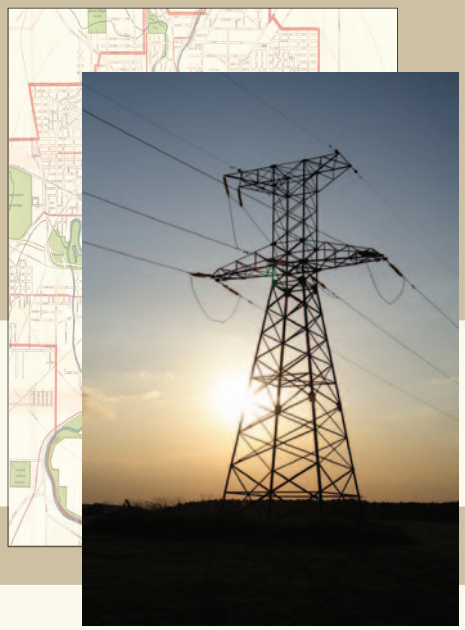
# RECONNECTING FORT WAYNE: Infrastructure

## Energy Efficiency



Prepared for
City of Fort Wayne, Indiana

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CNT

# The Potential for Energy Efficiency: Defining a Vision for Fort Wayne's Energy Future


## Acknowledgements

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## About the Center for Neighborhood Technology

The Center for Neighborhood Technology (CNT) was founded in 1978 to research, adapt and test new community revitalization strategies relevant to urban communities, especially strategies that harnessed the environmental and economic value of the more efficient use of naturalresources. Over the years, CNT has worked to disclose the hidden assets of the Chicagoland economy and urban areas more broadly; demonstrate the multi-bottom line benefits of more resource-efficient policies and practices; and show how the value of what we demonstrated could be captured to benefit communities and their residents inclusively. CNT's work, especially in the areas of energy, transportation, materials conservation and housing preservation, helped fuel a generation of community development institutions and learning, garnering us a reputation as an economic innovator and leader in the field of creative sustainable development.

CNT serves as the umbrella for a number of projects and affiliate organizations, all of which help the organization fulfill its mission: to promote the development of more livable and sustainable urban communities. CNT's transportation work is focused on using transportation assets to serve both the environmental and economic development goals of regions and communities. CNT works to boost demand for clean, efficient and affordable mass transit; increase the supply of traditional and non-traditional mass transit services; disclose the linkages between transportation costs and housing affordability; create model value-capture mechanisms that take advantage of the intersection of efficient transportation networks with community economic development programs; and promote policy initiatives that increase public participation in investment decisions and make more resources available for sustainable investments.

More information about CNT is available at www.cnt.org.

# The Need for Energy Efficiency

The cost of energy is one of the largest, fastest growing, and least predictable components of the operating costs of residential, commercial and industrial buildings. The price of natural gas has risen dramatically in the Midwest resulting in a $14 billion dollar increase in customer bills between 2000 and 2006.[1] Under I & M's proposed rate increase, electricity prices will increase in the near future by as much as 21% for residential customers in Fort Wayne.

However, there is also significant potential for savings. Implementing diverse energy efficiency programs could save Indiana families and businesses. $500 million in direct natural gas bill savings and $802 million in direct electricity savings over the next five years. This reduction in savings would result in a downward pressure on natural gas prices and consumers in Indiana could see an additional $565 million in savings by 2011. Energy efficiency is good for the local economy with the potential to create more than 30,000 new jobs and $750 million in net employee compensation in the Midwest over the next five years.[2]

Despite the burden this is creating, property owners in this region are not currently accessing available energy efficiency technology as a strategy for reducing costs because the process is difficult, confusing and time-consuming. In contrast, successful energy efficiency programs across the U.S. have shown that information, technical assistance and financial resources in a "one-stop shop" can and should be provided as part of an integrated and easily accessible service to building owners and managers. In doing so, meaningful impacts on reducing energy use and expenditures can be achieved.

# Energy Efficiency Program Development

In order to substantially improve the energy performance of buildings and reduce operating costs for residents and business owners in Fort Wayne, I&M and the City of Fort Wayne and other partners should promote state of the art energy efficiency programs.[3] The criteria for identifying the best energy efficiency programs to include are:

- **Direct Energy Savings:** Demonstrated ability of the program to deliver substantial kwh and kw savings from efficiency. Programs that have a large overall impact in number of households met and in cost-effectiveness.
- **Evaluation of Results:** Good verification and evaluation methodology to document savings impact and ability to maintain savings.
- **Qualitative Assessment:** Potential for high customer satisfaction, stakeholder support.
- **Transferability:** Well documented programs that can be replicated in other settings.

With these criteria in mind, the following recommendations are made with regard to the energy efficiency programs that AEP has outlined in their rate case:

1. As defined in the rate case, the programs proposed are at a very small scale. Year one energy efficiency programs would deliver kwh savings equivalent to 0.03% of load, year two grows to 0.08% of load. In contrast year one of ComEd's Illinois programs have the goal of 0.2% of load. Both of the AEP and ComEd in Illinois programs are new programs which will be rolling out in 2008, but AEPs is much more modest. Larger more developed programs in California have goals up to 2% of the overall load.
   ***Recommendation:*** AEP's energy reduction goal should be increased from 0.03% to a level of at least 10 times greater to at least 0.2 % of load.

2. The proposed AEP program will target 1,000 household which is less than 0.002% of the households in their service territory. Efficiency Vermont, a well developed energy efficiency program, serves 10% of Vermont households annually.
   ***Recommendation:*** AEP's program should increase the number of targeted households to atleast 5,000 households.

3. AEP is not proposing a very comprehensive "whole house" approach. Specifically, their proposal does not include appliance trade-in programs. They should design programs that can partner with existing initiatives provided through the local weatherization and natural gas utility programs.
   ***Recommendation:*** The programs should be designed from the customer's point of view to deliver easily accessible, excellent service.

4. Evaluation programs should be 3-5% of overall program expenditures to assure that performance is verified and that evaluation results can be used in on-going program design.
   ***Recommendation:*** The evaluation component of programs should be conducted by a third party evaluator and at least 3% of all energy efficiency program costs should be dedicated to evaluation.

## Program Components

The table on the following page contains the components of a comprehensive energy efficiency portfolio that will target commercial, industrial and residential customers and achieve both electricity and natural gas savings. The matrix is designed in a spreadsheet format to be scaleable.

Table 1. Energy Programs Summary Matrix of Costs & Savings

| Sector | Program | Description | Target Audience | # of Customers | Energy Savings | Units | Avg Customer Savings | Cost | Description of Costs | Cost/Energy Unit | Units | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Commercial & Industrial | Commercial Lighting | Upstream program offered via contractors, subsidies for lighting installations | Small & Large Commercial & Industrial Customers | 100 | 3500000 | kwhr | 35000 | $ 400,000 | Funds used to pay for incremental costs of high efficiency lighting technologies. | $ 0.11 | $/kwhr | |
| Commercial & Industrial | Commercial Lighting | One Stop Shop providing full services from project inception to completion, technical & financial assistance | Small Business and Non-Profit Customers | 100 | 5100000 | kwhr | 51000 | $ 2,085,994 | Funds used to provide free technical assistance, & grants and loans for lighting equipment | $ 0.41 | $/kwhr | |
| Commercial & Industrial | Motor & HVAC | Upstream program to provide rebates to distributors who sell high efficiency equipment | Commercial, Industrial and Agricultural Customers | 100 | 2500000 | kwhr | 25000 | $ 398,864 | Funds are used as rebates to pay for incremental costs of high efficiency equipment | $ 0.16 | $/kwhr | |
| Commercial & Industrial | New Construction | Technical assistance to identify energy measures, commissioning services, and funding for energy measures | new commercial buildings that are going beyond code to LEED and Energy Star | 100 | 10650000 | kwhr | 106500 | $ 7,094,664 | Funds used for technical assistance, grants to fund ECMs and recomissioning | $ 0.67 | $/kwhr | |
| Commercial & Industrial | Retrofit Programs for Existing Buildings | Technical assistance to identify ECMs and Process Improvements, and funding for energy measures and performance monitoring | All C& I Customers | 100 | 37270000 | kwhr | 372700 | $ 3,545,195 | Funds used to pay for TA and rebates of $200/kW and $40/therm saved | $ 0.10 | $/kwhr | |
| | | | | 100 | 2800000 | therms | 28000 | $ 2,014,751 | | $ 0.72 | $/therm | |
| Residential | Lighting Programs | Upstream manufacturer buy-down program | All Residential | 1000 | 280000 | kwhr | 280 | $ 22,088 | | $ 0.08 | $/kwhr | |
| Residential | Appliance Recycling Programs | Upstream program to encourage people to recycle old, inefficient equipment | All Residential & Small Business/Non-profit | 1000 | 720000 | kwhr | 720 | $ 158,559 | Rebates for old refrigerators, freezers and Acs ($35-$50 each) | $ 0.22 | $/kwhr | |
| Residential | Mechanical Systems | Upstream program to encourage installation of high efficiency central air and heat pumps | All Residential & Small Business/Non-profit | 1000 | 870000 | kwhr | 870 | $ 1,059,130 | Rebates for old refrigerators, freezers and Acs ($35-$50 each) | $ 1.22 | $/kwhr | |
| Residential | Retrofit Programs for Existing Single Family Housing | Technical assistance, appliance trade ins, ECM installations, concentration on electric ECMs, can build off of Weatherization program to provide more service and expanded eligibility | Low Income Residential Customers & Seniors showing financial hardship | 1000 | 1680000 | kwhr | 1680 | $ 536,655 | Funds used to pay for technical assistance, all ECMs, new boilers, performance monitoring | $ 0.32 | $/kwhr | This program can be implemented with Weatherization Funds, dramatically reducing costs |
| | | | | | 500000 | therms | 500 | $ 3,444,375 | | $ 6.89 | $/therm | |
| Residential | Retrofit Programs for Existing Multi-family Housing' | Technical Assistance, loans for ECMs, performance monitoring, One-Stop Shop | Low-Income Multi-family residential customers | 1000 | 1500000 | kwhr | 1500 | $ 461,766 | Funds used to pay for technical assistance, low-interest loans for all ECMs, new boilers, performance monitoring | $ 0.31 | $/kwhr | This program can be implemented with Weatherization Funds, dramatically reducing costs |
| | | | | | 420000 | therms | 420 | $ 1,980,198 | | $ 4.71 | $/therm | |
| Residential | New Construction, Single Family | Upstream program through builders to encourage installation of Energy Star products and Energy Star Homes | Moderate to Upper Income Residential Customers | 1000 | 2800000 | kwhr | 2800 | $ 1,871,323 | $1500 rebate on HVAC, $1350 on geothermal, other rebates on appliances | $ 0.67 | $/kwhr | |
| | | | | | 150000 | therms | 150 | $ 1,835,286 | | $ 12.24 | $/therm | |
| Schools | Retrofit | Energy Smart School Programs implemented by School Disctrict | Schools | 100 | 9500000 | kwhr | 95000 | $ 1,245,902 | Comprehensive program, funds used for TA, recommissioning, training of engineers, performance monitoring | $ 0.13 | $/kwhr | |
| | | | | 100 | 11000000 | therms | 110000 | $ 13,538,462 | | $ 1.23 | $/therm | |
| | | | | | | | | | | | | |
| TOTAL SAVINGS | ELECTRIC | | | | 76370000 | kwhr | | $ 18,880,139 | | $ 0.25 | $/kwhr | |
| | NATURAL GAS | | | | 15995000 | therms | | $ 23,904,319 | | $ 1.49 | $/therm | |

# Program Elements & Feasibility

Residential energy retrofit programs are most effective when they combine technical assistance, financial assistance and ongoing monitoring and maintenance. Programs designed to address all building systems (envelope, heating/cooling, and lighting) most effectively reduce overall consumption. An energy performance standard measured in energy consumption per square foot per year can be established for each residential building type and serve as a target for building performance. For example an achievable space heating performance standard for multi-family buildings is one therm/sqft/year. Most buildings currently exceed that standard.[4]

## Energy Retrofit Elements

Typical energy retrofit program elements include:

- roof insulation;
- energy efficient windows;
- sealing air leaks;
- programmable thermostats;
- energy management systems;
- high efficiency boilers;
- flue dampers;
- tankless or solar hot water heaters;
- compact fluorescent light bulbs (CFLs); and
- lighting controls.

## Financing

In order to effectively reach property owners, technical recommendations should be partnered with financing assistance. Energy efficiency financing programs include matching grant programs and low interest financing. Alternative financing strategies include programs that use energy savings to payback the initial capital expenditures through utility bill financing, “pay as you save” programs or through energy service companies. A typical package of energy efficiency improvements for a multifamily building is shown below. The savings shown below result from the complete package of energy conservation improvements listed.

**Table 2. Sample Energy Efficiency Recommendations - Costs and Benefits**

| | Cost | Annual Savings | Simple Payback (years) |
|---|---|---|---|
| **Building Envelope** | | | |
| Ceiling Cavity Insulation | $7,049 | $1,531 | 4.6 |
| Seal Air Leaks | $400 | $70 | 5.7 |
| **Mechanical Systems** | | | |
| Replacement Hi-Efficiency Boiler | $24,000 | $4,542 | 5.3 |
| Boiler Controls | $4,500 | $901 | 5.0 |
| Outdoor Reset Control | $2,000 | $1,770 | 1.1 |
| Repipe Leaking Condensate Return Lines | $2,000 | $460 | 4.3 |
| Replace Radiator & Line Vents | $1,270 | $755 | 1.7 |
| **Electrical/Lighting** | | | |
| Compact Fluorescent Lamps in Common Areas | $152 | $55 | 2.8 |
| **Total for All Measures** | **$41,371** | **$10,084** | **4.1** |

** Based on a typical three-story, 24-unit masonry structure with 24,000 square feet of heated space.*

Residential energy efficiency programs are cost-effective, providing an excellent return on investment, and can provide benefits for households and the economy. Fort Wayne could implement innovative and broad strategies to make its housing stock more efficient and, thereby, make the city a more affordable place to

live and work.

## Low-Income Households

Energy efficiency programs are especially valuable for low-income households; yet they often do not reach the families that need them most—largely due to program design.[5] Low-income families are spending up to 25% of their incomes on energy costs.[6] According to advocates for these types of families, implementing energy efficiency programs in low income communities typically saves seven dollars for every one dollar invested over the life time of the energy efficiency measures.[7] These programs also benefit utilities by lowering bad debt. Unfortunately, low-income families have lower participation rates in energy efficiency programs.[8]

## Other Benefits

As discussed earlier, energy efficiency programs have a net positive impact on the economy. It is estimated that, if the Midwest region achieves a 1% per year reduction in natural gas consumption for five years, wholesale natural gas prices could decrease by as much as 13%.[9] Energy efficiency also results in the creation of local jobs. Additional environmental benefits include reduced emissions of the criteria pollutants associated with the reductions in electricity consumption and natural gas production. Utilities sometimes view energy efficiency programs as burdensome and as having a negative impact on revenue. This barrier can be minimized or removed by structuring programs to be revenue neutral from the standpoint of the utility. These “de-coupling” strategies are currently being implemented in several states.

# Next Steps

The following next steps should be conducted in order to establish large scale energy efficiency programs in Fort Wayne. Each step is define in greater detail in the sections that follow.

1. Inventory existing program delivery capacity for energy efficiency.
2. Conduct benchmarking & data analysis.
3. Convene stakeholders and determine target energy efficiency goals.
4. Establish a coordinating body for on-going program development and oversight.
5. Establish a one-stop communication shop.

## Step 1: Inventory Existing Program Delivery Capacity

A first step towards developing a large scale energy efficiency program as a pilot for Indiana is to inventory the existing capacity for program delivery in Fort Wayne and Allen County. This inventory would be organized by type of program and target audience (residential, commercial and industrial). For example, the inventory of residential programs would include existing energy efficiency programs like the Weatherization Program as well as community development corporations and others that provide residential renovation services. The inventory should include information on existing level of service delivery, funding, and barriers to expansion. The inventory will be used to identify programs that can be built off of as well as to identify markets that are currently not being served adequately.

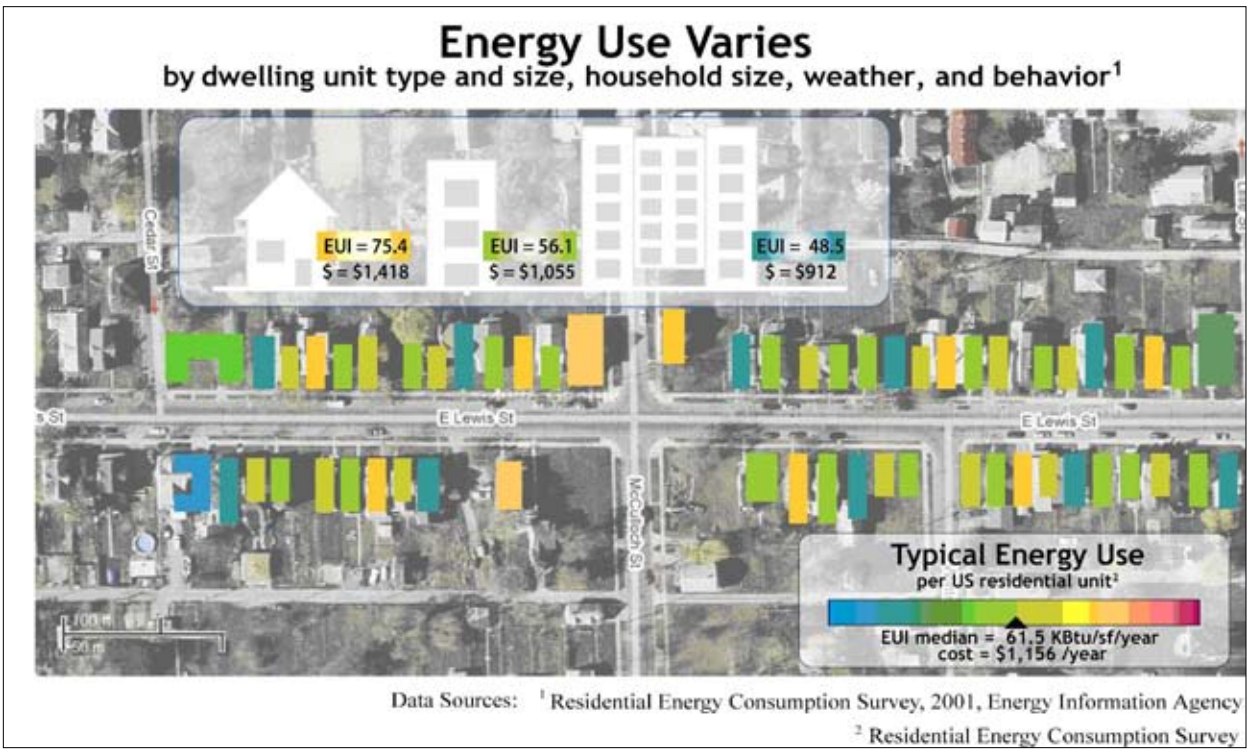
## Step 2: Benchmarking & Data Analysis

Fort Wayne's building stock is diverse in construction and use. In order to design programs that effectively target the many sectors that comprise Fort Wayne's building stock, it is necessary to conduct an in-depth analysis of energy consumption by type of structure, occupancy and use. Accessing the natural gas and electricity consumption would allow for an analysis of energy consumption in existing buildings, serving as a state-wide model. The analysis will combine electricity and natural gas data to calculate an energy intensity index (energy use per square foot) for each building type. This would allow planners to understand energy consumption in bungalows as compared to two flats as compared to multi-family buildings. This information would allow for a better understanding of the average retrofit costs for each building type and potential savings. The analysis is even more important for commercial and industrial buildings, because it would allow decision-makers to understand energy consumption in the many different building and establishment types. For example, the analysis would allow for the comparison between hotels, schools, museums and manufacturing facilities. The data would be used to provide more realistic estimates of costs and savings and allow for trade-specific program development. The analysis could be used to identify the multiple building types to be targeted and inform specific program design for each building type and use. This baseline will also be used to measure progress towards the annual program goals moving forward. The data would serve as a baseline and to compare against future consumption data allowing for the actual measurement of reductions in energy consumption and greenhouse gas emissions.

The specific tasks to be undertaken include:

- Obtain energy data from the natural gas and electricity utilities.
- Create database for energy consumption data. Datasets would be merged with tax assessor's database to get square footage, type of establishment and ownership information by building.
- Categorize data by class and building size, commercial use, square footage, and industrial sectors.
- Produce report on energy consumption baseline and high energy consumers for targeted outreach.
- Develop a plan for making this data visible to the Fort Wayne community, raising awareness about energy consumption.

The graphic on the following page display of how this information could be visualized.




## Step 3: Convene Stakeholders

Once the preliminary data on existing capacity and benchmarking has been made available, a group of key stakeholders should be convened to discuss establishing a joint goal for energy efficiency, program design, coordination of existing program activities and the opportunities for leveraging of joint resources. This meeting would include representatives of the service delivery organizations, property owner associations, trade organizations, municipal and county government and the utilities.

## Step 4: An Energy Efficiency Coordinating Body

An energy efficiency coordinating body could be established to serve the following functions:

- Assess the need for work force training and develop partnerships for training programs.
- Identify training needs for contractors on building and energy codes and standards for vendors. Coordinate efforts to deliver training to contractors and vendors..
- Identify and promote additional incentives through codes and standards to increase adoption of energy efficiency measures.
- Coordinate implementation efforts across multiple programs to assure that a “whole building” approach is implemented addressing electricity, natural gas, and water savings.
- Develop and implement evaluation mechanisms to identify and support the most promising outreach, technical assistance, and funding mechanisms for achieving program goals.
- Develop a funding plan for large scale program implementation that leverages utility programs, state and federal grant programs, and private sector financing.
- Identify opportunities for expanding capacity of existing programs by facilitating access to more flexible funding streams. Evaluate each of the proposed implementation models to determine which will be most effective for the identified underserved markets.

## Step 5: One Stop Communication Shop

With different programs available to serve a range of markets, it is important to provide the public with a

one-stop-shop – a place to go to understand what program would best suit the need of the building owner and to provide marketing support to all programs. The one-stop communication shop, including a web-site and call center, would be established by the energy efficiency coordinating body to provide the following services:

- Be a central source for energy efficiency program information.
- Serve as an ombudsman to connect residential, commercial, and industrial building owners with technical assistance and implementation financing programs.
- Maintain lists of experienced and certified contractors, energy auditors, and vendors.
- Help with choosing contractors and evaluating bids.
- Provide information on tax benefits and rebate programs.
- Provide information on expected return on investment for standard retrofit measures, providing a menu of choices and their relative costs and benefits.
- Record and address complaints.

# Endnotes


1 Kuschler et al. “Examining the Potential for Energy Efficiency To Help Address the Natural Gas Crisis in the Midwest”, American Council for an Energy Efficient Economy (ACEEE), January 2005.

2 Kuschler et al. 2005.

3 “ACEEE’s State Energy Efficiency Scorecard for 2006,” Eldrige et al., ACEEE, June 2007.

4 CNT Analysis of Utility Bill Data, June 28, 2007.

5 “Restructuring Today”, February 21, 2007.

6 “Restructuring Today”, February 21, 2007.

7 “Restructuring Today”, February 21, 2007.

8 Wirtshafter Associates, Inc. “Statewide Hard to Reach Market Update Study”, 2005.

9 Marty Kushler et al., “Examining the Potential for Energy Efficiency to Help Address the Natural Gas Crisis in the Midwest” ACEEE document U051, January 2005.