is committed to using the 25 x 25 plan implementation as a stepping stone to additional community awareness and activity that will lead to additional energy conservation, efficiency and use of cleaner, renewable energy.

Appendix: Guidelines for Project Selection

Guiding Principles/Decision Rules

Evansville Energy Independence Team

4/30/2009

Guiding principles and practices as we set priorities and chart a course of action for the City of Evansville's energy efforts:

1. Maximize every facility's opportunity
 - a. (Re)Assess all current and near future projects for ways each can advance energy innovation
 - b. If the City is involved in *any* way, energy innovation becomes part of the project
2. In projects, actively seek to:
 - a. Reduce long term operating cost
 - b. Reduce carbon footprint
 - c. Minimize short term costs
3. Favor projects that offer "2-fer" or multiple benefits. For example,
 - a. Replace mercury vapor lights to save energy and remove mercury from the environment, ensuring proper disposal
 - b. In lake landscaping, use native plants to save costs of mowing, discourage geese from lake, and keep water cleaner because a native plant buffer filters runoff
4. Strive for economies of scale
 - a. For example, if one wind turbine then explore whether other locations could use same model fruitfully to buy in bulk
 - b. Establish a practice of asking whether another site could benefit from the same application, which means orienting toward thinking about applications for all sites for improvement
5. Assess each project for its potential contributions to
 - a. Evansville's economic development
 - b. Evansville's culture and cultural brand
 - c. Energy innovation in Evansville
6. In cost-benefit analysis consider all items 1-5 above
7. Embrace new technologies and assume audits and some upgrades will be needed every two years
8. Value and plan for the public education aspects of every upgrade or installation
 - a. Undertake "small" improvements on City facilities that can model residential benefits or improvements
 - b. Think about each improvement as a "show place" for visitors—energy tourism

Appendix: Baseline Energy Consumption Data – Spreadsheets

See attachment.

Appendix: Energy Center of Wisconsin Project Measurement Program - Spreadsheets

See attachment.

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