

Land of Opportunity

The American Response To Climate Change

The Adirondack Model: Using Climate Change Solutions to Restore a Rural American Economy

Working Memorandum Energy Efficient Buildings & Contractor Preparedness

Sector Team Lead

Ann Heidenreich, Community Energy Services, Inc.

Sector Team

- Sue Montgomery Corey, Community Power Network
Mike DeWein, Alliance to Save Energy
Karen Davidson, Davidson Design, Inc.
Leah Filo, The Wild Center
Ellis Guiles, TAG Mechanical
Greg Hart, Workforce Development Institute
Chris Rdzanek, The Wild Center
David Trudeau, Honeywell

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Adirondack Background

The Adirondack region is unique in many ways. The Adirondack Park was formed in the late 19th Century primarily to protect the forests, mountains, lakes, wetlands, and rivers that provided the water resources that fed much of New York's canal system, which was a key component of the State's economic engine at that time. Over the past five generations, the Park has provided a dependable, clean, and abundant flow of water that helps sustain its natural and human communities and still underpins the economic vitality of the region.

Creation of the Park has done much more than protect water resources. For example, the six-million acre Adirondack Park is a biological treasure trove, and is one of the world's last remaining bastions of the vast temperate deciduous forest that once covered much of Europe, parts of Asia, and most of Eastern North America. Over 90 percent of this type of forest has been lost to fragmentation and development worldwide. The Park is also recognized as a world model of conservation that integrates public wildland protection and private land stewardship in a lived-in landscape where about 140,000 people make their home in more than 100 individual communities and host about 10 million visitors each year.

In an effort to balance the need for environmental protection with the needs of human communities in the Adirondacks, the Park was placed under the regional planning and zoning authority of the New York State Adirondack Park Agency more than a generation ago. Recently, the Park was included in a federally funded study of the environmental, social, cultural, and economic threats and opportunities facing the 26-million-acre Great Northern Forest that runs from Lake Ontario across Northern New York, Vermont, and New Hampshire to the coast of Maine. That study focused upon ways to enhance the quality of life for local residents through the promotion of economic stability for the people and communities of the area by maintaining large forest areas, encouraging the production of a sustainable yield of forest products, and by protecting recreational, wildlife, scenic, and wildland resources.

At the dawn of the Twenty-first Century, the natural and human communities of the Adirondack region are once again threatened, not by unsustainable resource extraction as in the past, but by the pervasive impacts of acid deposition, mercury contamination, and accelerated global climate change. With its relatively small population, the Adirondack Park has a limited potential to achieve globally significant reductions in greenhouse gas emissions. But dollar savings related to energy conservation, efficiency, and production from local, renewable sources could be significant for struggling households, businesses, institutions and local governments in the Park. The Energy Smart Park Initiative estimates that annual *per capita* residential and commercial energy costs are at approximately \$2,000 and rising very rapidly, putting the total annual energy bill for the Park at about \$260 million. Saving 20 percent of the energy used in the Park would save about \$52 million per year - over half a billion dollars in 10 years - dollars that can stay in the Park and help build economic strength, encourage energy independence and enhance the quality of life for human communities.

The Adirondack Park is an ideal place for exploring ways to make climate action planning a practical reality for rural communities. The transition to a clean, green, energy future will benefit the Park's human communities as well as the natural communities. It will unearth new job creation potential, new business opportunities, training, certification, skill-building, and educational needs which will, in particular, provide opportunities for young people to remain in the area. It will lay the groundwork for local governments to take a leadership role in developing more independent and lower carbon local economies. It will include defining the value to the Park of "greening" the tourism industry and outlining the steps required to become a Green tourism destination. This "greening" process will likely emphasize the health and economic benefits of producing and buying local food.

The region is already experiencing impacts from changes in the global system of climate patterns. Adirondack residents, visitors, businesses, and government representatives are increasingly seeking ways to lessen their own impact, reduce costs, and anticipate future needs in this uncertain context. It is through local choices, made as communities and individuals, about energy supply and use, transportation, solid waste and land use that Adirondack towns and villages can lead in addressing these challenges. *(Adapted from Energy Smart Park Initiative, November 2007 work plan draft)*

"What is the use of a house if you haven't got a tolerable planet to put it on?" –Henry David Thoreau

I. Executive Summary

Energy efficiency is the primary strategy for reducing greenhouse gas emissions in the building sector. Energy efficiency and conservation will offset more greenhouse gas emissions than renewable and alternative fuels combined, and will boost the economy by keeping dollars in the Park and generating significant numbers of jobs. Energy efficiency in the building sector specifically means substantially reducing the amount of energy that is now being wasted (performing no useful work) in our residential, commercial, municipal and institutional buildings. A significant portion of Greenhouse Gas ("GHG") emissions from buildings (about 50%) comes from electricity used to power appliances including lighting, and replacing wasteful appliances results in immediate and dramatic savings. Significant savings will be made in the systematic retrofitting of existing buildings and building all new buildings to high efficiency standards.

While local action should focus on educating people in the Park and making all of our buildings more efficient, the biggest driver of change will be higher energy prices and government policies mandating greater efficiency. While working locally, we should not take our eyes off the national and international scenes. We need to continue to lobby for a carbon tax or some other mechanism that insures the true cost of fossil fuels is reflected in their price, thereby leveling the playing field for energy efficiency and renewable energy systems. This paper identifies three major areas for action: education and outreach to all building sectors, improvement and enforcement of energy codes, and increased financing for energy projects.

II. Scope of Memorandum

The purpose of this working memorandum is to provide a basis for discussion at the November 18th & 19th Conference. The paper provides a brief analysis of current facts, challenges and opportunities, and suggests actions for achieving carbon reduction goals in buildings. It covers opportunities for saving energy in residential, commercial and institutional buildings and it addresses the need for trained and certified building professionals who can implement energy efficiency design, measures and programs. It does not cover industrial buildings/processes, renewable energy and distributed power systems and it does not address the myriad lifestyle and institutional changes that are needed to achieve GHG reduction goals. Finding data proved harder than anticipated. Sources are shown in parenthesis. In cases where we did not have more precise numbers, we thought it better to provide informed guesstimates rather than no numbers at all. We will welcome corrections.

III. The Need for Action

A. *Defining the problem:*

Buildings contribute more GHGs than any other sector. Estimates indicate that heating fuel (oil, kerosene, propane and natural gas) and electricity used in buildings contribute more greenhouse gas emissions than any other sector in the US. In 2005, commercial, institutional and residential buildings and the appliances in them accounted for about 33 percent of US GHG emissions (McKinsey Report: *Reducing Greenhouse Gases: How Much at What Cost?*). When you add energy spent getting people to and from buildings, their

total contribution to GHG emissions is over 60% (Alex Wilson presentation at Building a Greener Adirondacks). Electricity accounts for about half the total energy used in buildings, but about three-quarters of CO₂ emissions from buildings are due to the carbon intensity of the electric grid.

Current building stock is vulnerable to power outages and fuel and water shortages. Without power, water and heating fuel, most buildings are unlivable. During the ice storm of '98 when power lines came down across the North Country, many people had to leave their homes and move into emergency shelters. Hurricane Katrina caused a drop in oil supplies and consequent spike in oil prices. The increase in storms caused by climate change will affect the livability of our buildings. Climate change adaptation measures should include steps to maintain livable conditions in the event of energy and water shortages. In his presentation to the “Building a Greener Adirondacks” Conference, Alex Wilson called this “passive survivability”.

Buildings are central to economic development. Energy consumption in buildings also impacts economic development, health and quality of life. About 60% of the energy consumed in buildings is wasted through inefficiencies in its use, and most of the dollars we spend on energy flow directly out of our communities, having little or no multiplier effect. The Common Ground Alliance, a group of citizens in the Adirondack Region that focuses on economic development, has chosen energy as a high priority for action because of high heating fuel and gasoline costs.

Buildings impact health. Drafty, poorly insulated, and inadequately vented homes with poorly functioning heating appliances affect the health of people of all ages and all income levels. Mold, drafts and unhealthy levels of carbon monoxide result in allergies, colds and headaches.

According to a recent study by the Children’s Sentinel Nutrition Assessment Program (C-SNAP) (<http://www.c-snap.org>) the recent dramatic increase in energy prices coupled with the tight budgets of low-income families pose serious threats to children’s health and well-being. Babies and toddlers living in energy insecure houses are more likely to: be in poor health; have a history of hospitalizations; be at risk for developmental problems; and be food insecure—resulting in iron deficiency anemia and problems with cognitive development and behavioral and emotional problems. The C-SNAP study showed that children in households that receive heating fuel assistance through LIHEAP (Low Income Home Energy Assistance Program) are healthier than those in households that do not. Increased energy efficiency of our homes and buildings will result in a savings in health care costs.

An energy audit in St Lawrence County turned up high carbon monoxide (CO) levels in the home of a senior citizen who was suffering from headaches, which ceased when a malfunctioning hot water heater was replaced. Energy audits have found high CO levels in homes at all income levels.

Trained energy contractors are in short supply in the Adirondack Park. Reducing energy consumption in buildings requires properly trained and skilled energy professionals to evaluate those buildings and provide energy efficiency upgrades. There are relatively few contractors or other energy professionals in the Park who deliver these services. Apart from the Weatherization Agencies, only one certified Home Performance contractor currently resides in the Adirondack Park. Partially as a result of this infrastructure inadequacy, significant technical and financial resources available through state and other programs for improving building efficiency are inaccessible to most communities, residents, building owners and operators in the Park.

New green building technologies and products are inaccessible in the Adirondack region. Many such products (enhanced insulation, efficient storm window inserts, etc.) are more easily accessed in metropolitan areas where there is greater demand.

The lack of consumer awareness about how to reduce energy consumption. In the Adirondack Park, concern over high energy prices far outweighs concern about climate change. There is a danger that efforts to find cheap energy will exacerbate climate change. Offshore drilling is one such action; making ethanol from corn and unsustainable harvesting of biomass are others. Action to reduce energy consumption in buildings addresses both high energy costs and climate change. Consumer education is critical to get this message across, to raise awareness about simple measures that people can take themselves to lower energy consumption, and to provide information about technical and financial programs available to New York State residents to help them reduce their energy consumption.

B. Setting targets

Bluntly stated, to reduce greenhouse gas (GHG) emissions from their current level of 380 ppm (parts per million) to the 350 ppm that scientists deem “safe”, we must phase out fossil fuels, starting with shutting down all coal plants, thereby reducing GHG emissions by 80%.

The sooner we get started, the better and buildings are a good place to start. Reduction of energy consumption in buildings by 80% is an achievable target. It can be done with existing technologies and it offers the most cost effective opportunities for reducing GHG emissions (McKinsey Report: *Reducing Greenhouse Gases: How Much at What Cost?*). New buildings offer major opportunities for savings. For example, a group of architects in Germany is designing, building and retrofitting buildings to 90% greater efficiency than conventional buildings. Their “Passive House” technology is catching on in the European Union and may become the standard by 2015. Something equivalent could and should also become the standard for the Adirondack Park, New York State and the US. This is the goal of national initiatives like 2030 and Zero Energy Homes.

A Swedish town, Vâxjô become a global model for energy efficiency and economic growth. Vâxjô targeted per capita emissions levels by at least 50% by 2010 and at least 70% by 2025 compared to 1993 emissions levels. They achieved reductions of 32% by

C. Additional Benefits – Economic Development/Jobs & Health

A June 2008 study by Jerrold Oppenheim and Theo MacGregor entitled “Energy Efficiency Equals Economic Development” finds that “investing in low-income energy affordability is one of the most potent tools available for stimulating the economy and softening income disparities, while providing to everyone benefits that far exceed investment.” In five communities, the study found that investment of \$1 million in energy efficiency improvements in low income homes yielded \$23 million in increased economic output and 216 jobs. By comparison, \$1 million invested in attracting a manufacturing plant yielded \$11.9 million in increased economic output and 71 jobs. National results are similar: \$34 million in increased economic output and 337 jobs created by investments in energy efficiency vs. \$11.4 million and 98 jobs for a manufacturing plant.

To understand the impacts over a longer period and larger scale, a similar study conducted by the American Council for an Energy Efficient Economy (ACEEE), “Energy Efficiency and Economic Development in New York, New Jersey, and Pennsylvania”, showed that cost-effective energy efficiency improvements to buildings reducing energy use by 20% would save consumers more than \$150B in

energy bills and create 164,000 jobs in the region. This is clearly an important area for policy focus and program action.

QUANTIFYING THE BENEFITS		
<u>National Multipliers</u>		
For every \$1,000,000 in investment	Increased economic output	Jobs
ENERGY EFFICIENCY	\$34,000,000	337
MANUFACTURING PLANT	\$11,000,000	98

Energy Efficiency Equals Economic Development, by Jerrold Oppenheim & Theo MacGregor, June 2008

Green collar jobs in the energy efficiency and renewable energy sectors are good paying career track jobs that contribute directly to preserving or enhancing environmental quality. Like the traditional blue collar jobs, green collar jobs can range from entry level to high skill, high paying jobs. They feature opportunities for advancement in skill and wages. Another characteristic of green collar jobs is they tend to be local since they involve upgrading built capital or transforming natural capital. Green collar skills fit into jobs that cannot be outsourced. Some green jobs are new occupations such as wind turbine technicians but many are existing jobs that need new green skills such as construction workers that need up-to-date training in best green building practices and electrical workers that need to upgrade their skills to install solar panels.

New York Energy Research and Development Authority estimates that every 1.5GW of energy saved translates into 1.5 jobs. The American Solar Energy Society reports 8 million jobs created in 2006 in energy efficiency. In such studies, the economic multiplier of investment ranges from 10 to 23%. In other words, for every \$1 million invested in energy efficiency programs 10 to 23 jobs are created.

These jobs vary from the traditional construction job to the cutting edge of new technologies. Typical residential retrofitting jobs may include the following tasks: wall, ceiling and rimjoist insulation; air-leak sealing; heating/cooling system testing and replacement; windows and door replacement; sheet metal work; duct sealing; boiler retrofit; hot water heater replacement, temperature reduction and insulation wrap; low flow showerheads; pipe insulation; refrigerator replacement; and washer/dryer replacement. Some jobs, such as energy auditors, home energy rater, indoor air quality auditor, deconstruction worker, and solar installer and technicians are relatively new. The other job creation benefit is the indirect benefit to manufacturers of equipment and building materials. Most equipment manufacturers are U.S. based and materials are primarily bought locally.

IV. Challenges and Opportunities

The following challenges and opportunities were identified at the Wild Center's Climate Change Conference Keene Valley meeting:

CHALLENGES

- High oil prices, many oil-heated buildings

- Many energy inefficient buildings
- Few certified contractors & building professionals
- Weak codes/lack of enforcement
- Lack of consumer knowledge of energy efficiency potential
- Lack of appropriate funding sources to implement energy measures

OPPORTUNITIES

- People are motivated to save energy and/or switch fuel to save money
- Large savings possible
- Trained professionals will be in high demand
- Improve codes and enforce them
- Education/outreach
- Many energy improvements have short paybacks that make them attainable to Adirondack residents, building owners and operators; incentives are available from NYS Energy Research & Development Agency (“NYSERDA”) and utilities; banks can benefit from funding energy efficiency.

V. Solution Sectors

A. Residential Buildings

Existing small homes:

The permanent population of the Adirondack Park is 131,807 (APA). There are 42,965 single-family homes built for year-round occupancy and 4,812 mobile homes in the Adirondack Park (Josh Wilson, Ecology & Environment). Of these households, we estimate that approx. 11,950 (25%) are Home Energy Assistance Program eligible, and another 11,950 have incomes below 80% of state median income.

About 30% of homes in the Park were built before 1940, 30% between 1940 and 1970, and 37% between 1970 and 1990. Given the average age of the housing stock, we can safely assume that at least 40% of the homes are badly in need of weatherization (18,000 homes).

By far the largest producers of GHGs in these homes are appliances (278,449 tons) and fuel oil/kerosene (179,042 tons), which accounts for 50% of energy used for space heating in the Adirondack Park.

Opportunities for savings are considerable. Most homeowners can save 20% with fairly simple measures they can implement themselves, such as installing programmable thermostats, switching to CFLs, replacing old appliances with ENERGY STAR models, washing clothes in cold water and drying them on a clothesline. Through lifestyle changes, such as spending time in a heated central space in the home and lowering heat levels in the rest of the house, households can conserve significantly more energy.

Doug Welch and Ginger Storey-Welch have reduced electricity consumption in their Colton home by close to 70%. Their electricity consumption dropped from 4,701 KWh in 2005 to 2,484 KWh in 2007 and a projected 1,500 KWh in 2008. Measures they took included replacing an old freezer, cutting down on the use of their electric clothes dryer and using a solar dryer (aka clothesline), replacing their incandescent light bulbs with compact fluorescents, replacing their old refrigerator with an ENERGY STAR model, plugging appliances into power strips and turning them off when not in use to reduce phantom loads, and replacing their clothes washer with a high efficiency model, which saves significantly on hot water.

The major barrier to do-it-yourself energy reductions is lack of awareness and education. Most people don't know how much energy they consume, let alone how to start reducing that consumption. With a simple calculation, people could determine the energy intensity of their homes, and starting from there, take steps to reduce it. A park-wide education program that gives people tools to measure and reduce their household energy consumption would include media, websites, schools, local governments, service agencies, churches and community groups.

A twenty percent reduction in energy consumption is a good start, but it is not enough. Several effective home energy improvements go beyond what most people can do themselves. These measures include insulation, air sealing, and heating system service, repair and replacement. These generally require the assistance of skilled energy experts and can involve significant up-front costs. The Weatherization Assistance Program provides this service to a limited number of low-income homes throughout the Park each year.

NYSERDA has several programs offering technical and financial assistance for energy improvements in 1-4 family homes. These include Empower New York (appliance replacement and simple weatherization measures at no cost to HEAP eligible households including renters) and Home Performance with ENERGY STAR (whole house energy audit and implementation of energy saving measures with low-cost loans and grants). Households at 80% of State Median Income or below qualify for a grant equivalent to 50% of recommended approved energy efficiency measures up to \$5,000.

Average annual savings for 33 homes recently enrolled in the Home Performance Program and audited by CES were 45.7 Mbtus, 1,763 Kwhs and \$934. Projected annual savings in these homes ranged from -0.6 to 162.6 Mbtus, 0 to 6,047 Kwhs, and \$15 to \$2,905.
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The major barriers to widespread implementation of these programs are:

- most people do not know about them,
- middle and lower-income families cannot afford many energy efficiency measures,
- the Adirondack region has very few contractors who are trained and certified to deliver them.

Actions to overcome these barriers:

- Park-wide information and outreach to let residents know about available programs and incentives;
- increased and more accessible funding for energy efficiency improvements;
- recruitment and training of local contractors to deliver Home Performance programs.

New homes, additions, and retrofits

Local governments issue building permits for about 800 new structures and 3,500 modifications of existing structures each year (The Adirondack Atlas). We assume that most of the new buildings and renovations are for homes. Many of these are not built to high energy standards. Current codes require only a minimum baseline of energy efficiency, nowhere near the 80% savings we need to achieve. Lake Placid/Town of North Elba is working to promote the adoption of a 30% better energy code; much will be learned from that exercise and from other communities in the state that are adopting advanced energy codes. The impact of energy codes on existing buildings is restricted by the archaic "50% rule" according to which renovations must impact 50% or more of a building's systems before they are subject to code compliance. All code elements are poorly enforced, and they are far below what is achievable with current technologies and needed for the planet.

NYSERDA's ENERGY STAR® Home program rewards contractors for building homes that are 30% more efficient than code. A Federal Tax Credit for homes built to 50% more efficient than code is up for extension. It is possible with current knowledge and technology to construct buildings that are 80-90% more efficient.

The concept of a zero-net-energy house is the current goal for the US-Department of Energy ("DOE") residential building programs. A first step is the current DOE charge to develop a 30% better energy code. Germany and Canada are building homes to these high standards and could codify them in the near future. Given the urgent need to reduce energy consumption, and the desire of the Adirondack Park to be a model for other regions, then all new homes in the Park should be built to higher energy standards.

Barriers to building highly efficient homes:

- codes are not stringent enough and existing codes not fully implemented,
- lack of awareness on the part of new home buyers,
- few contractors who are able and willing to build to these standards,
- lack of financing packages that take into account long-term savings from upfront investments in energy efficiency.

To overcome these barriers:

- Several homes already exist and more are being built in the Adirondack Park to demonstrate the high levels of efficiency possible.
- Local governments need to review their building codes to require high energy standards, at least to the ENERGY STAR® level and preferably to 30% and beyond.
- The APA should require that all homes and buildings over which it has jurisdiction are built to high energy standards.
- Efforts should be made to identify people who are building or planning to build new homes and educate them about the options available to them, including building smaller homes, and the benefits of building for optimal energy efficiency. Code officers are a conduit to new homebuyers, as are lumber suppliers.
- Banks and financial institutions should offer energy efficient mortgage packages for new homes that build in the lower energy costs over the long-term.
- Energy efficient building courses should be made available and building contractors and architects should be encouraged to attend them. A conference for builders and architects such as the "Building a Greener Adirondacks" conference sponsored by the Wild Center on October 3rd should be an annual event and could grow to include skilled workshops on various building techniques (a mini Affordable Comfort Conference).
- New homebuyers and builders should be informed about and participate in the ENERGY STAR® Home program and build to higher standards.

Multifamily buildings

Energy usage per square foot in multifamily buildings is generally higher than in single-family households. Many of our multifamily buildings are highly energy inefficient, and many residents with low incomes and seniors on fixed incomes live in these inefficient buildings. Multifamily buildings have five or more units and include assisted and retirement housing and apartment buildings. Multiple energy saving measures are available to the residents and owners of these buildings through improvements to their envelopes and to their heating, lighting, ventilation and water systems. NYSERDA's Multifamily Performance Program offers significant incentives to owners and operators of multifamily buildings to make energy efficiency improvements.

Lake Flowers Apartments, Saranac Lake

In February 2007, the Harrietstown Housing Authority installed insulated blinds in all apartments at Lake Flowers Apartments, an electrically heated multi-family building. Largely as a result of this energy efficiency measure, their electricity use dropped from 105,760 KWh in the month of February 07 to 77,920 KWh in February 2008. Summer cooling costs also dropped and year-round comfort levels improved. CO2 savings in Feb. 08 alone were 250 tons.

The barriers to energy savings in multifamily buildings are:

- split incentives (tenants pay energy bills, owner pays for improvements),
- lack of awareness and knowledge among tenants,
- building owners and facilities operators of the huge savings possible,
- lack of skilled energy professionals to provide energy assessments,
- lack of contractors to install energy saving measures.

To overcome these barriers:

- Educate building owners and tenants about the opportunities for and benefits of saving energy
- Train building managers and operators to assess and reduce energy use in their buildings
- Increase participation in NYSERDA's Multifamily Performance Program
- Improve contractor training to increase skills in designing and implementing energy efficient improvements.

B. Commercial Buildings

Commercial buildings include offices, retail stores, hotels, motels and restaurants, gas stations and garages and other small businesses. There are significant opportunities for saving energy in all these buildings. NYSERDA's small audit is a good place to start for small business owners. For a small reimbursable fee, owners can get an expert energy assessment of their buildings and energy use with recommendations for improvements, cost, savings and available grants and loans. Building owners can then make informed decisions that lower their operating costs and make their businesses more sustainable. This initial assessment is a first step and can and should lead to greater energy saving measures. NYSERDA has a special program for hotels, motels and restaurants, and it also has programs for larger commercial buildings.

A March 2006 energy audit of the Northwoods Inn in Old Forge found potential annual cost savings of \$6,891 for a total project cost including NYSERDA incentives of \$21,720 and a payback of 3.2 years. Projected annual kilowatt hour savings of 27,211 kWh translate into a CO2 reduction of 20.4 Tons/CO₂/yr. Recommended measures included lighting replacements and upgrades, programmable thermostats (payback 6 months), air sealing, attic insulation and interior storm windows. [Need to call Jim Connerty at Northwoods Inn 315-369-6777 to get permission to use this.]

Average annual savings for 20 small businesses enrolled in the Small Audit Program and audited by CES were 98.7 Mbtus, 14,606 Kwhs and \$3,820. Projected annual savings in these businesses ranged from -29 to 388 Mbtus, 361 to 46,293 Kwhs, and \$723 to \$10,279.

Barriers to widespread implementation of this program are:

- Business owners are not aware of potential savings and programs to help achieve them

- Lack of skilled energy professionals to do energy assessments
- Lack of skilled contractors to implement energy saving measures
- Lack of readily available and affordable financing for energy improvements

To overcome these barriers:

- Widespread education and outreach to business owners
- Recruitment and training of contractors and energy professionals
- Recruitment of banks and development funds to provide low-cost financing for energy improvements

C. Institutional Buildings

Institutional buildings serving the Park include local government buildings in 61 towns, 13 incorporated villages, and 31 smaller communities, 65 public schools and 10 private secondary schools, one four-year college, an estimated 105 churches and chapels, 5 hospitals and 29 clinics, several two-year colleges, and libraries in many communities. NYSERDA’s Small Audit program described in Section B applies to most of these buildings.

Average estimated annual savings in churches audited by CES in 2008:
 MBtu – 126.4
 kWh – 4,551.8
 Dollars - \$2,144

For smaller churches including chapels, a general rule of thumb would be an average of \$60 in annual electricity savings and \$400 in annual heating savings over an 8-14 year payback. The savings is significantly greater for larger churches that are used throughout the week.

A recent energy audit of the Town of Ticonderoga Community Building found potential annual cost savings of \$2,804 for a total project cost including NYSERDA incentives of \$9,560 and a payback of 3.4 years. Projected annual kilowatt hour savings of 15,672 kWh translate into a CO₂ reduction of 11.7 Tons/CO₂/yr. Recommended measures include lighting upgrades and replacement with CFLs, and installation of a programmable thermostat, attic insulation, and an instantaneous hot water heater.

Energy upgrades in 2004 at two Historical Buildings in Saranac Lake, the Union Depot and the Saranac Laboratory, yielded significant fuel savings, despite 80 more heating degree days (HDD) in 2004/05. The drop in oil usage was as follows:

Union Depot:	Saranac Laboratory:
2003-2004: 2578 gals	2003-2004: 2979 gals
2004-2005: 2019 gals	2004-2005: 2456 gals
Saved 559 gallons	Saved 523 gals

Annual CO₂ reductions for these two buildings – 12 Tons CO₂

Information about fuel savings from Mary Hotaling, Historic Saranac Lake

Barriers to widespread implementation of this program are:

- Local governments and non-profits are not aware that these programs are available
- Lack of skilled energy professionals to do energy assessments
- Lack of skilled contractors to implement energy saving measures
- Lack of readily available and affordable financing for energy improvements

To overcome these barriers:

- Widespread education and outreach to local government and non-profit owners
- Recruitment and training of contractors and energy professionals

- Recruitment of banks and development funds to provide low-cost financing for energy improvements

D. Appliances, Equipment & Electronic Devices

Energy consumption of buildings depends on the building envelope (insulation and air tightness) and on the appliances, equipment, lighting and electronic devices in the buildings. Appliances are responsible for about 50% of household GHG emissions in the Adirondack Park (based on data from Josh Wilson). Simply replacing all incandescent light bulbs with compact fluorescents would yield immediate and large dollar savings and reductions in GHG emissions.

For every kilowatt hour (KWh) of electricity generated, 1.341 pounds of CO₂ is released into the atmosphere. **Replacing one 100-watt incandescent used three hours/day with one 28-watt compact fluorescent (CFL) reduces CO₂ emissions from 12 lbs/month to 2.5 lbs/month**, or a reduction of 8.65 lbs/month, 103 lbs/year (0.0585 tons). Count the light bulbs in your house and see how much you can save. To calculate carbon emissions, go to www.carbonify.com/carbon-calculator.htm

Barriers to widespread replacement of inefficient appliances and equipment:

- Failure of state and federal policy makers to set high efficiency standards
- Lack of consistent, standardized energy use and cost data for consumers
- Lack of motivation on part of consumers to purchase more efficient appliances
- Lack of knowledge, skill and motivation among energy professionals
- Unavailability of efficient appliances and equipment in rural areas

To overcome these barriers:

- Policy makers set higher efficiency standards
- Produce and disseminate good energy use and cost data
- Increase incentives for purchase of CFLs and efficient appliances
- Regular energy technology seminars and trainings for energy professionals
- Encourage local retailers to carry a wider range of energy efficient appliances and equipment and eliminate inefficient products.

E. Builders & Contractors

While building owners and renters can do a lot to reduce their energy consumption through changed behavior and do-it-yourself measures, achieving a goal of 80% reduction of GHG emissions will require the engagement of energy professionals. Specially trained and certified contractors, builders, architects and engineers are needed to implement NYSERDA programs. Without these professionals, home and building owners cannot benefit from NYS energy incentives. There is an urgent need to increase the number of certified contractors and trained energy professionals in the Adirondack Park and raise their profile as “energy professionals”.

Getting the work done

We estimate that about 40% or 18,000 homes in the Adirondack Park are badly in need of weatherization. To weatherize these homes in five years, we would have to do 3,600 each year. A crew of two people takes 2-3 days to weatherize a house. Assuming 5.0 person days per house and 231 work days per year, one person could weatherize 46.2 houses/year and 78 contractors would be needed to weatherize 3,600 homes. Some HEAP-eligible households are already being weatherized through the Weatherization Assistance Program (WAP). Contractors implementing weatherization will need training.

Barriers to achieving this goal:

- Contractors have invested in forms and tools for outmoded building practices and resist change for practical, financial and psychological reasons
- Builders are unaware of better ways to build homes
- Although fees for courses and certification are 100% reimbursed in the North Country, the high upfront costs are still a barrier to many contractors
- Many North Country contractors are self-employed with one or two person firms who already have sufficient work and see no additional benefit in joining the Home Performance program.
- The knowledge and time it takes for contractors to do computer modeling and fill in paperwork required by the HP Program.
- A strong distrust of government programs by independent-minded rural contractors.

To overcome these barriers:

- Provide regular seminars and trainings on new building materials, technologies and codes for energy professionals
- Make sure contractors and builders know about existing energy efficient homes and buildings in the Park that demonstrate what is actually possible
- Stress the local economic benefits of training and deploying a green collar workforce
- Recruit retired engineers and other professionals in the North Country who have indicated they would like to do energy work, are not afraid of computer modeling and paperwork, to serve as “hub” contractors and provide energy audit and inspection services to other contractors.

VI. Action Recommendations

While local action should focus on educating people in the Park and working to make all buildings and appliances more efficient, the biggest driver of change will be higher energy prices and government policies mandating greater efficiency. While working locally, we should not take our eyes off the national and international scenes and lobby for a carbon tax or some other mechanism to insure that the true cost of fossil fuels is reflected in their price in order to level the playing field for energy efficiency and renewable energy systems. The best way to change behavior locally is to create a sense of social connection, find admired public figures to model desired behaviors, and assist individuals and communities to establish personalized goals and regular feedback. Each action item should include a target, message, medium, and who will take responsibility for implementing the action.

EDUCATION AND OUTREACH:

1. Education & Outreach to Consumers:

- a. Frame message to homeowners in terms of health, comfort, safety, energy security, environment and GHG emissions. Shift the message away from “dollar savings” (a 25% reduction in energy use may not translate to a lower bill as energy prices increase). Most people do not ask what the payback is on cable TV, a new couch, a new car, or other household products and services they purchase – why do so for energy services?
- b. Develop a tool tailored to the Adirondacks by which consumers can calculate their greenhouse gas emissions and determine steps they can take to reduce those emissions to target and disseminate this widely on websites, at community gatherings and through the media.
- c. Hold “Save Energy, Save Money” workshops throughout the Park to educate consumers on steps they can take to reduce energy consumption (Cornell Cooperative Extension program financed by NYSERDA)

- d. Develop and disseminate accurate information about how much energy is consumed by various appliances (e.g. people buy big plasma TVs and then wonder why their electricity bills go up).
- e. Create a sense of social connection by organizing communities around joint actions. Hold public meetings to educate about climate change and peak oil, similar to the meeting conducted in Saranac Lake on September 19.
- f. Widely disseminate information about existing New York State programs - EmPower New York, Home Performance with ENERGY STAR, Small Audit, etc (North Country Energy \$mart Communities)
- g. Join or create a Heating Emergency Task Force in your community to assist residents with low incomes who cannot afford the high cost of fuel and gas, and lobby for increased spending on efficiency improvements in vulnerable homes.
- h. Launch a campaign to get people to switch to CFLs, use LED holiday lights, turn off lights when not in use, and in larger buildings use motion sensors to turn off lights in spaces that are not in use.
- i. Develop an Adirondack Green Building Program modeled after the Austin Energy Green Building Program, which is utility sponsored and provides green building clearinghouse services to the community. An annual "Building a Greener Adirondacks Conference" could be part of this program. Resources for this effort include the National Association of Home Builders and their green home verifier and green professional resources.

2. Education & Outreach to Municipal Officials

- a. Frame the message to municipal officials in terms of dollar savings, avoided costs, tax savings, more jobs, better health, business retention and economic development.
- b. Establish a training program for Community Energy Managers
- c. Encourage municipal governments to:
 - i. Benchmark all their buildings for GHG emissions and energy consumption (with assistance from NYSERDA's Local Government Focus Program), set targets and track savings
 - ii. Perform energy audits on all their buildings (using NYSERDA's Small Audit program)
 - iii. Institute an advanced 30+ code
 - iv. Appoint and train a "Community Energy Manager" charged with identifying all opportunities for saving energy, assisting with benchmarking and tracking energy savings, and offer his or her services to residents
 - v. Join the Energy \$mart Communities Program, identify energy saving projects in the community that improve economic development, support highly efficient demonstration projects, promote energy efficiency to all residents.
 - vi. Organize regular energy education programs
 - vii. Switch all holiday lighting displays to LEDs and hold an annual holiday lighting event that highlights savings to taxpayers by using these super efficient bulbs
 - viii. Promote the municipality as "green" or "Energy \$mart" community with posters and brochures, and encourage citizens groups to join efforts.
 - ix. Form a coalition to organize an annual Energy Fair highlighting businesses and organizations in the community that are promoting energy efficient products and actions.

3. Builder and Contractor Recruitment and Training

- a. Encourage NYSERDA to offer an additional incentive to "hub" contractors: certified Home Performance contractors who perform energy audits and final inspections but do not do hands-on implementation of recommended measures. Support for and recruitment of "hub" contractors would enable individuals such as retired engineers to participate in the HP Program without having to set themselves up to do hands-on implementation of recommended measures; enable the

participation of small independent contractors who do not want to do computer modeling and paper work, but are keen to do the hands-on energy efficiency work; increase overall access to the program in rural areas; give customers the option of choosing a contractor who provides an independent third-party audit and final inspection, avoiding the potential conflict of interest built into the current HP program; facilitate participation of households who qualify for Assisted Home Performance.

- b. Increase the frequency and availability of Home Performance training classes in the Adirondack Region by having a circuit rider trainer who can teach classes wherever there is a minimum number of contractors ready to take the training.
- c. Launch a new training program around the North Country with short, inexpensive evening or Saturday classes in basic skills required for implementation of energy efficiency measures, e.g. air sealing, proper insulation techniques, duct sealing, how to use a blower door, etc. These classes could be conducted by a circuit rider with scheduling assistance from North Country Energy Smart Communities, or they could be offered by professionals at existing academic institutions (North Country Community College, Jefferson County Community College, BOCES training centers, SUNY-Canton). Hub contractors might also help to train satellite contractors or take on apprentices.
- d. Establish a revolving fund to support contractors with high up-front costs for Home Performance Training.
- e. Increase involvement of the building trades, e.g.: Saranac Lake Building and Construction Trades Council.
- f. Engage with Green Jobs NY, and initiative proposing one million retrofits of residential (including multi-family) units in 5 years done with union participation.
- g. Offer Home Performance training through the Building Trades councils for their affiliate members offering full scholarships through Workforce Development Institute for unionists.

Green Jobs/Green Homes NY is a program proposed by the Center for Working Families to perform energy-efficiency retrofits on a million housing units in five years. It aims to jumpstart mass retrofits, remove barriers like lack of capital and green labor shortages, and ensure that greening is an engine for equitable economic growth in New York State. The first million retrofits are currently estimated to amount to more than 30,000 construction jobs – and more jobs in marketing and other program work. <http://www.workingfamiliesparty.org/>

4. *Outreach to Retailers*

- a. Frame the message to retailers in terms of business promotion; being a good member of the community.
- b. Encourage local vendors to investigate and carry new green building products.
- c. Join NYSERDA's Energy Star Retailers Program
- d. Partner with local not-for-profits such as Boy & Girl Scouts to promote energy efficient products such as CFLs in the community
- e. Take back CFLs for recycling as a service to your customers
- f. Have staff trained as Home Performance Contractors and offer Home Performance Audits and inspections to contractors and customers.

5. *Multifamily Building Owners/Operators*

- a. Frame the message in terms of lowered operating and maintenance costs, health and safety of building occupants, and increased building value
- b. Participate in NYSERDA's Multifamily Performance Program
- c. Send staff to Energy Efficient Building Operator Training
- d. Organize energy education workshops for tenants

- e. Provide energy saving tips to tenants

6. *Outreach to businesses and commercial building owners*

- a. Frame the message in terms of lowered operating and maintenance costs, business promotion, being a good member of the community.
- b. Participate in NYSERDA's Small Audit or Technical Assistance Programs
- c. Sponsor community efforts to save energy and reduce GHG emissions
- d. Become a "green" company and promote yourself as such

7. *Outreach to churches*

- a. Frame the message in terms of lowered operating and maintenance costs, comfort and safety, stewardship and well-being of the community.
- b. Have an Energy Audit and implement recommended measures
- c. Sponsor energy education workshops in your faith community
- d. Join New York Interfaith Power and Light <http://www.nyipl.org/>

8. *Outreach to schools*

- a. Frame the message in terms of lower operation and maintenance costs, health, safety and effective learning environment. Wasteful, inefficient school buildings teach students that it's ok to be wasteful and inefficient.
- b. Enroll schools in NYSERDA's Energy Smart Schools Program
- c. Enlist teachers in NYSERDA's Energy Smart Students Program
- d. Engage students in community efforts to save energy and reduce GHG emissions.

9. *Outreach to architects and engineers*

- a. Frame message in terms of professional excellence
- b. Organize technical seminars and conferences that offer Continuing Education Units on building science and green energy technologies

Improve & Enforce Energy Codes

1. Develop advanced codes in Adirondack Communities with more stringent codes, increased training and oversight.
2. Require homeowners, when upgrading, to install more efficient equipment. At this point in time a heating system upgrade or replacement is considered a "repair" within the code and therefore does not fall under any energy code requirements. A modification to the energy code requiring the installation of "high efficiency" equipment and "repairs/improvements" to distribution systems (specifically air distribution systems) would go a long way towards reducing site/source energy usage by homeowners.
3. Communities might institute Residential Energy Conservation Ordinances (Point of sale efficiency codes that impact existing buildings)
4. Train Code officers
5. Enforce energy codes.
6. Maintain ANSI standards such as the Air Conditioning Contractors of America's Quality Installation Standard, which addresses proper design, installation and operation of HVACR Systems. Support proper ongoing maintenance and operation as outlined in ANSI/ASHRAE/ACCA Standard 180-2008, which provides guidance on commercial HVAC system maintenance. These are industry standards that can be used as references for code officials, utilities, etc.

Increase Financing for Energy Projects

1. Create a carbon fund to support energy projects. Tally carbon reductions and sell them for credit.

2. Encourage investment of local government funds in energy efficiency projects
3. Encourage investment of Economic Development Funds in training of energy professionals, energy services businesses, and energy efficiency improvements in commercial buildings.
4. Encourage banks & loan agencies to include energy efficiency assessments in all their building improvement loan packages, including home improvement loans and mortgages. Doing so will benefit their customers and lower the risk of defaults.
5. Encourage Housing Agencies to train their staff to become certified Home Performance contractors, perform Energy Audits on all the homes they service, and leverage NYSERDA project funds wherever possible.