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# Energy Efficiency and Economic Opportunity in Grand Traverse County

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JUNE 2012



## *A Special Report to the Community*

Creating Jobs  
Increasing Local Investment  
Saving Energy & Money  
Boosting Profits



*This report is a project of the Michigan Land Use Institute,  
with technical assistance by SEEDS.*

MLUI works with citizens, officials, and organizations to protect the environment while building walkable communities, a locally based food system, and a clean-energy future.

*This report was written by*

**Jim Dulzo,**

*MLUI's senior editor,  
who reports on clean energy issues  
for the organization.  
Reach him at [jimdulzo@mlui.org](mailto:jimdulzo@mlui.org).*

**Barton Kirk,**

*SEEDS' energy and environmental analyst,  
operated the LEEP-C system and provided all  
data and projections for this report.  
Reach him at [barton@ecoseeds.org](mailto:barton@ecoseeds.org).*



**Bold Solutions for Michigan's  
People and Places**

148 E. Front Street, Suite 301  
Traverse City, Michigan  
**[mlui.org](http://mlui.org)**  
231-941-6584



**seeds**

Energy & Environmental Analysis

P.O. Box 2454  
Traverse City, Michigan  
**[ecoseeds.org](http://ecoseeds.org)**  
231-947-0312

For a brilliant, in-depth discussion of the economic potential of applying aggressive energy efficiency measures to our nation's buildings, we invite you to read the relevant sections of *Reinventing Fire: Bold Business Solutions for the New Energy Era*, written by Amory Lovins and published by the Rocky Mountain Institute. There is more information at <http://www.rmi.org/Buildings>.

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## INTRODUCTION

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# Energy Efficiency and Economic Opportunity in Grand Traverse County

Investments in home, business, and public-building energy efficiency can pay excellent short- and long-term financial dividends. Each dollar properly spent on improving a building's efficiency saves multiple dollars in energy costs over the lifetime of the investment; provides a strong hedge against the increasingly volatile price of fossil fuels; and helps meet increased demand far more cheaply than investments in new generating capacity.<sup>(1)</sup>

*This report investigates another crucial but often-overlooked aspect of energy efficiency: its power to stimulate local economic development. A properly designed, communitywide energy efficiency program can increase local employment, produce new business activity, exert downward pressure on local energy prices, capture and keep “energy dollars” in the local economy, make the wider community more attractive to families and businesses, and reduce climate-changing greenhouse gases.*

This study of the economic effects of energy efficiency in the Traverse City area uses local, real-world Grand Traverse County statistics instead of “national” or even “state” averages to calculate the economic effects of a program that increases the efficiency of all residential buildings and fifty percent of public and commercial buildings by 25 percent in 15 years. Those local statistics include an inventory of residential, commercial, and public buildings; climatic conditions; and electricity and fossil fuel prices.

We project the proposed program's administrative, capital, and financing costs; the number of energy dollars saved by individual families; and aggregated community savings. The report includes a survey of possible community-based financing arrangements that could drive a Grand Traverse efficiency program, with or without taxpayer dollars, local utility or municipal participation, or new state or federal policy developments. We do not necessarily endorse these, but offer them to start a communitywide conversation.

Given the significant local employment that a 15-year, 25-percent increase in building energy efficiency would produce; the effect that such job growth and saved, re-circulated energy dollars would have on the economy; and how attractive the results of such a program would be to people and businesses considering relocation in our community; we believe it behooves local civic, business, non-profit, and government leaders to forge an innovative, countywide alliance that designs, popularizes, and executes such a program in a timely, even urgent manner.

This will increase the prosperity and the sustainability of Grand Traverse County, provide a model for other counties and state lawmakers to emulate, and reaffirm the region's reputation for innovation and leadership in sustainable development.

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PART I

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## Six Real-World Examples of Efficiency's Powerful Economics

Energy efficiency's greatest advantages are its low cost and high return on investment. Examples abound, and we offer three from small businesses that invested in their own energy efficiency measures, and three from utility-driven efficiency programs across the nation.

### Small Businesses

*Small businesses in the United States are discovering that spending some of their hard-earned capital on energy efficiency measures pays big dividends. These real-world examples are from the Energy Star pages of U.S. EPA's Web site.*

**LIGHT INDUSTRY:** A.O.K. Body Shop, in Philadelphia, invested \$7,832 in efficiency upgrades: improved modern lighting and fixtures, more judicious use of lighting, motion detectors, timers, programmable thermostats, new refrigerator, new space heaters, and staff education. *The business now saves \$5,577 in energy costs annually, for a payback period of 1.4 years.*

**HOME BUSINESSES:** The owners of Thomas Mott Homestead Bed & Breakfast, in Albert, Vermont—a 4,200-sq.-ft., five-bedroom, pre-Civil War house—went all-out. They spent \$60,000 to fill all walls with insulation, rewire its electrical system, replace 39 windows, swap out baseboard electric heating with a hot-water heating system and boiler, replace all conventional lights with compact fluorescents, and plant trees to shade the building. *The building is now very comfortable, and saves about \$10,000 in energy costs annually, for a payback period of six years.*

**RETAIL:** Working with rebates from the progressive, efficiency-oriented Sacramento Municipal Utility District, Vic's Market invested \$144,000 in efficiency measures; new lights, lighting fixtures, enclosed freezers, compressors to cool them, and deli equipment. *The store now saves \$48,000 in energy costs annually, for a payback period of three years. Better yet, the now-more-attractive store's business increased by 15 percent.*

### Utilities

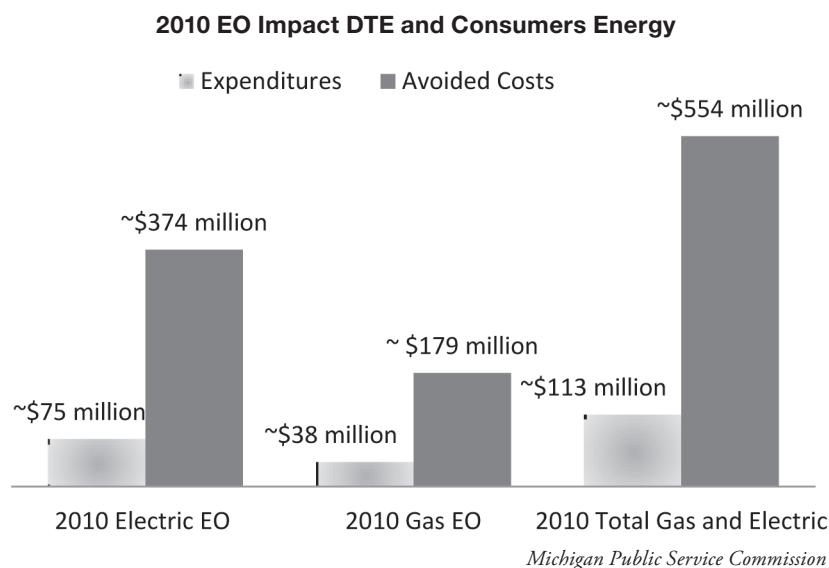
*Utilities can be a powerful, driving force for expediting energy efficiency measures. Here are three examples, starting close to home with what Michigan utility companies are accomplishing.*

**STATE OF MICHIGAN:** According to the Michigan Public Service Commission's report on initial returns from investments by Michigan's utilities in state-mandated "energy optimization" efforts, most of Michigan's utilities are seeing impressive results.<sup>(2)</sup>

Public Act 295, passed in 2008, requires Michigan utilities to help their customers use less electricity and natural gas—ramping up over seven years from a 0.3 percent cut for electricity and a 0.1 percent cut for gas in 2009, to, respectively, 1 percent and .75, annually, between 2012 and 2015.

The results for 2010, the program's first full year, released last December, are encouraging: Collectively Michigan's utilities accomplished 148 percent of their goal for electricity and 142 percent for natural gas.

According to MPSC, in a summary of the EO performance of the state's two largest utilities, DTE Energy and Consumers Energy together spent \$113 million on customer incentives encouraging lower electricity and natural gas consumption, and those investments, over the next nine years, will save the companies and their ratepayers \$554 million in "avoided costs"—costs the companies and their customers would have incurred without installing efficiency measures.



Stated differently, each \$1.00 invested in efficiency measures by the utilities will save the company—and its ratepayers—\$4.88 over the next nine years, the minimum life expectancy of the incentivized measures' effects. That equates to an annual return on investment of 22 percent.

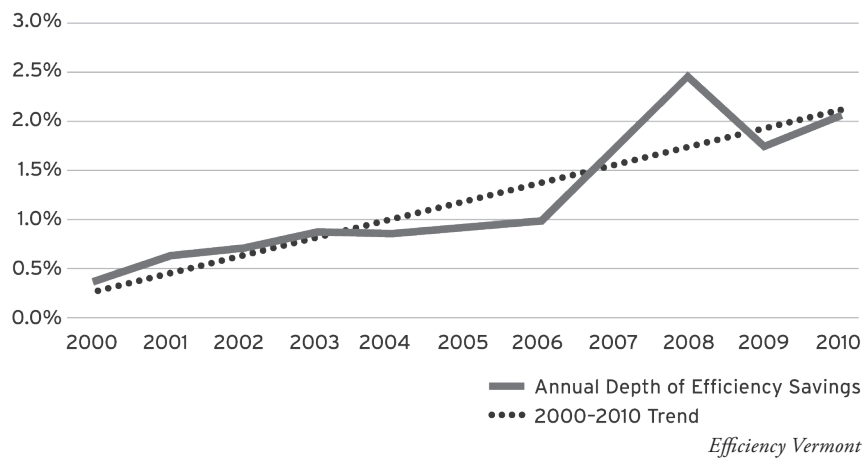
The two utilities' incentives for residential customers promoted appliance recycling, Energy Star lighting and appliances, home energy analyses, weatherization, HVAC and water heater upgrades, education, specially designed programs for low-income customers, and more. For commercial and industrial customers, efforts included customized solution programs, incentives for new construction, pilot and educational programs, and more. Based on these initial results, MPSC estimates that, over the full life of the optimization program, DTE, Consumers, and their customers will save \$2.5 billion. The combined statistics for all of the states' utilities are similar; a total of \$133 million invested, and a return of slightly more than four-to-one.

By at least one account, and by a different measure from the state's largest utility, the good news continued into 2011: DTE claimed in February 2012 that its customers used the utility's EO-driven incentives and rebate programs to reduce their energy bills by about \$50 million. In that year, a company press release says, approximately 156,000 residential and commercial customers worked with the company on saving energy and money.

**STATE OF VERMONT:** Another example, further from home but in a state with a somewhat similar climate, is Vermont. This national leader in energy efficiency programs regularly produces impressive efficiency gains. That's thanks to Efficiency Vermont, which describes itself as the nation's first-ever "energy efficiency utility." The non-profit, launched in 2000, works with all utilities and utility customers in Vermont, employs a wide range of incentives, rebates, and educational programs for residential and commercial customers, and funds them via a modest, utility-bill efficiency charge.

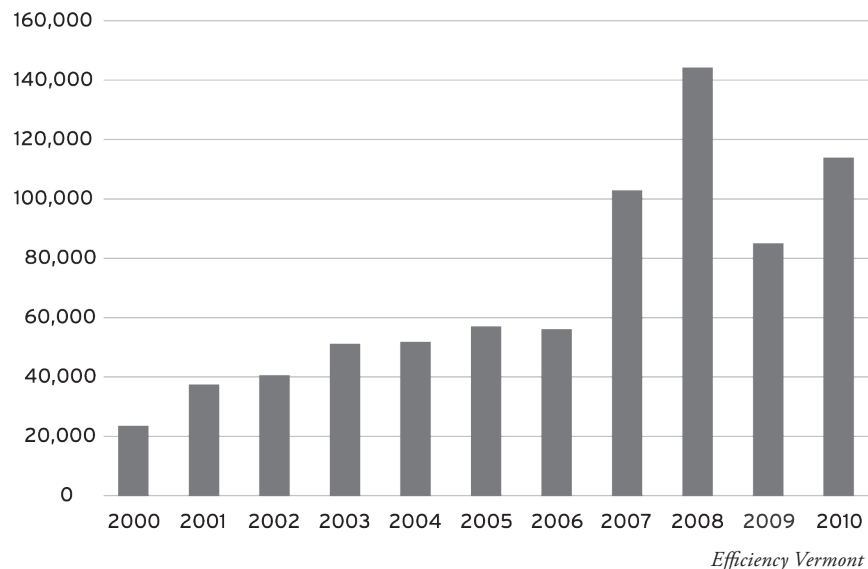
In 2010, Vermonters reduced their energy demand by a very strong 2 percent, saving \$112 million on their utility bills—an excellent payback on an investment of \$38 million in residential and commercial incentives, rebates, and other programs. So far, the cumulative reduction in overall energy demand means that *Vermont now meets 14 percent of its energy demand with efficiency measures, rather than new generation.*

**Energy Efficiency Savings as a Percentage of Vermont's Electricity Needs**



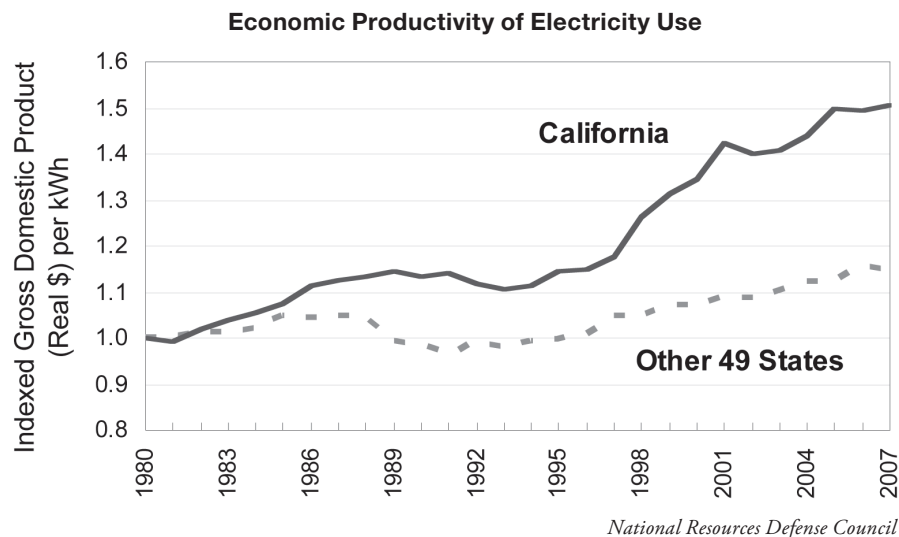
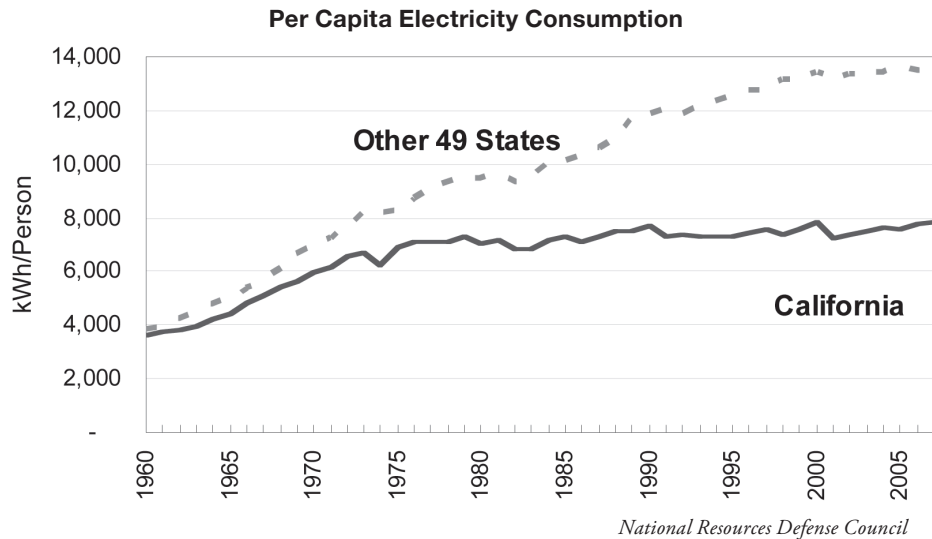
The cost comparisons are equally persuasive: Efficiency Vermont says that each kilowatt-hour of efficiency-spawned electricity cost 4.1 cents, while the state's conventionally generated electricity costs, on average, 14.4 cents.<sup>(3)(4)</sup>

**Efficiency Vermont's Annual MWh Savings**





**STATE OF CALIFORNIA:** If Vermont is an efficiency leader, California is the nation's efficiency godfather.<sup>(5)</sup> The state first required its utilities to become more efficient in the early 1970s. Today, on a per capita basis, Californians use only slightly more energy than they did 40 years ago, while nationally, per capita energy use has almost doubled: Annually, Californians used 7,500 kWhs a year in 1975, while the rest of Americans used 8,000 kWhs; in 2007, Californians used 8,000 kWhs, while the rest of us used almost 14,000.



Projecting those significant savings across the state's very large population yields enormous numbers: Utilities' investments of about \$4.9 billion in electricity and natural gas efficiency not only paid back that sum, but also generated additional savings (or avoided costs) of \$4.9 billion—essentially doubling the companies' initial investments—between 1999 and 2009.

A UC Berkley study of the entire state's efficiency gains between 1972 and 2006<sup>(6)</sup> found that total, cumulative, statewide savings (excluding program costs) were \$56 billion and produced 1.5 million jobs, with a total payroll of \$45 billion. And the cost for the electrical efficiency gains from 2005 to 2008 was even lower than Vermont's: slightly under 3 cents per saved kWh—indicating that even after 40 years of aggressive utility efficiency efforts across California, a great deal of "low hanging efficiency fruit" remains.

The outcomes measured in these snapshots of three states' utility-based energy efficiency (or optimization) programs closely match other, national studies of energy efficiency. According to the American Council for an Energy Efficient Economy, a survey of a number of real-world efforts indicates the cost of saving a kWh of electricity ranges between 1.2 and 5.1 cents per kWh.

The same study found that, as of 2006, annual state- and utility-led investments in efficiency of about \$2 billion have so far saved about 63 billion kWhs of electricity and 135 million therms, and that the electrical savings eliminated the need for 16 gigawatts (a gigawatt is 1,000 MW) of new generating capacity—roughly the equivalent of 16 very large coal plants which, today, likely would cost more than \$32 billion to build.

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## PART II

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### The Energy Efficiency Value Chain

Large or small, energy efficiency projects produce a significant value chain. That chain includes capital formation and/or financing, labor and materials, lowered utility bills, captured and re-circulated energy dollars, avoided utility costs, and downward pressure on utility rates. Collectively, their effect on a local economy compares favorably with many other economic activities, particularly using new power plants to meet new energy demand.

#### **Capital Formation and Financing**

Because investments in EE projects are typically in the thousands or hundreds of thousands of dollars, not the hundreds of millions or billions of dollars required for building power plants, projects can more easily draw on local capital sources instead of major, out-of-state investment firms.

Smaller capital requirements help to keep interest costs low; even better, those interest payments can stay within the community, rather than flowing to outstate financial institutions. Depending on capital sources and interest rates, local banks and credit unions can participate in communitywide EE projects either individually or in pools, lending either their own funds or administering bonds or other publicly assembled funds. Either approach provides good business opportunities to local financial institutions, provides local financial-sector employment, and builds local wealth.

#### **Labor and Materials**

Building new power plants to meet new energy demand involves huge amounts of labor and materials. Such projects employ a broad range of trades—from excavators and crane operators to concrete and steel haulers and workers; to industrial electricians, plumbers, and HVAC installers; and on through highly specialized electronics and IT technicians and more. But because a great deal of the work is so particular to power plants, many of the most skilled, highest-paid workers usually come from other places.

During such projects, which can last three to five years, the host community sees a massive influx of new workers, who stimulate if not overwhelm the local residential rental market, and boost the local service



and retail economy as they temporarily settle in or commute to the region. But that stimulus fades quickly as construction winds down and many workers leave, taking their rent checks, spending on food and services, and much of their saved earnings with them.

Like many of the workers, much of the materials used to construct new power plants is also imported: Steel, pipes, fittings, wiring, industrial HVAC and lighting equipment, digital controls, and the maze of boilers, tanks, pumps, coolers, and turbines typical of coal- or gas-fired power plants.

In contrast, energy efficiency projects use labor skills readily available in Grand Traverse County: building efficiency analysts, carpenters, plumbers, HVAC installers, insulation specialists, roofers, window installers, siding installers, even landscapers. While a well designed, communitywide energy efficiency project certainly employs far fewer workers than a large, industrial project, those workers live in the area and their employment in communitywide efficiency projects lasts for many years. So the economic impact of communitywide efficiency projects shows up in steady, ongoing, long-term increments, rather than in sharp peaks and valleys. Additionally, a much larger portion of wages paid for the project—and the wealth those wages create—stay in the community.

EE projects also avoid the sudden, costly strains on residential and tourism-related housing stock, as well as the booms and busts in earnings and spending that major plant construction can cause. EE projects also directly stimulate some parts of the local retail economy—construction and home improvement material suppliers. While some of those materials are imported from outstate manufacturers, many are also made in Michigan. One study finds that strong energy efficiency efforts nationally would produce more than \$2 billion in manufacturing-related economic activity in Michigan.

Whether or not these efficiency products are Michigan-made, their distribution and sale can be locally based, bringing wholesale and retail sales opportunities to area hardware, lumber, home improvement, lighting, appliance, and heating and cooling businesses.

### **Lowered Utility Bills Mean Locally Re-circulated Energy Dollars**

Among the most visible results of successful EE projects are lower utility bills, and those lower bills can help boost the local economy. Initially, a majority of the EE savings flows to the local lenders, a positive economic activity for those institutions. Then, after the EE project loan is retired, the home or business owner retains all of the saved energy dollars and enjoys a steady, long-term return on investment. This virtual boost in household or business income facilitates more local spending of dollars that would mostly leave town to pay for the fossil fuels used to provide energy. In terms of business, it can lead directly to increased investment, more sales success, and more hiring.

If the money is deposited and saved locally, it strengthens local financial institutions. If it is spent locally, it boosts the community's retail and service businesses—yet another dependable boost to local employment and profit margins, two building blocks of a prosperous local economy.

Part IV of this report estimates the amount of money, on a year-by-year basis, that communitywide efficiency projects would free up for either saving or spending by local homeowners, businesspeople, and government units.

## **Avoided Costs Help Dampen Energy Rate Increases**

EE projects also help ratepayers who are not directly participating in that activity themselves. That is because, as utility customers become more efficient, requiring less energy, several things happen within the utility that can save all customers money.

- 1) EE projects free up generating capacity that can be sold to other, new customers, or to other utilities, without adding new capital expenses to the utility's ledger.
- 2) If there is no market expansion, the utility has more ability to draw proportionally more energy from its least expensive sources, rather than from all of them, be they expensive or inexpensive, to meet demand.
- 3) Because EE projects may also reduce a utility's overall "peak" demand, the utility can purchase far less "peak" energy on the hottest days—by far the most expensive kind.
- 4) Less energy demand puts downward pressure on overall fuel prices, lessens maintenance costs, and postpones the need for new investments in generating and transmission equipment. Over time, these avoided costs put downward pressure on the utility's regulated rates.

For emphasis, it should be noted again that building new power plants to meet capacity has exactly the opposite effect—pushing up generating costs because new plant construction is expensive, incurring heavy long-term debt and maintaining or increasing upward pressure on the price of the fuel that runs the plant.

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## PART III

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## **Financing: Efficiency's Final Frontier**

It is easy to find homeowners, businesspeople, or governments that want to save money by saving energy. But it can be difficult to find homeowners, businesses, or governments that actually make the investments necessary to produce significant results. That is true even though efficiency investments are less risky than many other investments and their rates of return are often significantly higher than many other traditional financial investment instruments. Although a lack of knowledge about how to make homes more efficient or predict future energy savings are obstacles, the largest obstacle is usually a lack of access to affordable, upfront investment capital.

Here we look at five tested approaches that can finance efficiency projects without straining business, institutional, or household budgets: PACE, ESCO, On-Meter Financing, Sustainable Energy Utilities, and Energy Efficiency Mortgages. All five methods described below are summaries of findings from the recent report, *Energy Efficiency Financing – Models and Strategies*, published in March 2012 by Capital E for The Energy Foundation. The complete report is online: [http://www.raabassociates.org/Articles/Energy%20Efficiency%20Financing-Models %20and%20Strategies.pdf](http://www.raabassociates.org/Articles/Energy%20Efficiency%20Financing-Models%20and%20Strategies.pdf)

## **Efficiency Financing for Commercial Buildings: PACE and ESCO**

Commercial building owners in Michigan currently have two financing options if they lack their own capital for efficiency upgrades. One, called PACE, is now embedded in Michigan law, and is already being deployed in Ann Arbor, a longtime state leader in efficiency efforts. The other is provided by Energy Services Companies, or ESCOs, and usually applies to large buildings.

**PACE** stands for “property-assessed clean energy.” A local government, DDA, or other fiduciary establishes a fund—through a municipal bond or other public sources with very low interest rates. The building owner borrows from the fund at favorable terms, installs the efficiency (i.e., “clean energy”) measures, and then uses a good portion of the energy savings to repay the loan via the building’s property tax bill. Once the project is paid off, the owner retains the full savings for as long as he owns the building. One crucial key: No matter who owns the building in the future, the debt stays with that building until the loan is retired, since the new owner would also enjoy the benefits of the efficiency project.

Ann Arbor’s PACE program is just getting underway. It allows loans of between \$10,000 and \$350,000 to businesses in the city, which are paid back through special assessments on the businesses’ property tax for up to 10 years. A May 10, 2012 article at [AnnArbor.com](http://AnnArbor.com) indicates that more than \$700,000 in PACE loan applications are already in the works; the program’s administrator says that, of the 30 businesses she’s contacted so far, 85 percent said they are very interested in using the program. The businesses can invest in energy analyses, insulation, lighting, HVAC, doors and windows, and cool (heat-reflective) roofs. Once a building’s efficiency is maximized, loans can also be used for solar electricity or heating, geothermal, combined heat and power, and biomass thermal systems.

Ironically, PACE could also work very well where it is needed most—privately owned homes, whose owners often view efficiency investments as too expensive in comparison to actual paybacks, which are real, but also more gradual. However, federal home loan guarantors Fannie Mae and Freddie Mac are blocking residential PACE due to concerns that, since loan repayments are treated as property taxes, the local government has first lien on that loan repayment in case of mortgage or property tax default. At this writing, efforts continue to change Fannie’s and Freddie’s policies.

**ESCOs** employ a proven, longtime, but still somewhat arcane business model. ESCOs offer turnkey services that, like PACE, typically require little or no upfront cash from the customers, which usually are governments and companies with sizeable buildings. The ESCO analyzes the building, chooses the efficiency measures, and installs them, combining utility incentives and rebates with its own raised capital to finance the project. Then, the ESCO essentially takes over the utility bill. The customer pays a monthly fee to the ESCO that is somewhat smaller than his past, average utility bills, guaranteeing immediate savings. The ESCO keeps the difference between that fee and the much smaller payout it now makes to the utilities. Once the ESCO has collected its agreed-upon payback, all future savings go to the building owner.

New ESCOs are now forming quickly across the country, to join the ranks of established efficiency firms like Johnson Controls, a 125-year-old, global company with a strong presence in Michigan. The company claims on its web site that it has saved its customers \$7.5 billion in energy costs since 2000. Traverse City boasts at least one ESCO, Keen Technical Solutions LLC. ESCOs’ big drawback is that they mostly work with large buildings—usually 500,000 sq. ft., or more—but Keen also works on smaller sized buildings.

### **Homes/Businesses: On-Meter, Sustainable Energy Utility, EE Mortgages**

Two variations of PACE funding are suitable for both businesses and homes—utility-based “on meter” financing and the newly emerging “sustainable energy utilities” model. Meanwhile, energy efficiency mortgages have been available for 20 years, but remain relatively undiscovered by the wider marketplace.

**ON-METER FINANCING**, which has a mixed track record, allows customers to borrow from a rotating municipal bond or directly from their utility, which uses its own cash on hand, a special fund financed by a monthly efficiency fee or, as it would when building a new power plant, conventional financing.

As with PACE programs, the savings from the efficiency project are used to slightly lower the customer’s monthly bill and to pay back the loan to the utility. The loan remains attached to that building’s utility bill, and is taken over by a new owner, who benefits from the savings the building is achieving.

There are big advantages to this approach. Since capital requirements for efficiency projects are a small fraction of those for building a typical, multi-billion-dollar power plant, the utility’s borrowing costs are far lower. Combined with the low cost of producing saved kilowatt-hours, on-meter financing saves money for all: The utility avoids higher generating, fuel, capital, and construction costs; participating ratepayers immediately see slightly lower bills that drop dramatically after loan payoff; and non-participating ratepayers benefit from the downward pressure the utility’s avoided costs exert on rates.

**SUSTAINABLE ENERGY UTILITIES** offer another approach that somewhat resembles an ESCO and on-meter financing. Although it does not identify itself as such, Efficiency Vermont (see Part I) is an early, somewhat limited variation of this approach, known as an SEU.

The SEU is a stand-alone non-profit, and is funded by a bond and/or a small, passed-through efficiency charge on local utility bills. The SEU administers the fund, provides technical expertise, guidance on conventional utilities’ financial incentives, project financing, energy savings verification, and, in some cases, loan guarantees for outside, third-party investors. The SEU then shares in the customer’s energy savings until financing is repaid.

The combination of steady income from loan repayments and the efficiency charge can, over time, expand the fund. In 2007, the State of Delaware passed legislation establishing a SEU that, in addition to energy efficiency, also addresses distributed renewable energy generation, such as solar panels, as well as transportation. The non-profit is currently undergoing its first rigorous evaluation of investments and resulting savings to ratepayers.

**ENERGY EFFICIENCY MORTGAGES** can facilitate significant investments in new buildings’ efficiency, as well as extensive efficiency retrofits in old ones during either their re-financing or sale. Lenders increasingly view more-efficient buildings as less risky properties than conventional buildings because owners’ operating costs are lower due to lowered utility bills. This can enable the lender to charge a lower interest rate, which in itself further reduces loan risk.

The Federal Housing Administration requires evaluation of the proposed project via the Home Energy Rating System, and capital for the efficiency project cannot exceed five percent of the home value. With

typical mortgage terms of 10, 15, or 30 years, repayments can be kept relatively low, allowing the efficiency work to produce a net positive return on a monthly basis.

FHA also has launched a new program that extends up to \$25,000 to borrowers and backs 90 percent of an efficiency loan with federal mortgage insurance; Energy Star Mortgage programs in several states also inject capital into these mortgage products to further buy down interest rates, which are typically between 3 and 9 percent.

Utility incentives and state and federal programs can be used to further reduce the cost of the project, and therefore the mortgage principal. While many appraisers still need convincing about the low-risk nature of EEMs, some lenders, state agencies, and other organizations continue to move forward with these loans and to see success.

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## PART IV

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### **LEEP-C: An Economic Modeling Program for Efficiency Projects**

#### **Introducing ACEEE**

This report uses an economic modeling spreadsheet, called “LEEP-C,” developed by the American Council for an Energy Efficient Economy. Founded in 1980, ACEEE conducts in-depth technical and policy assessments, advises policymakers and program managers, and works collaboratively with a variety of business and civic groups and organizations.

Specifically, the 50 staff members of ACEEE team up on projects and initiatives with federal and state agencies, utilities, research institutions, businesses, and public interest groups.

ACEEE also organizes conferences and workshops; publishes books, conference proceedings, and reports; and educates consumers and businesses.

The non-profit receives financial support from foundations, governmental organizations, research institutions, utilities, and corporations.

#### **Understanding LEEP-C**

LEEP-C, the ACEEE modeling spreadsheet used here, is shorthand for Local Energy Efficiency Policy Calculator. The model, released in November 2011, draws from ACEEE’s decades of research on the measured costs and benefits of real-life energy efficiency projects that have been implemented for business, homes, and governments around the United States.

According to the LEEP-C users guide, the calculator “is intended for use by policymakers and stakeholders interested in advancing the adoption of energy efficiency in their communities.”

Currently, LEEP-C analyzes the impacts of seven different sets of policies from two economic sectors: residential housing and public buildings. The seven policies—or strategies—for saving energy include:

- 1) Capital-intensive, comprehensive efficiency retrofits for existing public buildings
- 2) Lower-cost “tune ups” for existing public buildings
- 3) Rating and labeling existing public buildings’ efficiency
- 4) “Whole Home” efficiency analysis and improvements, including Energy Star
- 5) Rating and labeling existing homes systems efficiency
- 6) Residential “efficiency code” upgrades when a home is sold
- 7) Assistance to multi-family affordable housing

LEEP-C estimates the effect specific project strategies have on energy savings, cost savings, pollution, jobs, and other metrics. LEEP-C is primarily designed to inform local, rather than regional, state or national programs. To that end, LEEP-C allows customization of a number of factors used for its economic and energy projections. For our project, those factors include:

- 1) Grand Traverse County population
- 2) Years over which project is implemented
- 3) Years over which project is evaluated
- 4) Total square footage of public buildings in the county
- 5) Number of residential units, sorted by building type (single, multi, mobile)
- 6) Total annual building energy consumption in the county
- 7) Annual energy use growth rate
- 8) Community’s energy-related priorities
- 9) Financing terms for efficiency investments

LEEP-C allows users to try out different goals, such as modest vs. deep building retrofits; quick vs. gradual implementation; high vs. low interest rates; emphasis on creating jobs vs. emphasis on quick return on investment; and more. Each change renders a different set of outcomes, allowing a community to make decisions about proposed efficiency investments based on what it wants to accomplish.

## **Limitations**

LEEP-C does not directly address costs and savings associated with investments in commercial building energy efficiency. That is because modeling for such buildings is difficult: Many commercial buildings use large amounts of energy in many different ways—from office equipment to display lighting to large HVAC systems to refrigeration. So predicting their energy use and potential savings is risky, except on a sector-by-sector basis.

Yet commercial buildings and the activities that they support are at least as energy-intensive as public buildings and the activities they support. We suggest, therefore, that the savings and prosperity-building opportunities for commercial buildings are at least as significant as they are for public buildings.

In fact, as noted in Part I, businesses often find that investments in efficiency measures provide excellent returns. While we do not provide Grand Traverse County numbers for this assertion, success stories



from elsewhere and ACEEE's continuing work on the question indicate that including commercial building retrofits in a long-term, communitywide energy efficiency project can typically provide a 23 percent annual energy saving for each building, a significant contribution to increasing local prosperity.

We extend our thanks to ACEEE for its modeling work and the care the organization took to allow the use of local, rather than national statistics to estimate the economic potential of energy saved by residential and public buildings in Grand Traverse County. This localized approach is the most accurate and credible way to proceed, and distinguishes our LEEP-C projections as "a first" for county residents, local governments, and, by extension, local businesses.

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## PART V

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# LEEP-C Projections for Grand Traverse County

## Overview of Results

We applied the LEEP-C model to two sectors—public buildings and residences—using seven different strategies, listed below. Our work indicates that the most cost effective energy efficiency programs for Grand Traverse County are those that target public buildings—city, village, township and county municipal buildings, public libraries, and public schools.

Specifically, comprehensive energy efficiency retro commissioning (facility tune-ups) and retrofits of public facilities can be implemented relatively quickly, provide significant energy savings and high returns on investment, and generate several jobs.

LEEP-C suggests that accomplishing substantial long-term savings and job creation requires investment in residential and commercial energy efficiency. Although LEEP C does not currently evaluate investments in commercial building efficiency, data being compiled by the National Renewable Energy Laboratory and by ACEEE suggest similar programs aimed at the commercial sector would offer the best of both worlds—extraordinary energy savings and return on investments, plus significant long-term job creation.

## The Impact of Interest Rates

Because deeper energy efficiency gains often require an initial investment of capital, financing terms can have a dramatic effect on the cost effectiveness of energy efficiency investments. We compare all results using two interest rate scenarios to demonstrate this effect and highlight the strongly positive economic effects of developing a low-interest financing program in tandem with strategic energy policies and programs.

LEEP-C's default interest rate is 6 percent, a reasonable one for energy efficiency investments for private or individual public sector energy efficiency projects. We also evaluated the effect of a 4 percent interest rate, which may be possible through a comprehensive effort to reduce project-financing costs through one or more municipal bonds, such as the PACE program discussed in Section III, or access to other private, foundation, or public funds dedicated to improving energy efficiency.

## Scenario Summary

In the following charts, public building strategies are completed within two to five years and residential strategies in 15 years, with a goal of a ~25 percent reduction in building energy use, and a 30-year evaluation period. For public buildings, 'Policy costs' include management, labor, materials, and interest. For residential, costs include 'Administrative costs,' 'Incentives' (for strategies that include them) and 'Participant costs', including labor, materials, and owner's interest costs. 'Simple payback period' is total capital costs divided by gross, first-year annual savings. 'Total investment costs' are gross costs to the community or costs paid by all parties involved, including administrators and participants. 'Total energy saved' includes gas and electricity. 'Net savings' are gross savings minus owners' capital and interest costs. 'Net Present Value' reflects the time value of money, in that cash flows in the future are worth less presently than cash on hand, and is a best indicator of total value to the community. 'Average annual jobs' is the average jobs created per year over 30 years. Annual jobs during the peak of policy implementation are much higher. 'Benefit - Cost Ratio' compares Net Present Benefits to Net Present Costs; values larger than 1.0 mean a net return on investment.

Grand Traverse County's public buildings encompass 3.24 million square feet and, in 2011, used 37.2 million kWhrs of electricity at 11.3 cents/kWh, and 1.93 million therms of natural gas at 77 cents/therm. Annual energy use grew by 2.79 percent. The county's 35,272 residences (74.4 percent single family, 17.1 percent multi-family; 8.4 percent mobile) used 171 million kWhrs at 11.23 cents/kWhr and 37.7 million therms of natural gas/propane/fuel oil at 80.3 cents/therm. Energy use grew 0.8 percent.

## PUBLIC SECTOR

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LEEP-C evaluated three strategies or policies aimed at publicly owned buildings in Grand Traverse County. Each represents an important step in the Energy Star guide to improving energy management for buildings.

### Strategy 1:

#### Public Building Benchmarking and Disclosure

One of the first steps in energy management is to establish a baseline of energy use for a facility and then benchmark or compare it to the performance of similar facilities nationally. The simple act of documenting and then disclosing the building's energy use and costs, critical energy losses, and opportunities for cost savings can then drive action toward efficiency in public sector operations.

In other words, this step provides a gateway to well-thought-out, strategically selected and designed energy saving projects. If we require 100 percent of public facilities within Grand Traverse County to benchmark their energy use over the next two years it would, without much further action, produce small behavior and purchasing changes leading to modest energy savings of approximately 1 percent annually, with only a small administrative cost.

This strategy or policy's more important effect is that it lays down a strong, credible foundation for taking the next, more substantial steps: retro commissioning and retrofitting. In fact, benchmarking helps us choose which buildings to "tune-up" and which to comprehensively retrofit.

**Public Building Benchmarking: 1st Year Annual Policy  
Costs and Benefits (per 10,000 SF of public facilities)**

Policy Cost	Electric Savings	Natural Gas Savings	Simple Payback (years)
\$1,300	\$175	\$23	6.6

**Total Policy Costs and Benefits (over 30 years w/ two financing rates)**

Scenario:	Total Investment Cost	Total Energy Saved (MMBtu)	Net Savings	Net Present Value	Avg. Annual Jobs Created	Benefit / Cost Ratio
Interest						
6%		53,700	\$675,600	\$459,400	<1	1.8
4%	\$580,700	53,700	\$760,700	\$533,100	<1	2

## Strategy 2:

### Public Building Retro Commissioning

An often-overlooked step in energy efficiency management is one of the most cost effective: retro commissioning. This involves a facility staff and a building energy specialist critically reviewing the performance of the existing energy systems to find literal and operational energy leaks resulting from poor design, installation, changes in use, and wear and tear.

By “tuning-up” existing equipment, making minor repairs, and adjusting controls to meet current operating conditions, retro commissioning achieves substantial energy savings with very little capital investment, resulting in quick paybacks. A study by the Lawrence Berkley National Laboratory evaluated the results of 163 retro-commissioning projects and found a median energy savings of 16 percent, with a median cost of \$0.30/sq. ft. and 1.1 years as the median payback.<sup>(7)</sup>

Retro commissioning is most commonly applied to large facilities (100,000 sq. ft and larger), but the LBNL study found it to be cost-effective for smaller buildings as well. “Tuning-up” all public facilities sized at 50,000 sq. ft. or larger represents 50 percent of the county’s public facilities. This strategy represents the single most cost effective approach within the LEEP-C quiver.

**First Year Annual Policy Costs and Benefits Public Retro-commission  
(per 10,000 SF of facility participating)**

Policy Cost	Electric Savings	Natural Gas Savings	Simple Payback (years)
\$1,806	\$1,329	\$471	1.0

**Total Policy Costs and Benefits (over 30 years w/ two financing rates)**

Scenario:	Total Investment Cost	Total Energy Saved (MMBtu)	Net Cost Savings	Net Present Value	Avg. Annual Jobs Created	Benefit / Cost Ratio
Interest						
6%	\$462,400	127,300	\$1,812,400	\$1,639,500	<1	5.0
4%	\$403,300	127,300	\$1,871,500	\$1,690,600	<1	5.8

**Strategy 3:****Public Building Retrofit**

Comprehensive retrofits focus on a combination of operational improvements and strategic capital investments in new or replacement facility equipment and building envelope materials to improve the facility's energy performance. These strategies are typically prioritized based on a comprehensive energy assessment or audit. A 2005 study by ACEEE found that this approach required, on average, an investment of \$2.50 per sq. ft. and cut energy use by 23 percent.

Investing in comprehensively retrofitting 50 percent of the county's public facilities over five years would result in the largest total electricity and natural gas savings among these three policies and the greatest total net present value.

**First Year Annual Policy Costs and Benefits of Public Retrofit  
(per 10,000 SF of facility participating)**

Policy Cost	Electric Savings	Natural Gas Savings	Simple Payback (years)
\$30,794	\$3,058	\$1,084	7.4

**Total Policy Costs and Benefits (over 30 years w/ two financing rates)**

Scenario:		Total Investment Cost	Total Energy Saved (MMBtu)	Net Cost Savings	Net Present Value	Avg. Annual Jobs Created	Benefit / Cost Ratio
Interest	Efficiency Goal Attained						
6%	23%	\$10,663,100	618,400	\$3,542,200	\$2,286,000	2	1.3
4%	26%	\$9,299,700	699,000	\$3,619,100	\$2,239,500	2	1.3

**RESIDENTIAL SECTOR**

LEEP-C evaluated four strategies for reducing home energy use in the county, each of which could be implemented over the next 15 years. These four programs represent three different approaches to implementing energy efficiency: disclosure of energy use at point of sale, required minimum energy upgrades at point of sale, and incentives for and investments in voluntary energy retrofits.

**Strategy 4:****Residential Labeling and Disclosure**

Similar to benchmarking and disclosure of energy use in public facilities, measurement and disclosure of energy use and performance rating can encourage voluntary implementation of energy efficiency measures.

Providing the results of a basic but standardized home energy assessment at the point of sale of a home or rental can be viewed as simply requiring full disclosure of the condition that a home is in. It helps the buyer or lessee make informed choices about the true long term costs of their purchase and encourages sellers to make cost-effective energy upgrades, which can boost the real estate value of the dwelling.

Such a policy could also improve or be integrated with other incentive-based efficiency programs.

*Please note: Due to its overlap with Strategy Five, this strategy is not included in the Summary Total.*

**First Year Annual Policy Costs and Benefits Residential Labeling  
(per participating household)**

Admin Cost	Participant Cost	Electric Savings	Natural Gas Savings	Simple Payback (years)
\$42	\$613	\$86	\$23	6.0

**Total Policy Costs and Benefits (over 30 years w/ two financing rates)**

Scenario:	Total Investment Cost	Total Energy Saved (MMBtu)	Household Net Cost Savings	Community Net Present Value	Avg. Annual Jobs Created	Benefit / Cost Ratio
Interest						
6%	\$22,286,000	1,696,000	\$13,987,000	\$7,379,400	6	1.5
4%	\$19,427,000	1,696,000	\$18,045,600	\$10,380,100	6	1.7

**Strategy 5:**

**Residential Energy Upgrade Requirement**

A more direct approach than disclosure is requiring a minimum standard of energy performance for homes and rental units that must be achieved at the point of sale or rental. In this way it is very similar to requiring a building be up to code before it can be sold. In most cases such ordinances target easy energy efficiency improvements with quick paybacks and a cost cap to prevent the policy from becoming overly burdensome to property owners. This is a controversial policy, but it raises the quality of the community's housing stock gradually over time, boosts the real value of each home as it is sold, eliminates local government administrative costs, and results in the largest net financial savings to the community as whole.

**First Year Annual Policy Costs and Benefits Residential Sale Upgrade  
(per participating household)**

Admin Cost	Participant Cost	Electric Savings	Natural Gas Savings	Simple Payback (years)
\$0	\$938	\$71	\$117	5.0

**Total Policy Costs and Benefits (over 30 years w/ two financing rates)**

Scenario:	Total Investment Cost	Total Energy Saved (MMBtu)	Household Net Cost Savings	Community Net Present Value	Avg. Annual Jobs Created	Benefit / Cost Ratio
Interest						
6%	\$42,495,000	5,262,400	\$8,623,000	\$5,170,500	8	1.2
4%	\$37,062,000	5,262,400	\$27,127,000	\$18,351,100	12	1.7

**Strategy 6:****Home Performance with Energy Star**

Much like the retrofits for public sector facilities, home energy retrofits based on a comprehensive home energy assessment offer the largest energy efficiency gains. Some Traverse City residents are actually already familiar with this program: Home Performance with Energy Star is very similar to the TC Saves program initiated in several neighborhoods last year. In other words, participating home owners receive a standardized assessment of their energy use, energy losses, and opportunities for savings and are then connected with qualified energy contractors, efficiency incentives, and attractive financing options. Investments are voluntary, but the program provides information to homeowners in a way that helps them make financially sound energy improvements with confidence.

Around the country these programs have averaged 20 percent gains in efficiency. Some individual programs have made greater gains, such as Austin's program, which has documented a 28 percent average improvement among participating homes.

If 100 percent of the county's 26,000 single family homes participated in such an assessment and improvement process over the next 15 years the resulting energy savings would exceed that of all of the other policies evaluated by the LEEP C model combined.

**First Year Annual Policy Costs and Benefits of Home Retrofit  
(per 10,000 SF of facility participating)**

Admin Cost	Energy Incentives	Participant Cost	Electric Savings	Natural Gas Savings	Simple Payback (years)
\$637	\$841	\$3,830	\$153	\$245	13.3

**Total Policy Costs and Benefits (over 30 years w/ two financing rates)**

Scenario:		Total Investment Cost	Total Energy Saved (MMBtu)	Household Net Cost Savings	Community Net Present Value	Avg. Annual Jobs Created	Benefit / Cost Ratio
Interest	Efficiency Goal Attained						
6%	21%	\$160,088,000	15,636,700	\$83,920,200	\$9,009,100	26	1.1
4%	25%	\$191,218,000	18,615,100	\$99,430,500	\$9,904,000	34	1.1

**Strategy 7:****Assistance to Affordable Housing**

A similar retrofitting program could also be applied to affordable housing. This policy looks specifically at providing technical assistance and financial incentives for tune-ups and upgrades to multi-family affordable housing units.

Although multi-family affordable housing represents only a small percentage of residential units in the county, this strategy helps people who would benefit significantly from energy efficiency investments—those with the ability to pay utility costs but who have less control of their ability to make cost-effective investments in their homes.



**First Year Annual Policy Costs and Benefits Residential Affordable Assistance  
(per participating household)**

Admin Cost	Energy Incentives	Participant Cost	Electric Savings	Natural Gas Savings	Simple Payback (years)
\$200	\$527	\$641	\$50	\$62	12.2

**Total Policy Costs and Benefits (over 30 years w/ two financing rates)**

Scenario:	Total Investment Cost	Total Energy Saved (MMBtu)	Household Net Cost Savings	Community Net Present Value	Avg. Annual Jobs Created	Benefit : Cost Ratio
Interest						
6%	\$7,106,000	696,300	\$6,225,800	\$680,800	1	1.1
4%	\$6,198,000	696,300	\$6,651,400	\$1,335,200	1	1.3

## COMMERCIAL SECTOR

LEEP C does not currently include models for the commercial sector.

However, the model's authors do suggest that the success of the comprehensive retrofit policy for public sector facilities is likely achievable for commercial properties. An inventory of energy use and greenhouse gas emissions completed by SEEDS for the county in 2008 indicated that commercial energy use amounts to 50 percent of the county's electricity consumption and 34 percent of the county's natural gas consumption. Assuming that 26 percent average efficiency is similarly achievable across at least 50 percent of the commercial building stock, the resulting \$6.6 million gross in *annual* energy savings to county businesses would far exceed the annual savings of any other policy considered.

## Thirty-Year Summary

(Assume 4 percent interest)

Policy	Average # of Jobs	Net Savings (millions \$)
Public Benchmarking	1	.8
Public Retro Commissioning	1	1.9
Public Retrofit	2	3.6
Residential Sales Upgrade	12	27.1
Residential Energy Star	34	99.4
Residential Affordable	1	6.7
Commercial	25	72.5
<b>Totals</b>	<b>76</b>	<b>212.0</b>

Over 30 years these strategies pay for themselves, add \$212 million in spendable income to the local economy, and annually employ an average of 76 people.

## **Five Suggestions for a More Prosperous Grand Traverse County**

Applying the LEEP-C model to Grand Traverse County's building stock leads to three important conclusions, and those conclusions strongly suggest five next steps that our community's leaders can take.

### **CONCLUSIONS**

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*First*, public investment in all municipal buildings in Grand Traverse County will quickly begin saving local tax dollars.

*Second*, investment of bonded or private, interest-subsidized funds in residential efficiency in Grand Traverse County will pay back homeowners over the medium and long term. This immediately creates a significant number of ongoing, good-paying, local jobs in finance, contracting, construction trades, engineering, and retail, and the release of millions of saved energy dollars into local pocketbooks.

*Third*, our public building modeling results indicate that efficiency programs for local businesses could quickly cut their energy costs without burdening their cash flow. Since there are far more business than public buildings in the county, most with large energy-saving opportunities, the program would create many long-term, good-paying, local jobs in finance, contracting, construction trades, engineering, and retail, and free up millions of energy dollars for other business uses.

### **POSSIBLE NEXT STEPS**

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We believe county residents, governments, and business would greatly benefit from further exploration of the financing mechanisms necessary to unlock the economic benefits of energy efficiency. We think the following ideas are worth further research and discussion:

- 1) A countywide efficiency fund with a very low interest rate.
- 2) Using a portion of the fund to finance efficiency retrofits for at least half of the public buildings in Grand Traverse County, with loan terms that immediately produce cost reductions from saved energy.
- 3) Using most of the fund to finance a PACE program for businesses.
- 4) A local, public/private consortium providing low-interest loans for residential customers in Grand Traverse County.
- 5) Using a small portion of the funds for a position that coordinates outreach, marketing, expertise, incentives, and financing for a countywide efficiency campaign that provides a gradual, increasingly powerful, lasting local economic stimulus and a model for the region.

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148 E. Front Street, Suite 301  
Traverse City, Michigan

**[mlui.org](http://mlui.org)**

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