



25 X 25 Plan for Energy Independence

City of Kaukauna

**2010 Wisconsin Energy Independent
Community Partnership**

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- 2) Benchmark January – June 2010
- 3) 2010 Conservation Projects
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Overview:

Introduction:

The City of Kaukauna in cooperation with Kaukauna Utilities applied for and was awarded a grant from the State of Wisconsin Office of Energy Independence (OEI) to develop a strategy to have at least 25% of the energy used by the city to be from renewable sources by the year 2025.

Many communities across the state are interested in adopting a pathway to 25% renewable energy by the year 2025. This plan may be a guide to those communities and may assist them in developing their own plan.

Kaukauna is uniquely positioned to achieve this goal because of the municipally owned electric and water utility and the long history of renewable energy through the use of the community owned hydro-electric generating facilities along the Fox River.

Objectives:

- 1) Develop a pathway, using conservation and practical sources of renewable energy to make our community a prototype for others
- 2) Establish programs that "Lead by Example"
- 3) Reach out to the community to increase awareness of energy conservation, energy efficient practices and sensible use of renewable energy sources
- 4) Make energy conservation an integral part of all decision making processes
- 5) Include reduced water use as part of the comprehensive plan

Process:

Establish an Energy Independent Team: Build a committee consisting of utility representatives, city representatives and interested members of the community. The purpose of the group will be to examine where the city is in terms of renewables, set realistic goals and develop strategies to achieve the goals. The group will meet monthly.

The members of the Kaukauna Team are:

Jim Brown, Energy Utilization Consultant
Jeff Feldt, General Manager, Kaukauna Utilities
Alice Rasmussen, Executive Assistant, Kaukauna Utilities
Jeff Forbes, Energy Services Representative, KU/WPPI Energy
John Sundelius, Director of Public Works, City of Kaukauna
Bob Jakel, Director of Development, City of Kaukauna
Cathryn Keating, Citizen Representative, Residential
Don Brittnacher, Citizen Representative, Residential
Kurt Rossebo, Citizen Representative, Commercial
Paul VanderHeyden, Citizen Representative, Industrial

Establish a starting point or benchmark: Examine what the city energy use is at the present time and determine how much of it is renewable. Attachment 1 shows the total 2009 energy consumption for all end uses. The analysis shows all energy uses including building electric and HVAC, street lights, well pumps, and all vehicle fuel use including off road vehicles. The analysis also shows what portion of the use is renewable at the present time. The renewable portion can vary. Kaukauna Utilities purchases 100% of the electrical energy they use in the general office and warehouse facilities as renewable from the power supplier, WPPI Energy. The City of Kaukauna purchases 75% of the electrical energy used at city hall as renewable energy from WPPI Energy.

The amount of hydro generation can vary year to year depending on weather conditions; but there is historical data that can provide a reasonable average. That average is 131,837,000 kWh (kilowatt-hours) per year.

The year 2009 was used as a benchmark because it was the first year of good and consistent data for all energy uses.

Establish goals: Based on where the city is at the present time, establish an achievable overall goal of the program. Since Kaukauna was at 17% renewable at the end of 2009, the committee decided to expand the goal from the prescribed 25% to 34% by the year 2025.

A benchmark template was created. It was decided that the goal should be monitored every 6 months. Attachment 2 is the first benchmark for the first six months of 2010. PLEASE NOTE the first benchmark contains the city and utility water use. A water use reduction goal of 5% by 2025 was established.

Manage growth: As the city grows, the demand for city services will also grow. This will mean a potential increase in energy use by both the city and the utility. This plan includes a commitment to manage energy use through conservation, such that there will be zero growth in energy consumption through the year 2025. For instance if the city grows by 2% per year, and the demand for city services increases energy demand by 2% per year, the city will commit the necessary resources to reduce energy consumption by that same 2% or, in essence, keep the energy use from growing. Although capital commitments will be needed to accomplish this portion of the goal, savings should recover those expenses in a reasonable amount of time.

Conservation:

The committee recommends that 50% of the money saved from conservation projects be reinvested into additional renewable purchases and/or additional renewable resources. For example, the pool VFD (Variable Frequency Drive) project saved approximately \$2,364 in 2010. One half of this savings should be reinvested with emphasis on new renewables installed within the city.

The goal of the conservation portion of this plan is to manage the growth of the city energy use. The energy use of 40,176 MBTU (Million British Thermal Units) in the baseline year of 2009 is to be the energy use in the goal year 2025.

At the beginning of each year potential projects should be investigated and worthwhile projects implemented.

Alternative financing options such as zero interest loans from WPPI Energy for electrical energy saving measures should be considered in evaluating projects.

Projects completed in 2010

- 1) City garage lighting
- 2) Air Conditioner replacement at 1,000 Islands Environmental Center
- 3) Kaukauna Utilities Warehouse lighting
- 4) Kaukauna Utilities Warehouse low-speed destratification fans
- 5) Kaukauna Utilities Gas Turbine lighting
- 6) Kaukauna Pool variable frequency drive
- 7) Utility hybrid line truck.

| Attachment 3 shows the impact of these projects.

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Recommended future projects:

- 1) Replacement of security lighting on utility buildings
- 2) Conversion of city owned decorative street lights to induction
- 3) Finish conversion of all traffic lights to LED
- 4) Conversion of utility owned decorative street lights to induction
- 5) Relighting at Kaukauna Public Library
- 6) Relighting at 1000 Islands Environmental Center
- 7) Relighting of Kaukauna Pool
- 8) Relighting of park pavilions and security lights in all city parks
- 9) Develop a program for the conversion of standard cobra-head street lights to induction. Establish a rate and conversion plan with all new street lighting to be induction
- 10) Energy management system for city hall
- 11) Replace electric rooftop heating system at Kaukauna Public Library with a gas unit
- 12) Replace water distribution pumps with VFDs
- 13) Convert line trucks to hybrid
- 14) All new vehicle purchases to include evaluation of energy efficiency

Attachment 4 shows the impact of these projects.

- 1) In order to keep equipment running at maximum efficiency, establish a regular maintenance schedule for all HVAC and pumping systems based on manufacturer's recommendations.
- 2) Establish general energy policies with regard to the use of vehicles and equipment such as an anti-idling policy and an efficient driver training program, etc. These policies should be part of the general operation of the departments and reviewed with new hires and the general employee population periodically.
- 3) Discuss the plan with surrounding governmental agencies and elicit their support.
- 4) Establish an "Energy Advocate" in the organization who will be involved in all energy use. The Energy Advocate could be a city or utility employee or the duties could be split between representatives from each. The duties of the Energy Advocate(s) will include the following:
 - a. Monitor city and utility energy and water use
 - b. Do the six month benchmark
 - c. Investigate new conservation and renewable technologies
 - d. Suggest additional strategies for achieving the goal
 - e. Research and seek out possible grants and incentives
 - f. Implement the education component of the plan
 - g. Disseminate information about City/KU 25 x 25 activities to the public
- 5) Investigate the energy component and do life cycle costing for all equipment purchases.
- 6) Investigate cost effectiveness of hybrid or alternate fuel vehicles when purchasing new vehicles.
- 7) Require LEED certification for any new LEED eligible construction projects.
- 8) Extend the concept to the whole community by issuing an "energy challenge" to the public. Ask the public to commit to general energy and water reductions and renewable energy commitments equal to that achieved by the city.

General Recommendations – Education:

- 1) Hold periodic meetings to discuss energy related matters with city and utility employees. Discuss the impact employees have on energy use. Behavior modification may be needed to achieve the goals. Employees should understand all the objectives of the program. Employee buy-in will be essential for the overall effort to be successful. These meetings should be done at least once per year or as necessary.
- 2) Community education through the city newsletter, city and utility websites, direct mailings, and other media sources.
- 3) Speak to community groups soliciting their support for the program.
- 4) Hold city-wide energy and renewable events during Public Power Week and Earth Week to promote and increase public awareness of conservation activities and renewable technologies.
- 5) Engage the schools in teaching conservation and work with them to develop an energy curriculum for the school and home environment.

Conservation alone will not allow us to achieve our goal. We must generate more energy from renewable resources. As shown on Attachment 1, the total baseline energy use for the city is 40,176 MBTU. The goal set by the committee is to have 34% of that energy use or 13,660 MBTU renewable by the year 2025. During the base year (2009) the amount of renewable energy used is 6,889 MBTU. An additional 6,771 MBTU must be achieved to meet the projected goal.

The existing hydro operation provides 18% of the electricity needs in the baseline year. The renewable contribution from the existing hydro is currently 2,518 MBTU. Unless the Badger project is constructed, it can be assumed the hydro component will remain constant. The hydro benefit is spread across all customers in the KU service territory. The hydro contribution to this program will then decrease as a percentage of the total. Based on projections from Kaukauna's power supplier WPPI Energy, an average growth rate of 1% annually can be anticipated over the next 15 years. The growth is projected to be greater in the near future and less as we go forward. The contribution from the existing hydro will be reduced to 14.7% or 2,056 MBTU by 2025. Therefore, an additional 462 MBTU will have to be achieved and added to the goal. The total goal then will be 7,233 MBTU. If the Badger hydro project is approved and moves forward, the hydro contribution in 2025 will then be 16.2% or 2,266 MBTU, reducing the goal to 7,023 MBTU.

By the year 2015 10% of the energy sold by electric utilities has to be from renewable sources. To calculate this contribution we would have to subtract the renewable purchases and the hydro contribution from the total. If we assume that the total electric energy use remains constant at 17,441 MBTU, the renewable purchase remains the same at 3,453 MBTU and the hydro contribution will be 2,056 as stated above, then 1,193 MBTU will be provided to the system from WPPI Energy. It is very likely that the contribution will be greater than the mandated 10% but cannot be predicted at this time. This analysis will assume the mandates will remain the same and the supply of renewable energy from WPPI Energy will remain at the 10% level. In 2009 WPPI Energy provided 918 MBTU of renewable energy through the grid which leaves 275 MBTU of additional renewable energy that will be received for this project. Subtracting this from the goal of 7,233 MBTU leaves 6,958 MBTU of additional renewable energy needed to meet the stated goal.

Attachment 5 shows the breakdown.

Recommended Renewable Projects:

- 1) Wind project at Kaukauna High School.
- 2) Solar tracker projects at Hydro Park (2) and Coffee Hill (5).
- 3) The committee supports the pending KU Badger Hydro Project. The proposed project retires the old and new Badger hydro power plants and constructs a new hydro facility increasing the output at the Badger location by 25%. This project will increase the hydro contribution to this program.
- 4) Have assessments done to help identify additional wind and solar sites in the city.
 - a) Commerce Crossing
 - b) New Prosperity Industrial Park retention pond
 - c) Kaukauna Dog Walking Park
- 5) Purchase additional renewable energy for the city and utility electric accounts. Currently about 19% of the electrical energy used by the city and utility is purchased through the WPPI Energy renewable program. Finance additional renewable purchases from conservation savings. The total savings from the 2010 conservation projects as shown on Attachment 3 is 4,192 therms of natural gas, 194,690 kWh of electricity and 621 gallons of diesel fuel. The total annual dollar savings is approximately \$25,911 based on today's costs. The savings are normally used to pay back the capital cost of the projects. This proposal suggests that half of these funds or \$12,955 be used to purchase additional renewable resources or additional renewable energy through the WPPI Energy program. Paybacks for projects will be extended, but if life cycle cost analysis is used, these projects will still have a positive economic impact. \$12,955 will buy an additional 1,295,500 kWh of energy or 4,421 MBTU. The total cost over the 15 years is \$194,325. Savings from future projects should be handled in the same manner.
- 6) Investigate the use of bio-diesel or B-20 for all diesel vehicle uses. In 2009 the city and utility used 8,005 MBTU of diesel fuel. The use of B-20 diesel could reduce that by 1,601 MBTU. It is suggested that a temporary tank be installed at the city garage and the B-20 fuel be tested in selected vehicles. The purpose of the test is to see what additional maintenance would be necessary and how performance would be affected. B-20 costs about 20¢ more per gallon than standard diesel but reduces hydrocarbon emissions by 19%.

- 7) Reduce idle time in police vehicles by use of battery technologies. Attached is a description of a technology that could be used. Monitor fuel use to

determine actual savings. There is one Kaukauna police vehicle that uses over 5,000 gallons per year and three other police vehicles that use an average of 2,700 gallons. Based on the manufacturer's data the battery technology can save 3.5 gallons per day per vehicle or in the average year, 924 gallons. In the Kaukauna scenario we could assume one vehicle would save the 924 gallons and the other three would save approximately half of that or 462 gallons each. The total savings for the four vehicles would be 2,310 gallons of unleaded fuel. At \$2.60 per gallon the savings would be \$6,006. The cost of the battery units is \$4,000 each or \$16,000 for four units. The payback is 2.66 years. The units have a life expectancy of 5 years.

- 8) Install an additional 100 kW of solar and wind energy in the city. With a load factor of 20%, 100 kW would produce 192,720 kWh or 657 MBTU. The cost of wind generation is approximately \$5,000 per kW. A financial commitment of \$500,000 would be necessary to meet the goal. Utility and Focus on Energy incentives could reduce this cost. Corporate sponsorship should be explored.
- 9) Purchase additional renewable energy from the WPPI Energy renewable program. 100% of the goal could be met by renewable purchases. In 2009 Kaukauna used 5,110,327 kWh of electrical energy. 1,011,733 kWh of this energy was renewable. To meet the stated goal of 6,958 MBTU it would be necessary to purchase 2,038,675 kWh of renewable electricity from WPPI Energy at a yearly cost of \$20,387 or \$305,805 over the life of the project.
- 10) At the present time, the committee does not recommend the use of E-85 over standard unleaded gas because of the poor performance of E-85 fuels. The committee does recommend the purchase of E-85 capable vehicles when applicable because as time progresses, the performance characteristics of E-85 should improve. If the state emission standards become more restrictive, the city would be in a position to meet the new restrictions.

Water Conservation:

Kaukauna Utilities provides water to the City of Kaukauna. Water tables in the area are decreasing. The use of this essential resource is an important part of our environmental concerns. The management of the water supply and conservation efforts will help us assure a good supply of water at reasonable costs for future generations in the same manner that managing energy use assures a continuing supply of energy at reasonable costs. The water use for the city and the utility for the base year 2009 was 15,329,512 gallons. The goal is to reduce water consumption by 5% by 2025 or 1,149,713 gallons.

Recommended Projects:

- 1) Convert all toilets in city and utility buildings to Water Sense high efficient 1.28 gallons per flush toilets.
- 2) Convert all faucets to Water Sense rated faucets.
- 3) Use Demand Initiated water softeners. Investigate waterless water softener technology when they become available in Wisconsin.
- 4) Investigate natural irrigation systems (use of river water instead of city water) when appropriate.
- 5) Investigate the possibility of doing annual hydrant flushing rather than semi-annual.
- 6) Investigate the frequency of vehicle washing and reduce when appropriate.
- 7) Use a mechanical system to cool power plants in the winter (Badger and City Plant).

Summary:

- 1) Kaukauna can achieve the stated goal of 34% or more with a concerted effort to manage energy consumption and reinvest a portion of the savings from conservation into renewable energy.
- 2) A key element for a successful plan is the monitoring of energy use on a continuing basis and reacting to changing energy patterns.
- 3) Much can be accomplished by working throughout the organization to engage employees in the process.
- 4) Create policies that make energy and water use an integral part of all equipment purchases and all building decisions.
- 5) Establish a position of "Energy Champion" to oversee energy and water use and be an advocate throughout the city for conservation and renewables.
- 6) Public buy-in will be needed because rate payer and tax dollars will be needed for the plan to be successful. Public education in the overall process will be needed.
- 7) As new technologies emerge, investigate these technologies and incorporate them if they apply. This plan could and should be revised as needed. Each year new conservation and renewable energy opportunities should be explored and implemented.
- 8) Challenge energy and water consumers in the city to individually participate in the effort. Ask city consumers to follow the lead of the city and subscribe to match the city's conservation and renewable goals.
- 9) Achieving the goal will reduce carbon emissions by over 3,500,000 lbs of CO₂ annually.

Attachment 7 shows emissions analysis

Dated this _____ day of _____, 20__

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