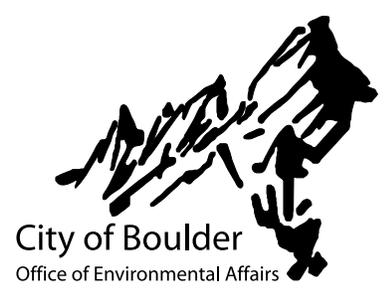




strategies ideas achievements **2007 progress report**



City of Boulder
Office of Environmental Affairs
Climate and Energy Programs
Progress Report - 2007

MARCH 2008

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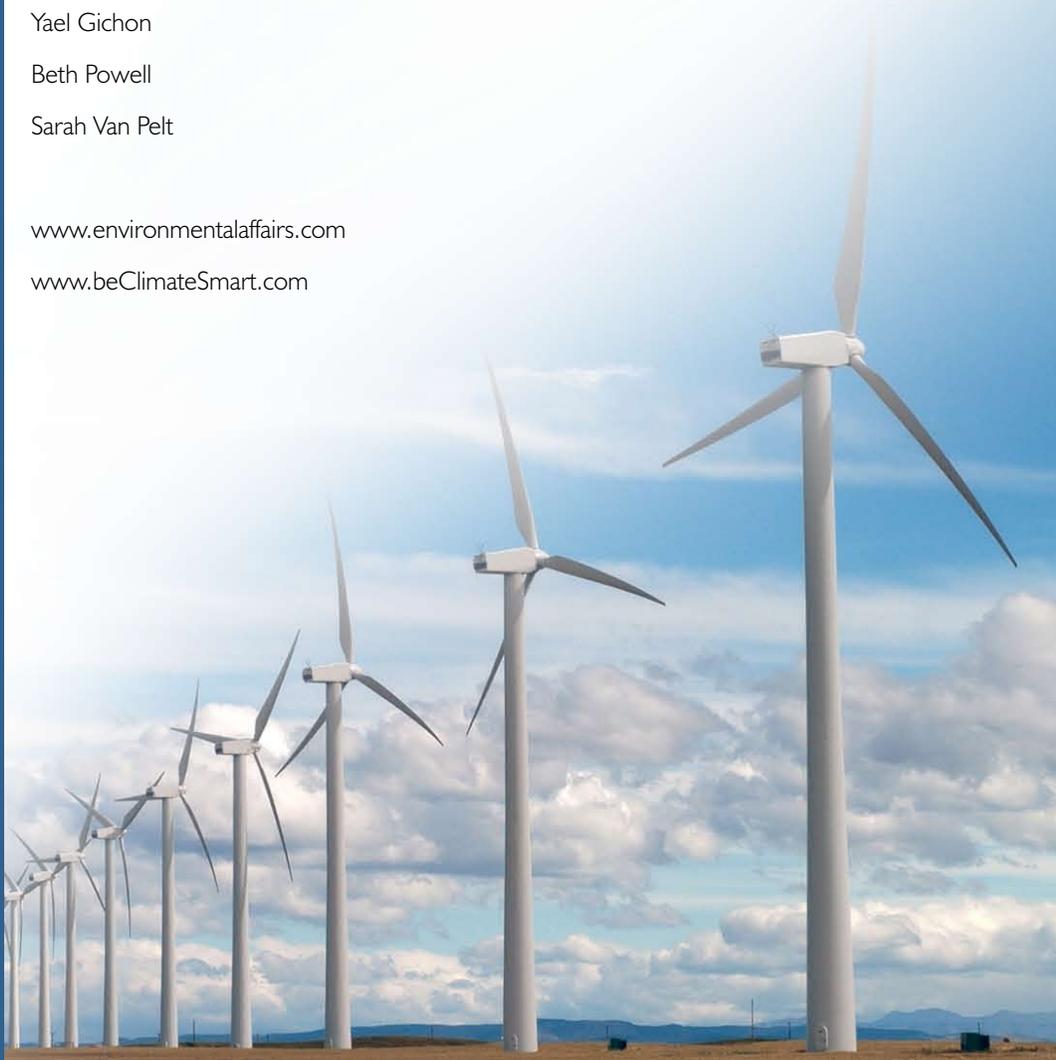




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OVERVIEW

In 2007 the city of Boulder continued to lay the foundation to reduce greenhouse gas (GHG) emissions. City staff from the Office of Environmental Affairs (OEA) and local partners began implementing the Climate Action Plan (CAP) adopted by City Council in 2006. The CAP is a working document that outlines programs that will guide the city's efforts to reduce GHG emissions to meet the goals of the Kyoto Protocol by 2012.

In 2006, Boulder became the first municipality in the nation to tax energy use as a method to fund GHG emissions reduction strategies. This tax was approved by 60% of the November election voters and will be used to fund implementation of the CAP. Beginning in April 2007, Xcel Energy began collecting the CAP tax (based on electricity use) from Boulder customers.

The 2006 GHG inventory revealed an increase in emissions relative to 2005, after three consecutive years of reductions. Implementing the CAP will have a measurable effect on emissions although it may take a few years for reductions to exceed growth in energy use related to new construction.

In 2007 many existing programs were expanded and several new programs and services were implemented. Highlights from 2007 include:

- Began collection of a city-wide carbon tax to fund implementation of the Climate Action Plan.
- Doubled the number of commercial building energy assessments to 35 businesses as part of the Building Performance Program.
- Established a Trade Ally Network to support commercial building energy efficiency improvements and renewable energy systems.
- Expanded the Residential Energy Audit Program by tenfold, serving 300 homes.
- Doubled residential weatherization services, serving 20 homes.
- Held a second neighborhood sweep to provide energy efficiency kits and information to 350 households in Martin Acres.
- Provided a subsidy for or distributed almost 15,000 energy-efficient compact fluorescent lights (CFL).
- Developed and launched ClimateSmart, the CAP's marketing campaign, to engage the community and inspire voluntary action to reduce emissions.
- Expanded outreach and education efforts in the community.
- Continued and expanded partnerships with Boulder County and local communities to offer jointly funded programs under the umbrella ClimateSmart campaign.
- Worked to leverage funds from external sources.
- Reduced emissions from city operations in excess of Chicago Climate Exchange (CCX) requirements.
- Formed the Climate Action Plan Advisory Group (CAPAG), comprised of local technical experts and stakeholders to provide input on CAP implementation and an evaluation of options for increasing emissions reductions.

2007 was dedicated to building the foundation for CAP implementation. Emissions reductions will be realized over time, in response to the city's programs, services and inspirational marketing and community outreach efforts.

CLIMATE ACTION PLAN

City Council approved the Climate Action Plan in June 2006, culminating years of effort by staff, Council, and the community to develop a plan to combat climate change through GHG emissions reductions. The CAP outlines baseline information, including the emissions inventory, and establishes the context for programs and priorities. It also presents emissions reduction strategies for each sector. The primary strategies for reaching the 2012 emission reduction goal are to reduce energy use through conservation and efficiency, shift to renewable energy sources, and to reduce vehicle miles traveled. The specific strategies are based on programs and policies in other communities, utility energy efficiency programs, staff research, and input from the community and Climate Action Plan Advisory Group (CAPAG). The CAP roadmap is continuously evolving in response to new information, legislation and opportunities.





At the request of the Boulder Chamber of Commerce and City Council, staff convened the CAPAG in January 2007 to serve as a technical review body for CAP implementation. Throughout the year the CAPAG met monthly and provided technical expertise and policy guidance regarding program design, development, and implementation with the purpose of meeting or exceeding the city's GHG reduction goals. All CAPAG materials are posted on www.environmentalaffairs.com. The Advisory Group's work will become more important in 2008 as CAP staff works to select pathways for more aggressive emissions reductions.

Section VI of the CAP – The Implementation Plan – outlines the specific programs and actions proposed for 2007 to 2012, with service levels and programmatic details subject to change in response to new circumstances and as targets are achieved. This section reflects participation rates and results that are believed to be reasonable, achievable and slightly conservative, so as not to overestimate results or underestimate the necessary budget. The CAP can be viewed at www.environmentalaffairs.com or www.beClimateSmart.com.

When adopted, the CAP anticipated a gap in emissions reductions necessary to meet the City Council goal by 2012. To address this gap the CAP suggested a purchase of renewable energy credits or RECs in 2013 and beyond, in order to achieve and maintain the GHG objective. City Council chose to eliminate the REC purchase and asked for more aggressive action to reduce emissions. Among other factors, this decision related to a desire to limit the maximum annual tax revenue indicated on the ballot, and also a desire to maximize other emissions reduction strategies and avoid purchasing RECs that require ongoing investment.

Because the CAP assumed that programs, service levels and budget would be adjusted over time, and because City Council requested more aggressive measures as an alternative to RECs, CAP staff is working with the CAPAG (and the city's Environmental Advisory Board) to evaluate additional program and policy options which will inform a City Council study session in spring 2008. Strategies to maximize emissions reductions will likely result in an update to the Implementation Plan in 2008.

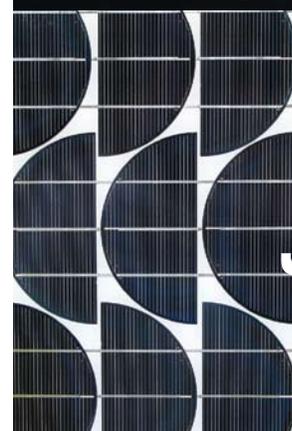
Collaborative Efforts

Internally, staff from the Office of Environmental Affairs has worked with other city departments with the dual purpose of ensuring that the city models the behavior and actions desired in the community and works in a coordinated manner to provide the tools and resources needed for community action to reduce emissions and meet other city goals. Goals and policies within the city's Fleet Services and Facilities and Asset Management (FAM) divisions have achieved emissions reductions for the city organization in the past. New efforts are planned for 2008 that will set the city on a path to increase building efficiency and renewable energy use. More details are provided later in this report. On the transportation front, a new CAP staff member responsible for reducing transportation emissions began coordinating work with the city's Transportation Division and GO Boulder last year. Because a primary CAP strategy for reducing transportation emissions relies on achieving Transportation Master Plan goals, coordination of programs and marketing campaigns will be enhanced in 2008.

The city also expanded external collaborative efforts in 2007. Among local government agencies, Boulder County, the city of Longmont and many of the communities across the county are coordinating on programs and with the ClimateSmart marketing campaign. This coordination was initiated through the Boulder County Consortium of Cities Energy Strategy Task Force (ESTF), which formed in 2006. Collaboration leverages staff and financial resources and better serves the public in addressing regional and global issues.

Boulder County is a key partner in CAP implementation and in researching and designing new initiatives. Their Sustainability Program has provided significant funding for the residential energy audits, as well as funds for commercial and transportation programs. Through their coordination of the ESTF, new policies and programs have been evaluated to identify the most effective future path for consortium participants.

The Governor's Energy Office (GEO) greatly expanded its staff and budget in 2007 and will continue to grow in 2008. The city of Boulder has requested funds and technical assistance to support a variety of programs including building codes training and a residential insulation pilot.



Xcel Energy remains an important partner for the CAP programs. From collecting and remitting the CAP tax to involvement on the CAP Advisory Group, Xcel staff has been an important element of CAP implementation. Xcel's demand-side management (DSM) and Solar Rewards programs provide rebates for energy efficiency and solar photovoltaic equipment and are critical to the success of the CAP. In 2007, Xcel Energy proposed enhancing both programs. The city will participate in the Public Utilities Commission's proceedings on these proposals in 2008 to support the strongest possible targets for energy efficiency and renewable energy.

The University of Colorado at Boulder (CU) plays an important role in CAP implementation by providing students, who through internships or class projects, assist the CAP staff with education and outreach, research, and evaluation of policies. A CU representative also sits on the CAPAG.

Budget

In 2007, funds to implement the CAP were derived from the CAP tax and 2006 trash tax revenues for a total budget of \$860,265. Xcel Energy began collecting the CAP tax on April 1, 2007 so additional funds were needed to provide the first year budget proposed in the CAP. Use of trash tax revenues was approved by City Council to make up the balance.

The budget allocated funds to programs and services for commercial, residential and industrial sectors. The CAP tax rates were set by City Council in the 2006 ballot language and sector rates correspond to the proposed expenditures for the sectors with the following breakdown; residential sector – 58%, commercial sector – 39% and industrial sector – 3%. As sector expenditures change over time, sector contributions and tax rates will also be adjusted.

CAP tax revenues were lower than projected for the year 2007. The primary reason is that April revenues did not equal a complete month's revenue due to Xcel Energy customer billing cycles. Expenditures were reduced to compensate for reduced revenue. In 2008 the tax will be collected for a complete year and revenue projections are in line with the proposed budget which remains unchanged from 2007 at \$860,265.

The CAP called for increasing the budget over time, which would require an increase in CAP tax rates. Rates can be increased to sector limits established in the ballot measure without voter approval. Options for more aggressively reducing emissions and associated revenue requirements will be discussed with City Council during 2008.

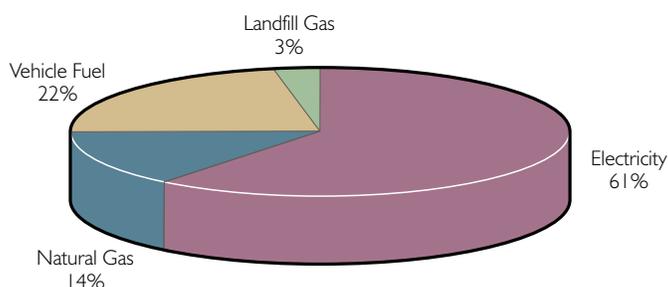
Staffing

As mentioned previously, the Office of Environmental Affairs (OEA), a division of the City Manager's Office, is charged with Climate Action Plan implementation. Over the years, budgeting and staffing levels have varied. In 2006, OEA had one full time and one fixed term employee working on GHG reduction programs. The CAP budget allowed for the hire of four employees who by May 2007 were in place to manage four different areas of focus. These areas of focus are the commercial sector, the residential sector, the transportation sector, and marketing/outreach. Two of the positions are fixed term, expiring at the end of 2008. Program and staffing priorities will be discussed with City Council during 2008.

GREENHOUSE GAS INVENTORY

The inventory was updated in June 2007 to reflect 2006 data using the city's Inventory Maintenance System. The primary data sources are community electricity and natural gas consumption from Xcel Energy, CU operations and generation, annual vehicle miles traveled within Boulder from the city's

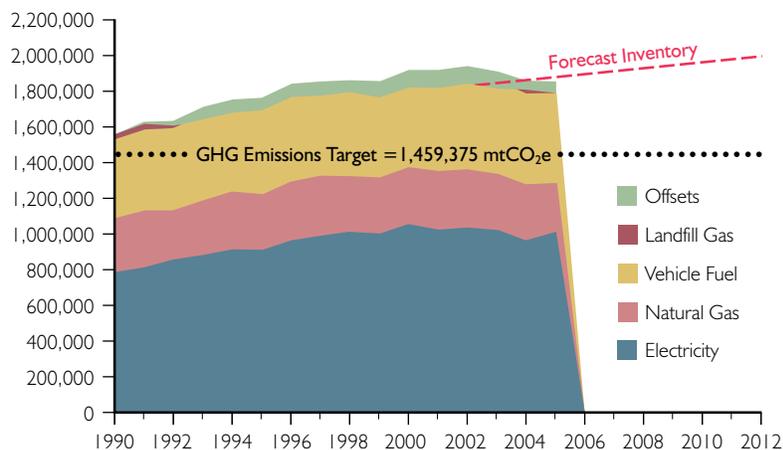
2006 GHG INVENTORY BREAKDOWN BY ENERGY SOURCE



Transportation Division, tons of garbage sent to the landfill, and offsets from the purchase of renewable energy, such as wind power and biodiesel. The system translates these inputs into GHG emissions by sector and by fuel source. Overall, the city's energy use resulted in the release of 1,887,596 mtCO₂. The pie chart shows the GHG emissions per source of energy and indicates that the vast majority of the city's emissions are a result of electricity use.

After experiencing declining GHG emissions from 2003 through 2005, Boulder experienced an increase in emissions of 4.6% in 2006. The 2006 levels are the highest emissions levels since 1990. The following graph depicts the current trends of Boulder's GHG emissions based on energy source. It is important to note that the offsets depicted in yellow actually decrease Boulder's emissions. They are shown at the top of this graph for demonstrative purposes.

2006 ACTUAL INVENTORY BY ENERGY SOURCE



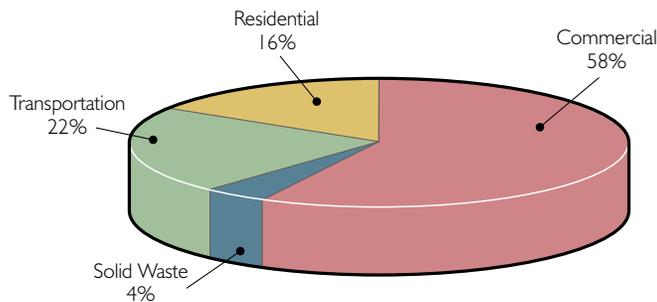
According to Xcel's 2006 annual report to Boulder, total electricity consumption increased by 5.5% in 2006. Possible, but not proven, reasons for the increase are increases in air conditioning from additional systems and longer use, increases in plug loads, and new construction of homes and commercial space. The 2006 increase was also impacted by a 9% increase in natural gas use. However, there was also an increase in the amount of renewable energy purchased either through renewable energy credit companies or Xcel's Windsource program.

Transportation emissions peaked in 2002 and have since fluctuated below this level. However, emissions did increase by 2% from 2005 to 2006. Overall, it appears that efforts to reduce vehicle miles traveled and encourage the use of alternatively fueled vehicles is helping stabilize to emissions in this sector.

The community must reduce annual GHG emissions by 406,489 metric tons from 2006 levels by 2012 in order to meet the goals of the CAP. This represents a 22% decrease from 2006 levels.

Commercial buildings and industrial facilities continue to be the largest source of emissions at 58% of the total. This year, the commercial, industrial and the CU sectors were grouped into one category after it was discovered that Xcel had previously changed sector classifications for various Boulder businesses and CU. Combining the sectors creates consistency for future year to year comparisons. In 2005, the total for the combined sectors was 52%. Thus, these sectors had a 4% increase in the overall percentage of GHG emissions produced in 2006. The chart shows the 2006 emissions breakdown by sector.

2006 GHG INVENTORY BREAKDOWN BY SECTOR



CLIMATESMART PROGRAMS

In general, the city acts as a facilitator to connect residents and businesses to existing resources, to develop and implement policies and programs that fill important gaps, and to provide information to help the community make smart energy choices. Wherever possible, the city promotes existing external resources, such as Xcel's energy efficiency and solar rebates and state weatherization funds. This approach is in contrast to providing direct financing or directly implementing efficiency measures in private buildings. The city's intent is to encourage and facilitate private sector investment in actions to reduce emissions.

Many of the programs initiated in prior years were continued and expanded in 2007, and several new programs were added. As described in the CAP, the primary focus is on energy efficiency, followed by renewable energies. As directed by City Council, initial phases of implementation focus on providing programs and services to support voluntary action to reduce emissions. The need for direct incentives or regulations will be based on reductions achieved with a voluntary strategy. Funds contributed by Boulder County enabled expansion of several program areas without increasing the city's budget or tax rates. To maximize emissions reductions toward the 2012 goal, programs and very likely the CAP budget will need to be expanded in future years.

The next sections will summarize the results of the 2007 programs. All of the listed programs are planned for continuation and expansion in 2008 with some modifications to incorporate results achieved in 2007.

ClimateSmart At Work

ClimateSmart at Work is the umbrella name for programs associated with the commercial and industrial sectors. As mentioned above, these sectors account for 56% of Boulder's total GHG emissions; this number reflects a higher energy use per property than residential units. It is critical that CAP staff work closely with the business community to reduce GHG emissions, while at the same time supporting a vibrant business climate. All programs implemented under the ClimateSmart at Work banner are intended to have significant impact on reductions in Boulder's GHG emissions.

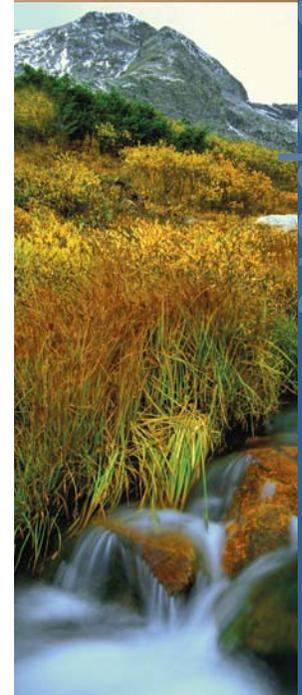
Building Performance Program

In 2005 and 2006, the Building Performance with Energy Star program, where Boulder provided free commercial energy audits and Energy Star benchmarking, was quite successful. However, in 2007 the program was updated to eliminate the Energy Star component and rename the program the Building Performance Program (BPP). This change allowed more funding for actual energy audits, which in turn are expected to lead to greater efficiency improvements. The program also focused greater emphasis on assisting businesses with the actual implementation of recommended energy efficiency improvements.

The BPP is designed to help local businesses and contractors identify energy saving opportunities and receive utility rebates for efficiency projects. This level of service is not offered by Xcel or any other entity in Boulder. The program's primary objectives are to increase efficiency in Boulder's commercial buildings, raise awareness of utility rebates, and better understand the energy-related support needs of the commercial sector. The BPP is administered by a local contractor called Nexant, and has three main areas of focus: energy audits, a trade ally network, and outreach.

Energy Audits

The main component of the BPP is the energy audit. Nexant performs a site survey and walk-through of commercial facilities to analyze the main energy uses and opportunities for improving the energy efficiency of the facility. Renewable energy opportunities are also evaluated. A detailed report is delivered and a follow up meeting with the customer is scheduled to discuss the report and energy efficiency opportunities. Both Nexant and the city maintains contact with the businesses after the audit and follow up meeting to offer ongoing project implementation support.



Trade Ally Network

To help connect the businesses with qualified contractors who can implement the recommended energy efficiency retrofits, a Trade Ally Network (TAN) was developed in 2007. The TAN consists of heating/cooling, lighting, and solar contractors who provide service in the Boulder area. These contractors are encouraged to promote the BPP which in turn increases their business prospects, while the city promotes the TAN by providing a contractor member list to all audited businesses.

Outreach

The BPP was marketed and promoted to the business community through many different channels. CAP staff worked closely with the Chamber of Commerce to present a number of workshops on topics including the BPP program, Xcel rebate programs, commercial solar options, and the Trade Ally Network. Staff also completed presentations at a variety of business groups including Downtown Boulder, Inc., Commercial Brokers of Boulder, and Leadership Boulder County. Other marketing strategies included direct calls, direct and electronic mailings, and local advertising. Print ads included recognition of all 2007 BPP participants and two case studies of savings expected by two local companies who obtained the BPP audit and implemented efficiency projects.

Results

An initial target of 35 audits and an efficiency project implementation goal of 500,000 kWh were set for 2007. An actual implementation goal is believed to ensure a reduction in GHG emissions. To focus the BPP goal on retrofits, the application process was changed to ensure that a company's financial decision maker was involved from the start, and extensive post-audit follow up assistance was provided.

The results from the BPP show that the 2007 program was a success. The program achieved both of the established targets. The most common recommendation made during these audits was an upgrade to lighting systems. The table below shows a comparison of overall results from the last three years.

Results	2005	2006	2007
Buildings Audited	31	15	35
Potential Electrical Savings (kWh)	1,924,526	352,673	4,296,469
Potential Natural Gas Savings (Therms)	46,526	4,857	16,145
Potential Annual Energy Cost Savings	\$220,000	\$17,888	\$341,944
Estimated Capital Investment	\$800,000	\$58,298	\$3,436,804
Average Payback (years)	3.84	3.42	9.64
Potential GHG reductions (mtCO ₂)	2,575	348	4,053

The table reveals significant opportunities for energy savings. At the same time, there was an increase in the average payback time. This is mainly due to the inclusion of projects which tend to carry higher costs such as heating and cooling system replacements.

Below is a partial list of participants in the 2007 BPP program:

- American Outdoor Products
- Aweida Properties, Inc.
- Boulder College of Massage Therapy
- Boulder Community Hospital
- Boulder Theater
- Crispin Porter + Bogusky
- E-Source
- MicroMotion, Inc.
- Ocean First Divers
- Penrose Building
- Pruett Building
- Railhead Properties, LLC
- Ron Smaron Properties
- Qwest
- Shining Mountain Waldorf School
- SmartWool
- Tebo Properties
- Trinity Lutheran Church
- UNAVCO
- Vectra Bank
- Wall Street on Demand
- West Peak Building
- Western Disposal
- WW Reynolds



As mentioned above, in 2007 actual results were sought by following up with previously audited businesses to offer implementation assistance. This effort has resulted in implementation of energy efficiency measures detailed in the table below.

Results	2005	2006	2007
Implementing Businesses	7	5	3
Electric Savings Achieved (kWh)	83,269	142,321	531,710
Natural Gas Savings Achieved (therms)	9,190	2,448	-
GHG Savings Achieved (mtCO ₂)	130	145	490

Small Business Energy Performance Program

Small businesses were underserved by the BPP because of its focus on facilities with greater square footage; this challenge was solved with a partnership with Boulder County to develop a commercial energy efficiency program that focused on the small business sector needs of these communities.

This Small Business Energy Performance Program (EPP) offers an energy audit for small business as well as additional implementation service beyond what was offered to the larger businesses. For efficiency measures the business elects to implement, Nexant acts as a general contractor by hiring subcontractors, reviewing bids, and ensuring proper implementation of the measures. By removing the burden of project management and implementation from the small business owner, improving energy efficiency becomes more desirable.

Results

The table below details the results from the EPP. The audits had a more limited scope than the BPP to focus on measures with shorter paybacks (intended to encourage a high level of implementation) but still found numerous savings potential. While no business has yet implemented efficiency measures, Nexant is currently securing bids for projects at three audited businesses.

Results	2007
Small Businesses Audited	8
Potential Electrical Savings (kWh)	172,979
Potential Natural Gas Savings (Therms)	178
Potential Annual Energy Cost Savings	\$13,528
Estimated Capital Investment	\$51,034
Average Payback (years)	4.96
Potential GHG reductions (mtCO ₂)	161

Industrial Energy Efficiency Workshop

In December, CAP staff sponsored a workshop with the Colorado State Industrial Assessment Center (IAC). The IAC provides numerous services to industrial facilities across the Front Range including audits, engineering assistance and trainings. The workshop was offered to Front Range industrial facility managers and covered topics including Xcel rebates, motor efficiency, compressed air efficiency, and efficient clean rooms. Thirteen industrial facilities were represented at the workshop.

Next Steps

The success of the 2007 BPP & EPP have spurred CAP staff to develop even more flexibility and options for the commercial sector. The energy audits provide a valuable resource to the commercial sector. An encouraging level of participation ensures this program will be expanded in 2008. However, an important outcome for this program in 2008 is that an energy audit translates into retrofits and actual GHG reductions. The energy audits project the potential savings, but it is up to the facility owner to implement the suggested recommendations. In 2008, staff will focus on developing stronger relationships with the business sector to encourage and facilitate the maximum number of retrofits possible.



One goal for the program in future years, based on an identified need for more flexibility in service offerings, is to add more services to the core audit offering. In 2008, BPP will become part of the ClimateSmart at Work commercial program suite and will offer an expanded level of service including workplace trainings, rebate assistance, and bid review. Also, as mentioned previously, continuing to develop key partnerships will be a priority. The first priority is a collaboration with Xcel and their commercial energy assessment program launched in October 2007. To capitalize on Xcel's offerings, the 2008 ClimateSmart at Work program will incorporate the Xcel energy assessments (audits). This will allow city of Boulder tax dollars to be stretched further to offer more audits and other services to the community.

Additional collaboration with the IAC will bring more service offerings to the large industrial customers in the city of Boulder. Capitalizing on the IAC's expertise and contacts will help the city design appropriate services for these customers.

Finally, collaboration with GO Boulder and Partners for A Clean Environment (PACE) will lead to a comprehensive program that will provide a suite of services to help businesses reduce their carbon footprint.

ClimateSmart at Home

Residential Energy Audit Program (REAP)

The Center for ReSource Conservation (CRC) administers the REAP in partnership with the city of Boulder, Boulder County, Longmont, and the town of Superior. The program provides low-cost, professional energy audits and energy conservation information to participating homeowners. The homeowner's cost is based on the home's conditioned square footage, and ranges from \$100 to \$250. The city of Boulder and Boulder County each provide a \$100 subsidy for each audit, which is provided by local energy service professionals and includes a blower door test, insulation assessment, and appliance and HVAC system assessment. The homeowner receives a report with an analysis of energy usage gathered from a history of utility bill data, a series of energy efficiency recommendations, and a list of qualified contractors to perform the recommended work. After the report is received, the homeowner also receives a survey to collect data about their experience and planned energy efficiency improvements.

Results

The first step of the REAP asks the homeowner to submit their utility bill data which is analyzed by the auditor and reviewed with the homeowner. The homeowner signs a waiver permitting the program to collect utility bill information one year after the audit in order to measure actual changes in energy consumption. Results are measured as soon as one year's worth of post-audit data is collected. The data is normalized for weather using 'heating degree days'. Data collected one year post-audit on the 15 homes that were part of the pilot in 2006 revealed 23% natural gas reductions and 21% electricity reductions.

While the program has not collected information about which measures were implemented in these homes, it is believed that at least four homes installed solar electric systems and that the pilot participants are likely to be 'early adopters' (i.e. enthusiastic and ready to implement measures). Therefore, these results could be higher than what might be seen after a full year of regular program implementation.

Following a successful pilot, 2007 was the first full year of implementation with 224 audits completed in the city of Boulder. There were five energy professionals performing audits for the program. Each visit was preceded by a visit from the CRC program manager who completed an initial utility bill analysis, performed a thorough inventory of all the energy loads in the house, collected basic household information (appliances, systems, characteristics of the house),

Utility Bills as a Diagnostic Tool

Utility bill history is an underutilized source of diagnostic information about household energy saving opportunities. This data provides a recorded history of how much energy is actually being consumed by a house. By analyzing this information along with some basic characteristics of the house, energy professionals can easily identify opportunities for savings before even visiting the house.



distributed compact fluorescent light bulbs (CFLs), and a packet of educational information including a list of contractors qualified to complete the work typically recommended.

A standardized reporting database is under development and will improve audit report comparisons. A random sample of the 224 audit reports for 2007 reveals that insulation and air sealing are the top two recommended implementation measures. Beginning in the second quarter of 2008 the program will compile utility bill data from audits that were performed in the first quarter of 2007; these results together with survey results will provide data on actual energy savings and measures implemented.

Evaluation and Analysis

CAP staff contracted with a local consultant, Synertech, Inc., to evaluate the REAP program. Synertech produced a detailed report analyzing various components of the program: the audit, analysis tools, information distributed, audit reports, and contractor training. The primary recommendations were to:

- Optimize the effectiveness of the technical audit process (tools used, tests conducted, and organization of the visit).
- Improve reporting format and include information on estimates of anticipated costs and resultant savings.
- Improve the utility bill analysis section to include a breakdown of fuel types and carbon equivalents.
- Add a printable worksheet to the report that allows the resident to set goals.
- Update some of the technical information in the literature distributed.
- Implement quality control in contractor recommendations and training and certification for contractors.
- Expand the scope of the program to include townhouses and apartments.

These recommendations were taken into consideration in the last part of 2007 and will be implemented further in the 2008 program design. To view the complete report by Synertech, visit www.environmentalaffairs.com.

Next Steps

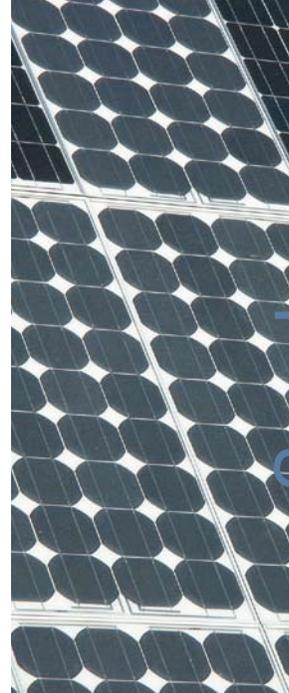
A few key program improvements will be made based on experience and evaluation of the 2007 program. The program will transition from providing a pre-audit visit to conducting an in-depth phone consultation with the resident discussing areas of concern and collecting data prior to the technical audit. The time spent at the home by the technical auditor will be extended, allowing them to conduct education both during the audit and after the audit. This change saves greenhouse gas emissions associated with two vehicle trips and saves time for the homeowner.

In order to provide a more comprehensive list of local contractors available to perform specific energy efficiency upgrades, the CRC released a Request for Information (RFI) to local contractor networks and other outlets in the fall of 2007. The RFI asked local contractors to provide detailed information about their services, pricing, certifications, training or other relevant qualifications. This information will be published in an expanded contractor referral list so that homeowners may make informed decisions while selecting contractors.

The RFI also requested applications from new, qualified energy auditors in the community to contract with the REAP program. In March 2008, the CRC will announce an expanded number of auditors participating in the program.

CAP staff hopes to expand the contractor network into a trade ally network in 2008, working with other local organizations such as the Boulder Green Building Guild and E-Star Colorado. The network would be a forum for contractors to share information, attend trainings, and commit to working with ClimateSmart to meet the program's goals.

In addition, a need for consistent reporting was identified, both for the resident's benefit and for program managers to collect program information and track results for one year after each audit. A database to be completed in 2008 will allow the REAP program to generate reports summarizing recommendations, average payback and energy savings potential, and analysis





showing actual results one year post audit. Each auditor will have access to a license of the software to standardize reporting in the program.

Lastly, the Governor's Energy Office (GEO) is offering a matching grant for an insulation and air sealing rebate program. The city will apply for funding and incorporate this incentive into the audit program, requiring an energy audit as a prerequisite for a rebate.

Neighborhood Sweep

Inspired by direct install programs across the country and a successful 2006 Boulder pilot, the city of Boulder partnered with Longs Peak Energy Conservation (LPEC) again to coordinate the 2007 ClimateSmart Sweep during October, national Energy Awareness Month. The Sweep distributed free energy and water conservation kits door-to-door in Boulder's Martin Acres neighborhood, targeting an 800-home area. With help from volunteers and student workers from the University of Colorado at Boulder's (CU) Environmental Center, 350 kits were distributed along with energy conservation and sustainability information. The kits contained CFLs, water reduction aids, energy and water conservation information and a card offering the resident an opportunity to sign up for a free ClimateSmart Visit (CSV).

Improved aspects of the 2007 program:

- A consistent template for the educational materials which incorporated up-to-date information and data collected from a variety of sources in the community.
- A menu of educational materials available was shown to the resident who could then select topics of interest. This approach saved paper and allowed the resident to choose the information they wanted.
- Volunteers and staff delivering kits integrated a direct install component to the kit delivery by offering to replace incandescent porch lights with a CFL.
- Each kit offered a resident four CFLs. To receive an additional four, the resident was asked to remove four incandescents from their home, almost ensuring a direct install of four CFLs by the resident.
- A more in-depth ClimateSmart Visit (CSV) was offered on a first-come, first-served basis for 80 households visited through the Sweep. At the CSV, LPEC-trained staff conducts a mini-audit providing key energy efficiency recommendations, provides educational information to the resident about how their home works (ex: programmable thermostat, water heater temperature, etc.), and loans a whole house energy monitor to the homeowner (see side box on previous page).

Whole House Energy Monitors

Whole house energy monitors provide instantaneous feedback to homeowners by connecting into either the house's breaker box or the electric meter. The device sends wireless information to a display visible inside the house. Most models provide instantaneous electricity use along with expected electricity costs. As appliances, lights, and other electrical loads are turned on and off, the display reflects the household's energy draw from the grid. Existing studies show that providing direct instantaneous feedback on household electrical demand can reduce energy consumption by 10-15%. The city is piloting the installation of these in the CSV homes and will implement a loan program for these devices in 2008. See www.environmentalaffairs.com for more information.

Affordable Housing Partnership

ClimateSmart Kits were assembled and delivered to two affordable housing agencies in Boulder, Boulder Housing Partners and the city of Boulder's Department of Housing and Human Services (HHS). At Boulder Housing Partners, the ClimateSmart Kits were distributed to tenants as they moved in, as a welcome gift basket. At HHS, the kits were given away to participants in home ownership classes through the affordable housing program. These kits had identical contents as Sweep kits but did not offer the CSV.

Results

Sweep Kit distribution

A total of 34 volunteers knocked on 800 doors and distributed 350 kits. 109 of those kits contained four CFLs, and 241 kits contained eight CFLs, for a total of 2,364 CFLs distributed. A

total of 489 incandescent bulbs were decommissioned through the CFL swap. The average kit recipient received 6.75 CFLs and gave up 1.4 incandescent bulbs.

- Resident at-home rate: 44%
- Bulbs distributed: 2,364
- Total electrical savings: 1,016,520 kilowatt hours (kWh)
- Total energy cost savings: \$92,503
- CO₂ emissions reduction: 939 mtCO₂

Resident Feedback

The method of acquiring feedback from residents was to include postage-paid comment postcards. We received 21 responses, a response rate of 6%.

- 76% owned their homes, 33% were 2-person households, 14% were 1-person households, and 14% were 3-person households.
- 67% of the correspondents were expecting the Sweep visit because they had seen advertising yard signs or heard about it through the Martin Acres Neighborhood Association (MANA).
- 76% of the respondents said the visit was very useful.
- 71% said the visit helped them learn more about energy and its environmental impacts.
- 95% recommended that the city of Boulder distribute more kits.
- 52% installed more than 7 bulbs from the kit.

Affordable Housing Kits

- 300 kits were delivered to Boulder Housing Partners. If all of the bulbs are installed, residents will save 1,212,000 kWh over the life of the bulbs. This represents energy cost savings of \$110,292 at today's electricity prices and an emissions reduction of 1,119 metric tons of CO₂.
- 181 kits were delivered to HHS, who distributed them to participants in their affordable home ownership programs. If all of the bulbs are installed, residents will save 731,352 kWh of electricity over the life of the bulbs. This represents energy cost savings of \$66,553 at today's electricity prices and an emissions reduction of 675 metric tons of CO₂.

ClimateSmart Visits (CSV) and other results

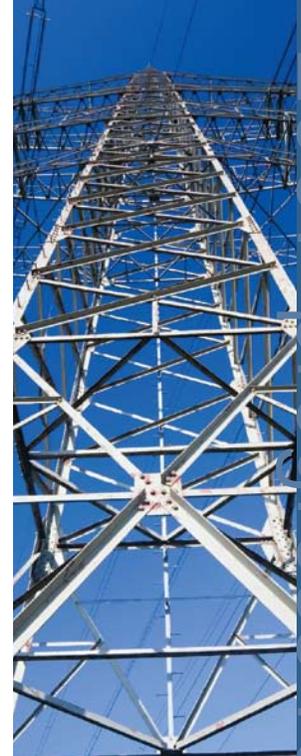
LPEC began conducting the CSVs in December 2007. At the time of this report, as only 11 of the 80 visits were completed, it is too early to report results. Below are recommendations from the 11 visits:

Recommendation	Number of homes (11 total)
Wall Insulation	11
Attic Insulation	8
Air Sealing	6
Replace Refrigerator	6
Replace Furnace	5
Duct Sealing	3

Other results not quantified at this time include energy reductions associated with showing people how to use their programmable thermostats and other tips such as how to reduce energy use in the summer without air conditioning. The emphasis for the CSV is to make reasonable goals for energy conservation and efficiency and fit them into the resident's existing plans for remodeling, moving, or retirement. Lastly, interested residents receive a loan of a whole house energy meter (see side box on pg. 12) for two months along with educational information on how to interpret data and realize energy saving results. LPEC will collect utility bill data to measure results.

Next Steps

Overall, this popular program is regarded as successful. Resident and volunteer feedback has





been very valuable and will inform planning for 2008. There are several improvements planned for 2008, such as increasing visibility, reducing per unit costs, ensuring the program is simple yet effective, building on community strengths and past experiences, and exploring other electricity-saving devices besides CFLs. The neighborhood chosen for the 2008 Sweep will, as in past years, represent an area with older, typically energy inefficient homes.

During the 2006 Sweep, 63 pilot homes received a one-hour follow-up energy audit. In these homes, the top recommendation was to increase the amount of insulation. LPEC has begun a pilot program surveying the recipients of these audits to understand which measures were completed and plans to offer incentive rebates for insulation installation and duct sealing.

Home Performance with ENERGY STAR (HPwES)

HPwES is a nationally recognized program developed and supported by the ENERGY STAR program to support a market for whole-house retrofits. The aim of the program is to increase the energy efficiency, comfort, and durability of homes using a holistic approach to building science that addresses the building envelope, heating and cooling systems, and appliances. In 2005, the city of Boulder partnered with the Fort Collins Utilities, E-Star Colorado, Colorado Springs Utility, and ENERGY STAR to offer technical training on home energy analysis and systems-approach retrofits to three area contractors.

In 2007, Boulder partnered once again with E-Star Colorado, ENERGY STAR, Fort Collins Utility, Colorado Springs Utility, Johns Manville, and Comfort Air to provide another round of training to local contractors. A large effort was placed on contractor recruitment and qualifications to ensure contractors would be successful incorporating building science and home performance into their business models. The recruiting process was a tremendous success that brought a high level of knowledge, experience, and dedication to the training.

E-Star hired Saturn Resource Management for this round of training, which included an online training tool. There were five classroom days and four field training days covering building science principles, blower door measurements, moisture management and ventilation, a home performance assessment checklist, performance modeling and sales strategies. The field training days covered work in three different homes, completing assessments and installing home performance improvement measures. The combination of classroom and field training proved to be a successful method for teaching this complex topic, combining theoretical concepts and hands-on experience with real world scenarios.

A nationally recognized Energy Analyst certification by the Building Performance Institute (BPI) was incorporated into the training. Contractors completed both a classroom and field exam to receive this certification. Lastly, the contractors are in the process of completing five projects with a mentor representative from the program, which involves comprehensive audits at five homes using the ENERGY STAR tools and analysis techniques.

Results

Seventeen companies from Boulder, Fort Collins, and Colorado Springs committed to the training program. Each company was offered two spots in the training. In total, 34 contractors were in attendance. Included in these numbers were four existing Home Performance (HP) contractors returning for additional training. Of these contractors, there were twelve participants from Boulder representing eight companies.

These professionals are now equipped with knowledge and tools to conduct HPwES analysis in their work. The city of Boulder recognizes the importance of training and increasing the number of local, qualified contractors to implement high quality energy efficiency improvements that will support the CAP goals.

As energy efficiency continues to be a growing concern with regard to existing housing stock, the city of Boulder will continue to financially support contractor training and education and will collaborate with key partners in government agencies, non-profits, and utilities throughout the state to further support this market transformation.



Next Steps

Plans to collaborate with E-Star Colorado in 2008 include a scope of work with the following goals:

- To support existing HPwES-trained contractors and demonstrate the validity of the HPwES performance contracting approach in Colorado.
- To complete 200 HPwES projects throughout the Front Range (an average of ten projects per trained HP contractor).
- To monitor and maintain the integrity of the program.
- To attract new funding that will support program growth in 2009.

Some strategies to achieve these goals are to:

- Coordinate program promotional activities among E-Star Colorado, program sponsors and contractors.
- Document results of HPwES projects.
- Promote financing opportunities for HPwES projects through regional funding opportunities.

Additionally, the city will work to continually promote HPwES contractors through other existing programs and organizations, such as the REAP and Boulder Green Building Guild. Plans also include the gathering and publication of quantifiable results into HPwES case studies.

Multifamily Housing Energy and Water Assessment Program

In 2007, with support from the city’s Water Conservation Office, the energy and water efficiency program for multifamily facilities realized significant progress over 2006. This program was named the Multifamily Performance Program (MPP) and was administered by the Brendle Group. The multifamily housing program is an important one as approximately 55% of the Boulder residents live in multifamily dwellings. The objectives of the program are to increase the energy and water efficiency of the buildings and reduce utility costs for residents. The program also seeks to better understand the utility usage, savings potential, demographics, and needs of Boulder’s multifamily housing stock.

The program had a 2007 goal of providing free energy and water assessments to 15 multifamily buildings. Staff promoted this program through press releases, outreach to the Boulder County Rental Housing Association, and direct contact with property managers.

Results

The 2007 MPP performed energy and water assessments at 13 facilities. These facilities varied from apartment and condo complexes to assisted living facilities. While it is a benefit to serve so many different types of facilities, the main challenge with the program is the variety of facilities. For example, some buildings are managed by property managers, while some are managed by an HOA. Some have combined heating/cooling, while others have individualized heating/cooling. Nevertheless, the program has found great potential for energy and cost savings. The table below details the results:

Results	2006	2007
Facilities Audited	4	13
Potential Electrical Savings (kWh)	96,220	614,240
Potential Natural Gas Savings (therms)	13,666	37,373
Potential Water Savings (gal)	2,846,400	4,391,800
Potential Annual Energy Cost Savings	\$33,897	\$104,110
Estimated Capital Investment	\$59,190	\$319,295
Average Payback (years)	2.33	2.78
Potential GHG reductions (mtCO ₂)	168	766





Next Steps

This program will continue in 2008 with a goal of completing 15 energy and water assessments. As with our BPP, a primary goal is to facilitate the actual implementation of the audit reports' recommended energy efficiency measures. To that end, post-audit follow up with financial decision-makers will be strongly emphasized.

An outreach program to reach the audited buildings' residents is in planning stages for 2008, and will entail door-to-door visits to provide conservation information and energy/water saving devices. A staffed ClimateSmart outreach table will be arranged for some of the larger buildings.

Weatherization Program

Program Design

The city of Boulder contracts with LPEC to offer free weatherization services to income-qualifying, owner and renter-occupied households not served under the existing countywide weatherization program. Sample measures include installation of CFLs, additional insulation, programmable thermostats, duct sealing, furnace repair and replacement, refrigerator replacement, and a combustion safety inspection. Under this program in 2007, 20 homes were retrofitted with a variety of energy efficiency measures – an increase of 100% from 2006.

Results

This table summarizes the energy retrofits that were completed at the 20 properties through the city's weatherization program in 2007. In 2008, the program will report actual energy savings achieved by these measures through utility bill analysis.

Action	Number of homes
Attic insulation	6
Wall insulation	5
Foundation perimeter insulation	4
ENERGY STAR furnace upgrade	5
ENERGY STAR refrigerator upgrade	5
Duct sealing	11
Compact fluorescent light bulbs	19
Programmable thermostat	4
Window storm or replacement	7
Misc measures*	20

**examples - water heater treatments, air infiltration sealing, weather-stripping, combustion safety testing*

While it is difficult to attribute specific energy savings data to certain weatherization improvements such as added insulation, it is estimated that 50% of the average home's energy demand is from heating and cooling. One of the most effective ways to reduce these energy loads is to have adequate insulation and sealed ducts to prevent heat loss in unconditioned spaces.

The furnaces replaced through the weatherization program were 60-65% efficient. The replacement ENERGY STAR furnaces are rated 90% efficient. This level of increased efficiency can save 15% per year in natural gas costs.

Over 323 CFLs were installed in the homes serviced through this project, an average of 17 per house in 19 homes. This energy efficiency measure saves 177,650 kWh over the life of the bulbs and prevents 164 mtCO₂ from being released into the atmosphere.

The response to this program in 2007 was successful due to ClimateSmart and LPEC's outreach and marketing efforts and an increase in maximum annual income qualifications for a one-person household to \$47,000. By December 2007, a waiting list for 2008 was generated. 2007 was the first year this program was opened to renters, a decision intended to address the challenge of split incentive between landlords and tenants. Half of Boulder's housing stock consists of rental properties. As only one household weatherized this year was a rental property, marketing efforts in 2008 will target more rental properties.

Previous Year Results

In 2007, the program collected utility bill data from 14 homes that were weatherized in 2005-2006. This data provided actual energy savings achieved in these homes as well as simple payback. The results are shown as totals for the 14 homes; the simple payback result is an average of the 14 homes.

Results from Utility Bill Analysis of 14 homes Weatherized in 2005-2006

Annual Gas Saved (therms)	3112
Annual Gas Savings (\$)	\$ 2,894
Annual Electricity Saved (kWh)	1533
Annual Electricity Savings (\$)	\$138
Retrofit cost (\$)	\$38,041
Average Simple payback (years)	12.5
GHG gas savings (mtCO ₂) Annual	16.5
GHG electricity savings (mtCO ₂) Annual	1.4

Since greater energy savings opportunities exist in homes with high consumption, the program coordinator recommends targeting homes that show high energy consumption usage where more cost and energy savings are likely. A possible way to approach this is to use pre-weatherization utility analysis to plan retrofits and limit expenditures where energy consumption patterns appear to be relatively low. Additionally, developing techniques to evaluate and address consumption in homes where electrical load has higher potential for savings than gas consumption might improve this program.

Next Steps

In 2008, this program will continue at similar funding levels. Some program changes may involve sharing the cost of replacement furnaces with the resident to allow the program budget to serve more homes, to seek funding for appliances through Energy Outreach Colorado, and to include general education on household transportation and greenhouse gas emissions. The primary goal will be to target homes with maximum savings potential and focus on innovative ways to address electricity reductions.

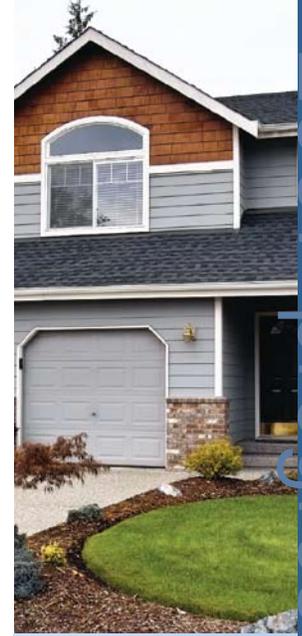
LED Holiday Light Exchange

In response to the increasing availability and popularity of LED holiday light strands, the CAP team organized a LED holiday light exchange. LED light strands use approximately 90% less electricity than traditional, incandescent strands and this program was seen as a great opportunity to reduce energy use during the holidays. As LED strands are relatively expensive, they were offered at a reduced price to Boulder residents who exchanged a working incandescent strand for each LED strand. This exchange ensured that each incandescent strand was removed from use and a recycling program ensured that all strands were properly disposed of.

This program was initiated as a pilot with about 700 strands available for purchase. However, community turnout at the event was remarkable and it soon became clear that demand for these products was extremely high. About 300 residents were turned away but CAP staff was able to secure another shipment and more than 1500 strands were eventually exchanged. This event was a great win-win opportunity to showcase the city's efficiency goals, and community members were pleased to save both money and energy. A larger program will be planned for 2008, most likely to include local retailers.

Results:

- 1,577 strands exchanged
- Approximately 400 households served
- 12.5 metric tons (27,480 lbs) of CO₂ emissions avoided





Shanahan Neighbors for Climate Action

In South Boulder, over 125 households in the Shanahan Ridge Neighborhood have formed Shanahan Neighbors for Climate Action (SNCA), a grassroots neighborhood organization dedicated to creating a strongly connected community working together to foster a sustainable future. SNCA is a fantastic model of the power of a community coming together to support a common cause. The neighborhood group has self-organized to create a campaign focused on reducing GHG emissions. Shanahan neighbors are pioneering the way for what is possible for neighborhoods – and other groups wanting to make a tangible difference – to accomplish.

SNCA's approach to reducing emissions is focused on three strategies:

- Fostering a strong sense of community, and using this to encourage environmentally sustainable practices.
- Providing a forum for the exchange of ideas and information related to human impacts on the environment.
- Creating a program focused on reducing the neighborhood's GHG emissions with a target of 22% below 2006 levels, in line with the obligations of the Kyoto Protocol and the city of Boulder's ClimateSmart campaign.

The ClimateSmart campaign is excited to support groups that are organizing around energy awareness. This support ranges from funds for printing materials to staff presentations about energy conservation, efficiency and other ClimateSmart programs. Staff recognizes the integral role that neighborhood groups can play in the overall effort of GHG emissions reductions in Boulder.

Green Heart Institute

As SNCA began to organize, the city connected the program leaders with the Green Heart Institute (GHI) to pilot a carbon reduction program in the neighborhood. The GHI is an educational program that teaches individuals, organizations, and communities (including neighborhoods and faith communities) to reduce their environmental impacts through conservation, increased energy efficiency, and use of renewable energy. The goal of the program is to support people with efforts to reduce their carbon footprint and expenses associated with energy consumption in homes, businesses, and places of worship.

The GHI program performs an Eco Audit™, collecting data about a participant's home including size, age, appliances, and heating and cooling systems. Other variables such as vehicles and mileage driven, number of people in the household, temperature, monthly electrical usage, natural gas consumption, gasoline, flight miles, pounds of trash, and recycling are also recorded. The GHI program uses customized software to compile this data as well as track future energy bill data. The program also keeps track of any carbon offsets that participants purchase, as well as other carbon reducing activities people have chosen. GHI collects at least twelve historical months of energy bill data to achieve a participant's baseline, and then collects the data monthly, tracking and comparing year-to-year changes.

Initial Implementation and Pilot Results

Together, GHI and SNCA developed a volunteer committee to promote the program and to enlist volunteers to learn to perform the Eco Audits. GHI provided training for the volunteers on the software program and Eco Audit techniques. The GHI provided Eco Auditor training in three, 3-hour classes, which included these key steps:

- Sustainability education, focusing on supporting individuals and the process of change;
- Educational presentation and software use;
- Recommendations and consulting.

Throughout March, April, and May of 2007, volunteers and staff from GHI provided Eco Audits for 28 families, collecting the baseline data and providing a report and recommendations. During this time, the web tracking became available on-line and GHI began collecting the household data for each month. After 2.8 months, results for 23 of the 28 participants have been compiled. The same months of energy use in 2006 were compared to the same months in

2007. Preliminary results show an 11% cumulative reduction in greenhouse gas emissions, with a few participants reducing up to 18% including reductions in airline flights. OEA contributed funds to support GHI's work with these 28 households.

Next Steps

The GHI program continues to collect data from the 28 households involved in the pilot. Collecting a full year's worth of data post Eco-Audit and further analysis into actual efficiency measures implemented will allow further evaluation of this program and create strategies to expand this initiative in the community. GHI has plans to enroll 30 additional homes in the Shanahan neighborhood as well as engage in a large-scale effort with 300 homes in nearby Lyons, Colorado. Other neighborhoods are using the SNCA model to organize around climate action. The newly formed Greenlands group in the Newlands neighborhood is one example. The city is currently communicating with this group to support their efforts. 2008 plans include developing a neighborhood/household recognition program in 2008 to create awareness about these groups and inspire others to mobilize.

Home Energy Makeover Contest

The Energy Makeover Contest is a new and creative way to promote energy efficiency. Contest organizers award a major home energy efficiency retrofit to two inefficient homes in a highly visible demonstration of the dramatic energy reductions possible. The Energy Makeover Contest educates consumers about the whole-house approach, making it a promising promotional avenue for existing Home Performance with ENERGY STAR (HPwES) contractors – see page 14 for more information on HPwES.

Xcel Energy and the Colorado Energy Science Center (CESC), a local non-profit organization, have completed two contests over the past few years. The 2006 contest attracted 16,000 applications in the Front Range of Colorado and the two winning homes reduced their natural gas use by over 70%.

Benefits of an Energy Makeover Contest include:

- Provides a demonstrable communication forum around energy efficiency.
- The contest entry process generates a list of pre-screened homeowners interested in energy efficiency.
- Lead generation for energy retrofit work that Home Performance contractors can perform.
- Fosters industry collaboration among program sponsors, product manufacturers, retailers, and local energy efficiency companies working together to give the winning homes a whole-house makeover that produces optimum results.

Boulder Contest Results

In 2007, the city of Boulder's OEA and Water Conservation Office partnered as a sponsor of the contest to guarantee that one of the two winning homes would be in Boulder. CESC worked with the city and Xcel Energy to recruit sponsors willing to donate their products and services for two home makeovers. Applications to enter the contest were advertised through Xcel Energy's utility bill inserts and the city's marketing and advertising channels. There were 500 applicants from Boulder. The most energy-inefficient home that met other program criteria was selected for the makeover.

The winning home was a 1200 square foot home built in 1902. A professional energy analyst completed an initial analysis of the home, providing a list of recommendations. The analysis showed that the home's energy performance was 280% worse than one built to today's energy code. After improvements are made the home will be analyzed again to "test-out" (i.e. see the actual impact of the improvements). Improvements are scheduled to be completed in February 2008 and are estimated to be valued at approximately \$20,000-\$25,000.

Improvements include:

- Insulation and air sealing
- Installation of a tankless water heater
- Installation of a high efficiency furnace





- New windows and window coverings
- New doors
- Complete lighting retrofit
- Water conservation measures such as low-flow toilets, high efficiency washing machine, and low-flow showerheads.

Next Steps

In early spring 2008, the city will hold an open house at the Boulder home to showcase the sponsors and the improvements completed in the home. A detailed case study showing energy savings and the cost of each measure will be provided. After one year, utility bill data will be collected on the home which will provide actual energy savings achieved. Lastly, the city is working with a local energy professional to analyze the energy use data from the 500 applicants to create an outreach plan to encourage these homeowners to complete energy efficiency retrofits based on their homes' individual needs.

Lighting Program

Program Design

Early in 2007, CAP staff attended regional meetings with representatives from utilities (both municipal, investor-owned, and cooperatives) and power producers from the Front Range to discuss a regional lighting program. Fort Collins Utility has run a successful lighting program for a number of years. The Fort Collins program was studied and a regional Front Range collaboration was explored. The Front Range cities eventually decided to postpone coordinated marketing efforts to the future, possibly launching a coordinated incentive program in 2008.

While Boulder did not participate in a regional effort, the city launched an efficient lighting coupon program in local hardware stores in October 2007, coinciding with ENERGY STAR's Energy Awareness Month and taking advantage of Xcel's DSM lighting program incentives (see page 5). Co-marketing efforts between the ClimateSmart program and McGuckin Hardware, Sutherlands, Ace Hardware, and Table Mesa Liberty Hardware promoted the program, which provided an in-store discount coupon for the purchase of CFLs. The discount structure followed a model from previous regional lighting programs that proved successful; it was provided in the store and each hardware store invoiced the city monthly for the rebate. The incentive offered the following discounts: \$1.50/single bulb; \$1.00/ each bulb in a multi-pack, and \$2.00/specialty bulb.

Results

Through this program, ClimateSmart helped incentivize the purchase of approximately 7,930 CFLs. 4,361,500 kWh will be saved over the life of the bulbs and 4,026 mtCO₂ will be avoided. This program provided an average subsidy of \$1.31/bulb. Some retailers offered an additional discount structure for CFLs, resulting in an even greater price reduction for consumers.

Next Steps

This program allowed ClimateSmart to continue building relationships with Boulder-based hardware stores, opening the possibility for future collaborations. A future possibility is the creation of in-store ClimateSmart kiosks that supply information on energy efficient products and direct customers to shelf locations.

Program plans for 2008 will eliminate the actual coupon, and the city's subsidy will likely be provided to the store to be used during their inventory purchasing process. The discount will still be passed on to the customer through the store's regular sale process but this method will save paper and administrative time and costs, and program results can still be measured through sales data. Program marketing would need to be more aggressive since the coupons provided the benefit of program awareness and recognition. In-store signs will still serve as a powerful incentive and awareness tool.

Another need to be addressed in 2008 is local disposal options for CFLs due to their mercury content. Currently the Boulder County Household Hazardous Waste Facility is the only local op-

tion for proper disposal. Having more convenient locations around town could facilitate proper disposal of used bulbs and would serve as an educational tool about CFL disposal.

In 2008, greater collaboration with Xcel's program could encourage promotions through a greater number of Boulder stores. ClimateSmart can subsequently fill gaps where incentives are not being offered in the community. Staff will also explore regional efforts and engage in partnerships where there is a logical opportunity.

Energy Green Teams

The Green Teams were created in 1996 as a collaborative effort between OEA and the CU Environmental Center's recycling program. Over the past ten years, this program has demonstrated an ability to improve the quality and quantity of residential recycling in predominantly student neighborhoods in Boulder.

This city/campus effort remains unique in the country. Its success is predicated on training student conservation leaders with accurate procedural information and providing them with promotional materials. These leaders work in small teams, making face-to-face contact with fellow students living in Boulder neighborhoods with high concentrations of student-rented households.

The past two years have revealed heightened interest in the Green Teams. A renewed emphasis was thus placed on expanding the Green Teams to cover energy and water consumption in these target households. City staff from OEA and Water Quality and Environmental Services partnered with CU Environmental Center staff to pilot an outreach program in 2007. The 'Energy Green Teams' were developed to support ClimateSmart conservation and efficiency goals, and help students make the connection between energy use and climate change.

In 2007 the Energy Green Teams went door to door visiting off-campus students to provide literature, gather survey information, and install CFLs. The Energy Green Team includes the Environmental Center's Energy Program Manager (PM), an Energy Team Coordinator (ETC) and Team Members (TMs). The PM trained team members on residential energy and water conservation and climate change, etiquette and techniques on speaking to residents, and installation of CFLs. The PM also acted as liaison to ClimateSmart program staff, developed a strategy and plan for reaching the Greek houses, and developed a brochure and content for Green Teams "Off Campus Resources" website.

The ETC recruited and trained volunteers, produced and managed printed materials and other supplies, organized and scheduled literature drops, tracked achievement metrics, and accompanied team members on literature drops and direct installs. The TMs conducted literature drops by visiting residents in off-campus student neighborhoods and installed CFLs. The TMs also contributed ideas and feedback for program improvement. While visiting homes the TMs conducted a survey of residential energy use, awareness of efficiency measures, and desirability of efficient housing.

Results and Evaluation

If residents were not home when the Energy Green Team visited, a packet of literature was left on the door handle. The two neighborhoods visited were Goss Grove and the University Hill district. Only half of the University Hill district was visited due to the large number of multifamily units. This neighborhood will likely be completed in 2008. Below is a summary of the results from each neighborhood:

Goss Grove

Literature drops: 275 residences
 Contacts: 273 residences
 Total residences (drops + contacts): 548
 Bulbs distributed: 275
 Surveys administered: 158

Hill district (about 50% complete)

Literature drops: 136 residences
 Contacts: 133 residences
 Total residences (drops + contacts): 269
 Bulbs distributed: 129
 Surveys administered: 41

The bulbs installed in the residences will save 185,840 kWh of electricity over the life of the bulbs





and 171 mtCO₂ will be avoided. Over 200 surveys were administered, and results revealed some interesting findings worthy of mention (see box):

A few key design elements have contributed to the success of this program. For example, the ETC provided strong leadership and organizational skills, had materials prepared and organized in advance and was enthusiastic about the project – all of these factors contributed to the program running smoothly. Additionally, the team members felt very strongly about their mission and they learned quickly and adapted their approach to visits as they gained more experience with the outreach.

The Green Teams felt encouraged by the appreciation they received from almost all the homes they visited and they commented that providing free CFLs ‘kept a lot of doors open’. The Green team students felt that other students responded well to them because they were students as well, finding them more willing to listen, ask questions and take seriously the information shared.

A few areas recognized for improvement are the need to emphasize CFL disposal options. Team members reported many residents were unaware of disposal options and many did not know that CFLs should not be thrown into the trash. Additionally, the survey was overly time-consuming and because the Personal Digital Assistants (PDAs) used to record the data were older, slow models, each visit took longer, leading to fewer overall home visits.

Next Steps

This pilot program will continue in the first part of 2008 to complete visits planned for the University Hill area. Once completed, results will be analyzed and used to evaluate the program and to design new strategies to see that student rental units continue to reduce energy use. While student renters might not be completely representative of all Boulder’s rental housing residents, they can provide useful information to help staff develop programs to address the split incentive between renters and landlords.

Initial ideas from the first phase of this program:

- Create a display for residential energy efficiency in the CU office of Off-campus Student Services (OCSS). This well-trafficked office serves students searching for off-campus housing and offers housing service such as addressing landlord disputes. A standing residential efficiency display would raise awareness of these measures among students getting their first off-campus housing.
- Continue focus on proper disposal of CFLs and develop plans for easier disposal options.
- Work with landlord/tenant associations to open lines of communication between tenants and landlords on improving the efficiency of rental properties should be a strategy to achieve these goals.
- Investigate rental efficiency rating systems that could help renters make more informed choices.

Initial Survey Results

Of the households interviewed in the Goss Grove Neighborhood:

- 92% are renters
- 76% are billed directly by Xcel Energy for their electricity and natural gas
- 62% already use some CFL bulbs
- 36% do not use CFL bulbs

Of the households that do not use CFL bulbs the reasons varied:

- 29% because they have never heard of them
- 20% because they are too expensive
- 46% because they just forget when buying bulbs

Other Results:

- 72% considered saving money on utility bills very important
- 62% said that concerns about climate change and global warming would be the most important motivator to use less energy, while 24% liked the money savings.
- 56% stated that renting an apartment certified as energy efficient by the city or county would be high on the list of decision factors when choosing a rental property.

ClimateSmart On the Road

The CAP identifies three overall strategies to reduce transportation sector GHG emissions: reduce vehicle miles (VMT), increase the use of biofuels, and increase the aggregate fuel economy of vehicles in Boulder. Work in this sector began in May 2007 with the hire of a Transportation Sustainability Coordinator. Initial work was focused on refining the GHG inventory and strategies for the sector, supporting fuel retailers interested in selling biofuels, and working with GO Boulder on travel demand management programs.

Establishing relations with key partners and participating in related initiatives was an important activity in 2007. Transportation GHG emissions are not confined to vehicles owned solely by Boulder residents. The transient nature of vehicular emissions demands a regional approach. CAP staff representation at the Governor's Biofuels Coalition, Denver Metro Clean Cities Coalition and the Regional Ozone Stakeholders Group has ensured that the city's priorities are represented regionally.

Reducing Vehicle Travel

Reducing VMT is an important strategy for reducing emissions and is addressed through implementation of the Transportation Master Plan (TMP). The TMP is the city's planning tool for increasing mobility by reducing congestion and enhancing travel options. As described in the CAP, developing all the TMP multiple transportation mode Action items will reduce transportation emissions by approximately one quarter of the amount needed to meet the city's emissions goals. In order to enhance VMT reduction efforts, CAP staff has worked with GO Boulder to incorporate GHG reduction strategies into existing and planned activities.

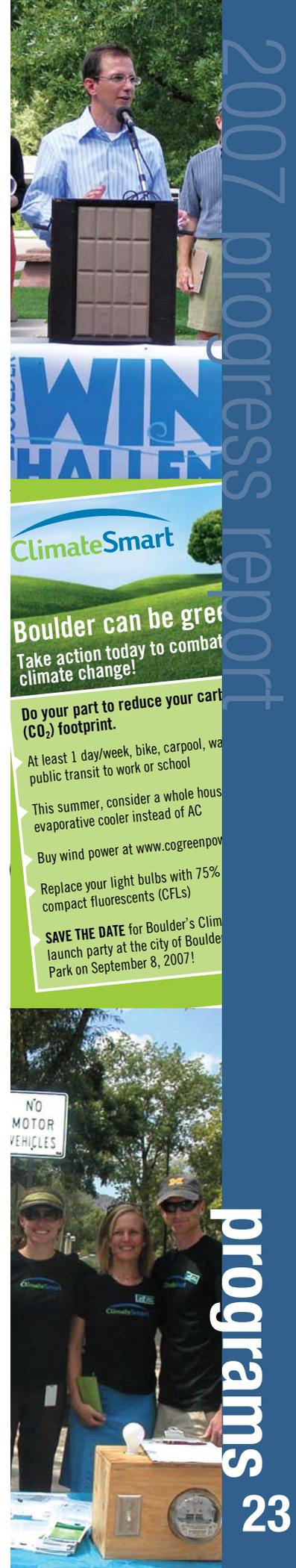
Staff also collaborated with GO Boulder on a pilot Individualized Marketing Campaign to facilitate increased use of alternative transportation modes. Results will be collected and analyzed in 2008 to determine if the program should be expanded throughout the community. Another project involves creation of a coordinated employer outreach effort that would simultaneously encourage participation in employee commute trip reduction programs, green fleet programs, energy efficiency, water conservation, and waste reduction programs.

In 2008 the city will evaluate how individual VMT reduction programs contribute to the city's GHG reduction target. Programs such as the Business and Neighborhood Eco Pass, GO Bike Boulder and Community Transit Network all have an impact on reducing VMT. For instance, although 250 new households enrolled in the Neighborhood Eco Pass program in 2007, associated GHG reductions have not been estimated. This ongoing analysis will serve to inform program and budget focus in 2008.

Improving Vehicle Efficiency

Increasing fuel economy reduces overall fuel use, thereby reducing GHG emissions. The small cars initiative led by City Council in 2006 provided a forum to discuss policies and programs to promote smaller cars. City Council is likely to discuss and prioritize these options in 2008. The main goal of the CAP is to educate residents on driving habits and vehicle maintenance tips to increase fuel economy. Information on highly fuel-efficient vehicles and available rebates and incentives is intended to assist residents with vehicle purchase decisions. These educational materials are also shared with private business fleets and will be incorporated into the employer outreach program mentioned above.

Research at a number of auto dealerships in Boulder in 2007 sought to understand what motivates Boulder residents to purchase a 'green' vehicle (highly fuel efficient, hybrid, E85-compatible or biodiesel-compatible) and to devise ways to incent city residents to buy efficient vehicles. Initial findings suggest that customers who buy these vehicles arrive at the dealership already having conducted their research and ready to buy. The salespeople also conveyed that customers not focused on the efficiency qualities of a vehicle are not concerned with the environmental, political or economic consequences of the amount of fuel their desired vehicle consumes. In an attempt to influence vehicle purchase decisions, CAP staff in 2008 intends to coordinate events with local auto dealerships to assist in the on-site customer education of the benefits of available green vehicles.





Increasing Supply and Use of Biofuels

As we acknowledge that VMT reductions alone cannot provide the needed level of emissions reductions needed to meet the 2012 CAP goal, increasing availability and use of biofuels could play a significant role in filling the gap. The debate over biofuels has engendered discussion among local residents as well as City Council. It is a charged issue that calls into question the energy balance of producing the fuels, the amount of water needed to grow crops and refine the fuels, as well as the difficulty in quantifying the effects of nitrogen runoff and impacts on worldwide food price and availability. At the same time, many leaders in fuel and climate research maintain that biofuels, specifically biodiesel and ethanol, are less carbon intensive than the petroleum-based fuels they replace.

CAP staff acknowledges that food-based biofuels are not a sustainable solution to reduce GHG emissions from local transportation. However, food-based biofuels are expected to be replaced in the near future with cellulosic biofuels made from non-food feedstocks and with impressive energy balances. The 2007 Federal Energy Bill calls for 21 billion gallons of cellulosic biofuels to be sold in the United States by 2022. It is important to increase infrastructure now so that the city can be prepared to meet customer demand for such fuels.

Biodiesel is currently available in Boulder and it is anticipated that through city assistance, E85 (85 % plant-based ethanol and 15 % gasoline) will be available in Boulder in early 2008. Currently there are 4000 E85-compatible, Flexible Fuel Vehicles (FFVs) and 1500 biodiesel-compatible diesel vehicles in Boulder. A partnership with the Governor's Biofuels Coalition and Boulder County has been and will continue to be important to increasing biofuels infrastructure. Both entities are likely to provide funding support to gas stations wishing to sell biofuels; CAP staff works to facilitate these support grants and will continue with additional strategies to increase the availability of biodiesel and E85 in Boulder in 2008.

Commercial vehicle fleets make up a significant number of total vehicles operating in Boulder, and there is a growing number of local organizations utilizing and benefiting from biofuels. Western Disposal began using biodiesel in its fleet in the spring of 2007. Boulder Valley School District fuels its school buses with biodiesel. RTD ran a biodiesel pilot with SKIP route buses for two years and the city has reached out to RTD to encourage the continued use of biodiesel. Currently RTD is focused on diesel electric hybrid technology and may consider using biodiesel again when the fuel industry agrees on a consistent industry-wide fuel quality standard.

Education and outreach about sustainable travel for Boulder residents and businesses is an important component of the CAP implementation strategy. Primary outreach messaging to encourage use of biodiesel and ethanol includes how to identify an E85-compatible FFV, a reminder that ethanol is produced in the U.S., and that ethanol is less carbon intensive than gasoline. For biodiesel, the messaging is that all 1993 and newer diesel vehicles have been approved to run on 5% biodiesel (B5), that higher percentage blends have been shown to perform without problems in most diesel engines (because the fuel is cleaner, engines run smoother), and that biodiesel is less carbon intensive than regular fuel.

Next Steps

CAP transportation efforts in 2008 will focus on expanding education, outreach and biofuels infrastructure efforts. CAP staff is also evaluating the GHG reduction potential of policies not outlined in the CAP such as a city-wide biofuels standard, vehicle registration feebates, the proposed Colorado Clean Cars standard, and the role of transportation GHG in the land use planning process. As with all CAP programs and services, this GHG reduction analysis may result in adjusted work plans to maximize achievable reductions.

Marketing, Outreach and Communications

Robust and sustained marketing, education, and outreach programs are necessary to create awareness of the community-wide challenge and to garner widespread support and behavior change. Marketing strategies are included in each sector's programs. Official marketing efforts

began in April 2007 when the Marketing and Communications Coordinator funded with the CAP tax was hired. A strategic marketing plan was created to identify short term and long term needs and priorities; the plan is updated twice each year or as needed. The three main marketing goals for 2007 were campaign branding, program marketing and communications, and community outreach.

Branding the Climate Action Plan

Between April and August 2007, staff worked with Vermilion, a local communications firm, to execute campaign branding. ClimateSmart (also the name of the November 2006 ballot measure) was selected as the campaign name, and a color palette and logo were designed. A ClimateSmart table display for all outreach events fully brands the campaign name and contributes to the brand “stickiness” factor. The new branding paved the way for development of the ClimateSmart website, program brochures, local print and bus ads, radio, and other communications initiatives. The ClimateSmart brand and programs are intended to symbolize the city of Boulder’s response to climate change, and to foster awareness of available programs facilitates residents’ and businesses’ ability to reduce GHG emissions.

The city of Boulder has embraced Boulder County’s participation in ClimateSmart and has made an effort to include all local communities, and to develop a regional collaboration through the Consortium of Cities. As of late 2007, five municipalities had expressed interest in using the ClimateSmart brand to market their own local energy sustainability initiatives. Boulder County committed funds in 2007 for ClimateSmart administrative and implementation costs and municipalities will pay for their own printing and media costs in 2008.

Marketing & Communications

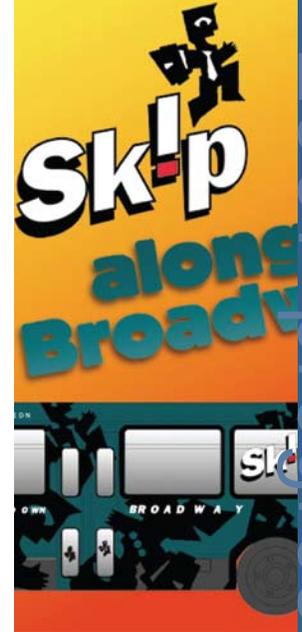
A key strategy of the CAP is effective marketing of programs and initiatives to inspire voluntary behavior change and investment with regard to conservation and energy efficiency and purchasing choices. Fundamental to this effort is the ability to link personal actions, such as driving and home energy use, to climate change and energy sustainability. The goal is to make this link ubiquitous and sustained in the Boulder community, such that there is a constant reminder that climate action is in large part the responsibility of individuals through their behaviors and purchase decisions.

The ClimateSmart website was launched in September 2007. As of December the most visited web pages were the carbon footprint calculator and the online pledge (to reduce carbon footprint). The calculator, which allows residents to calculate their annual carbon dioxide (CO₂) emissions based on travel habits and home energy and water use, has been used by over 800 people. The calculator tool will be continually updated to improve usability and appeal. The ClimateSmart online pledge page allows businesses or individuals to make a ‘public’ commitment by signing up to reduce their carbon footprint. A “Who’s In” page lists those that have pledged and a map shows a green pin at the participant’s address. Approximately 500 individuals and businesses had pledged by the end of the year.

Marketing messages in 2007 focused on specific calls to action and were diffused via the website, print advertising, program brochures, utility bill inserts, bus ads, and radio spots. Additional marketing tools included a monthly e-newsletter (*The Changing Times*), a viral email campaign during October Energy Awareness Month, and a bi-monthly ClimateSmart Q&A column in the Camera.

A significant amount of earned (free) media coverage was secured in 2007 through story pitches to reporters, regular press releases about ClimateSmart programs and initiatives, articles written by CAP staff for local publications, and through Channel 8 programming. Local print publications were extremely interested and supportive of Boulder’s climate efforts and this was reflected in the amount of media coverage.

In late 2007 a public recognition marketing campaign began with a press release and multiple ads in the Camera thanking local businesses that took advantage of programs and acknowledging residents and businesses that pledged to reduce their carbon footprints.



Primary 2007 marketing channels:

- 40 print ads in the Camera (ClimateSmart’s 2007 Media Sponsor)
- 16 press releases leading to 13 articles/news briefs and two radio interviews
- Boulder County Business Report’s annual Green Book (ad)
- ReDirect Guide (editorial + ads)
- Boulder Green Building Journal (editorial)
- Conservation Magazine (ad) published by the Center for Resource Conservation
- ClimateSmart CFL discount posters at local hardware stores during Energy Awareness Month
- Weekly spots on KUNC radio
- Transportation EcoTip video on Channel 8

Community Outreach & Events

Outreach efforts in 2007 included participation in and co-sponsorship of multiple events between April and October like the Step it Up March, Earth Day, Boulder Solar Week, Boulder County Going Local, and EcoArts. Overall outreach efforts focused on brand awareness, community engagement, and education. A Saturday ClimateSmart table at Boulder’s Farmer’s Market increased program awareness and the ClimateSmart team gave numerous general and technical presentations to business groups, neighborhoods, and special interest groups.

Between March and December 2007, 22 staff presentations to approximately 600 audience members were given throughout the community. Audiences ranged from local environmental organizations and a group of surgeons and public health officials at Boulder Community Hospital to Rotary groups, neighborhood associations, realtors, commercial brokers, the Chamber of Commerce, and the general public.

Wind Challenge

Achieving the city’s GHG goal requires a significant increase in renewable energy use. The CAP proposes holding annual wind challenge events to increase awareness of buying wind power as a renewable energy option. Challenges were held in 2005 and 2006 but not in 2007, primarily because of a lack of wind capacity available through Xcel Energy’s Windsource program. Even though the environmental attributes of wind energy can be purchased through renewable energy credit (REC) providers, the city was uncomfortable running a promotional program to encourage residents to purchase wind power if RECs were the only option available.

The city intends to hold a Wind Challenge in 2008 from spring into summer. The goal is to sign up at least 1000 new wind power subscribers and offset over 10 million kilowatt hours of annual electricity use. The city will partner with Xcel Energy, REC providers, Boulder County and communities across the county to promote the program. The city recognizes that the Wind Challenge is a great avenue to educate the public about wind power and RECs and their role in helping to reduce carbon footprints.

Next steps

Marketing and communications efforts in 2008 will focus on sustained, creative and upbeat “call to action” messaging, case studies of energy-sustainable businesses and individuals, continued use of most communication channels, and engagement in new outreach methods.

A system for quantifying results will be developed to track numbers of people participating in programs, visiting the website, receiving the e-news, calculating their carbon footprint, pledging online, visiting the farmer’s market, attending presentations, and viewing print and online ads. Email campaigns, which successfully drove visitors to the website this fall, will be used in an attempt to sign up hundreds more community members for the calculator and pledge. Outreach efforts will be expanded with weekly outreach table events and a target of 40 community presentations.

Community Engagement. Widespread success in reducing greenhouse gas emissions in Boulder will depend on the viral aspect of the ClimateSmart message – friends telling friends, kids encouraging parents, company owners supporting action among their employees (and



vice versa), and businesses telling other businesses how they benefited from ClimateSmart programs. Ongoing outreach to 'early adopters' and other community leaders to solicit their support in diffusing the call to action and program messaging to their networks is a priority for ClimateSmart staff.

Neighborhood Support. ClimateSmart staff play a support role to neighborhood climate action groups in Boulder. In 2007 the Shanahan Ridge neighborhood was the most active group (see the ClimateSmart at Home section for details), and in December the Newlands neighborhood jumped into action. In 2008 staff hopes to see up to five neighborhoods organize climate-focused action groups, and will support them with modest printing budgets, presentations at meetings, free prizes, ideas, and press coverage. Staff will evaluate our efforts over time to ensure we're being responsive to meeting the needs of the community as well as facilitating results. The creation of community is a rewarding outcome of this type of local action, and further bonds Boulder neighbors as they work towards creating a sustainable energy future.

Recognition Programs. Developing meaningful ways for local businesses and homeowners to be recognized for their efforts will be important in supporting the view that combined, sustained, community-wide efforts can add up to significant GHG reductions. In 2008, staff will solidify a commercial recognition program that will provide free PR (and other benefits) to companies displaying a commitment to energy sustainability. A neighborhood recognition program will be developed to recognize currently active groups for their efforts; the program will also intend to inspire others to take action.

CLIMATE ACTION IN CITY OPERATIONS

The city organization is committed to working towards a healthier environment. In addition to helping the community reduce GHG emissions, it is critical that the city look at its own operations to ensure that the city serves as a model for the community. The sharp rise in electricity and fuel prices also continue to strain already limited city budgets creating an additional incentive and benefit to reducing emissions.

In 2006, the city organization used over 27 million kWh of electricity and 700,000 therms of natural gas, emitting over 25,000 mtCO₂. The city's fleet annually emits almost 3,000 mtCO₂ although aggressive efforts in reducing fleet emissions have reduced this amount over prior years.

City departments have actively supported the GHG goal. For example, in 2007, CAP staff collaborated with Facilities and Asset Management (FAM) to develop an energy strategy for the city. Additionally, collaboration with Planning and Development Services led to the development of an updated Green Points program for residential construction.

The city is also taking steps to increase the amount of renewable energy utilized by the city. The city is currently establishing a one megawatt solar array that will help power the 75th Street Waste Water Treatment Facility. Additionally, a 10 kilowatt (kW) system will be installed at the Reynolds Library. Both of these systems will be installed in 2008.

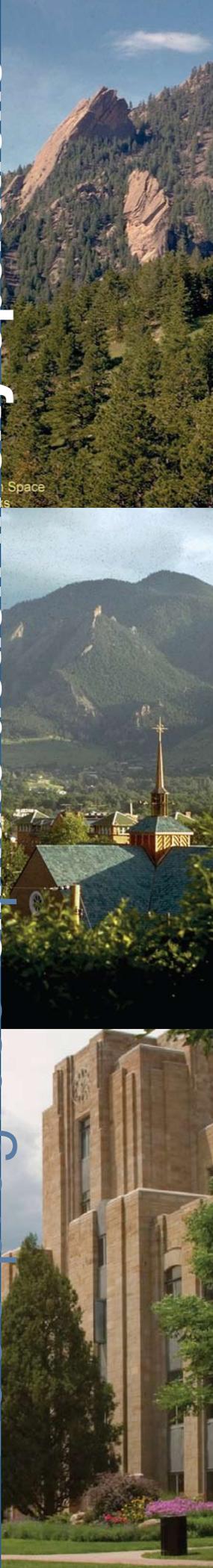
Facilities and Asset Management (FAM)

FAM is continuously evaluating strategies such as conservation, energy efficiency, and alternative energy to meet the energy needs of the city organization at the lowest possible cost. It is FAM's general policy to complete energy-saving projects that have a five-year-or-less payback period and to purchase hybrid and alternatively fueled vehicles where possible.

In 2007, FAM completed almost \$90,000 worth of energy efficiency improvements in city facilities. These improvements included efficient windows, replacement of heating, ventilation and air conditioning (HVAC) units, and increased insulation in city buildings. FAM actively pursues methods to reduce energy use as many departments have difficulty managing increased energy costs.

The city also continued purchasing wind power and utilizing solar thermal energy, bringing renewable energy-powered supply to 3% of the city's total electrical demand, not including hydroelectric power.





Fleet Services

The city's Fleet Services has also been active in reducing GHG emissions from the use of city vehicles. GHG emissions from the city's fleet have been reduced over time by reducing the number of miles traveled, expanding biofuels use, and purchasing vehicles with better fuel economy, including hybrid electric vehicles. In 2006 these strategies reduced emissions to 65 tons below the Kyoto target (7% below 1990 emissions). A preliminary analysis shows that in 2007, the city fleet had reduced emissions even further.

In 2007, Fleet Services purchased 36 vehicles. In nine of these cases no alternative fuel or hybrid vehicle was available that met the city's specifications. The remaining 27 vehicles purchased were alternative fuel or hybrid vehicles. Specifically, the city purchased three E85 vehicles, 16 diesel vehicles capable of using biodiesel, and eight Ford Escape Hybrids. Overall, the city purchased an alternative fuel or hybrid vehicle 100% of the time when one was available to meet specifications and 75% of the time overall.

Biodiesel, E85 and propane are available at the city's fleet fuel pumps. Use of biodiesel and E85 increased in 2006 relative to 2005. CAP staff has met with employees who regularly drive city vehicles to explain the importance of for GHG reductions. Staff will continue to serve in this role as a technical resource to city employees and to Fleet Services staff as new alternative vehicle and fuel technologies become available.

Green Points Program Updates

The Green Points Program is the residential green building ordinance designed to minimize the short and long term environmental impacts of new and remodeled homes, including energy consumption. In order to receive a building permit and pass inspection, a builder must earn a requisite number of "green points," based on the size of the project. The program was updated late in 2007 and the new program and code went into effect on February 1, 2008. A few goals for the update were making energy performance a pertinent component of the requirements and making certain "green" measures mandatory to enhance the program's contribution to the city's sustainability goals. Key changes to Green Points include:

Waste Management

Mandatory requirements for demolition and new construction:

- Demolition Management: Building projects requiring a demolition permit and classified as "entire structure" demolition will need to complete a Deconstruction/Construction Waste Recycling Plan before a permit is issued. This requirement may also apply to remodels and scrape-offs.
- Construction Waste Recycling is required on all new construction sites with a requirement that 50% of all waste material generated must be donated, reused, or recycled. Compliance must be verified on a tracking spreadsheet listing materials and weights that were hauled to a recycling facility.

Energy Efficiency Requirements for New Construction

Energy efficiency standards have been updated to exceed the 2006 International Energy Conservation Code (IECC). Compliance will be verified with a Home Energy Rating System (HERS) Index Score determined by a RESNET accredited rater. The HERS index is a nationally accepted rating system which reveals the energy performance of a home on an index of 0-500. A home built to code (IECC) will measure 100 on the HERS scale, the more efficient the home, the lower the HERS number score.

Energy efficiency requirements vary according to the size of the project as follows:

Type of Project	Square Footage	Energy Efficiency Thresholds Above 2006 IECC & Compliance Score
New Construction	Up to 3,000	30% = 70 HERS Index Score
	3,001-5,000	50% = 60 HERS Index Score
	5,001 and up	75% = 35 HERS Index Score
Multi-unit Dwellings	Applies to all	30% = 70 HERS Index Score

Energy Efficiency Requirements for Remodels and/or Additions

An applicant submitting a building permit for a remodel and/or addition of more than 500 square feet is required to obtain a home energy audit on the existing structure before submitting building plans. The intent of this requirement is to ensure that the homeowner receives energy efficiency information on their home before finalizing the scope of work on their planned alteration. Additionally, energy efficient light bulbs with a luminous efficacy of 40 lumens per watt or above must be installed in 50% of the existing light fixtures.

Point Options for New Construction, Remodels and/or Additions

In addition to the requirements for new construction (HERS rating above 2006 IECC) and remodels and/or additions (energy audit and efficient lighting), Green Point options apply as they did with the former program in that each project is required to obtain a certain amount of points from a list of options to meet the code. Since the new program incorporates many of the energy efficiency requirements through HERS and energy audits, the total points required to comply with the code have been reduced.

Nexus to CAP Goals

While most of the current CAP programs support voluntary action to reduce greenhouse gas emissions, it is recognized that regulations that support the other city environmental sustainability goals can be designed to contribute to the city's GHG reduction goals. This update to Green Points is an innovative approach to improving our housing stock in Boulder. Data collected through the program will demonstrate actual energy saved by building homes with energy efficiency as a requirement. Preliminary estimates indicate that this code revision could reduce GHG emissions by approximately 900 mtCO₂/year.

Renewable Energy Fund

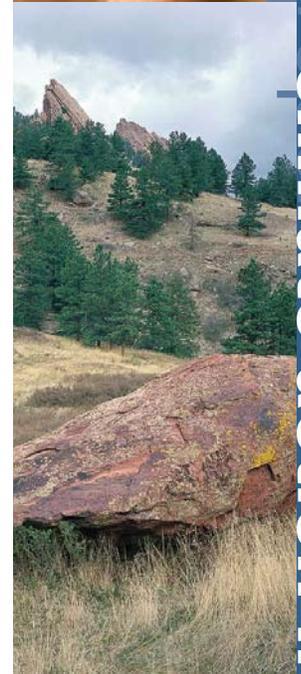
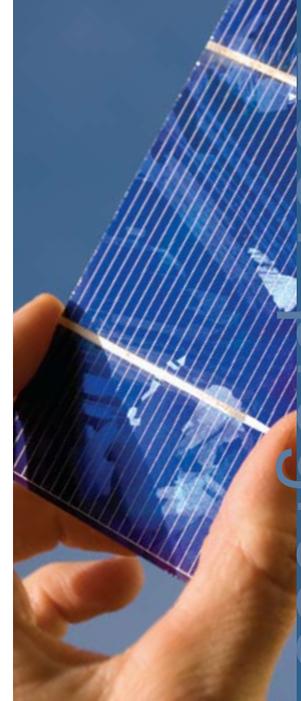
City Council adopted the solar sales and use tax rebate ordinance (No. 7487) on November 14, 2006, creating a renewable energy fund. A portion of the renewable energy fund (65%) was dedicated for the purpose of providing financial assistance through grants toward installation of photovoltaic (PV) or solar thermal systems on housing for low to moderate income persons and on the facilities of site-based non-profit entities operating in Boulder. The remaining 35% is dedicated to sales and use tax rebates for residents or businesses installing solar systems in the city. Approximately \$84,000 was generated in the fund in 2007.

ClimateSmart Solar Grant

The grant portion of the renewable energy fund, called the ClimateSmart Solar Grant, intends to fund a number of projects which will provide education about solar technologies in the community, install systems that will benefit recipients through lower energy costs, and provide visibility and education about the city's renewable energy fund and renewable energy goals.

Staff has developed a process and grant application for awarding ClimateSmart Solar Grant funds to qualified organizations or individuals in the community. Staff has recruited eight members of the community with knowledge of vital program elements such as solar systems, non-profit organizations, affordable housing programs, and financial systems to serve on a grant selection committee. The grant will have two cycles each year, March 15th and August 15th. The application was released to the public in the beginning of 2008. At the time of release, approximately \$55,000 was available in the grant fund. The first grants from this program will be awarded on May 1, 2008.

The solar grant fund will provide materials to award recipients such as yard signs for placement during construction, plaques for inside the finished building, and educational materials to distribute on tours. These materials are intended to promote the city's ClimateSmart Solar Grant program and provide education about renewable energy in relation to the city's GHG emissions reduction goals.





Solar Rebate

Rebates for a portion of sales and use tax paid on a solar system continue to be available through the renewable energy fund. In 2007, 39 applicants requested the rebate and approximately \$4,000 has been rebated. A new policy in 2008 may be initiated to allow money unclaimed after one year to be rolled over into the ClimateSmart Solar Grant fund.

City Sustainability Goals

The solar sales and use tax rebate ordinance is a great example of Boulder's commitment to economic, environmental, and social sustainability. Tremendous growth in the local solar industry as a result of Amendment 37 (which provided local rebates for solar through Xcel Energy combined with federal tax credits) has led to a much greater number of photovoltaic (PV) panels installed in the city than originally anticipated.

In relation to economic sustainability, the local solar industry continues to grow with the number of Boulder-based solar companies exceeding 25, while two years ago this number was closer to ten. Incentives to install solar systems support local growth of this industry.

Environmentally, the program reduces GHG emissions from electricity generation. Since the inception of this program, 1,108 kilowatts (kW) of solar has been permitted in the city of Boulder. The installation of this quantity of PV panels will reduce emissions by more than 1,492 mtCO₂ annually. If an equal quantity was installed in Boulder each year through 2012, approximately 2% of the city's current total GHG emissions reduction goal would be met.

Boulder City Council's decision to offer a partial rebate and to invest in a renewable energy grant fund helps to minimize the social sustainability concern that only wealthy property owners can afford these types of systems. The Solar Grant Fund addresses economic barriers to renewable energy investment by supporting installation of renewable energy systems on low to moderate-income housing and site-based non-profits.

Chicago Climate Exchange

In 2007, the city organization continued its membership in the Chicago Climate Exchange (CCX). CCX is a voluntary, legally binding cap and trade program designed to reduce GHG emissions, help businesses and organizations manage emissions and recognize the value of reductions, and implement market-based strategies for emissions reduction. For municipal members, only organization-wide emissions from electricity, natural gas, and fleet fuel are included; community-wide emissions are excluded. Participation commits the city to an additional 2% reduction in emissions below the baseline for a total reduction of 6% below baseline by 2010.

CCX accepted the city of Boulder's emissions report for 2006. According to the audited emissions report, the city organization reduced its emissions by 3.14% relative to the baseline. Emissions from electricity increased 2% and emissions from natural gas increased, but only slightly. Emissions from the city's fleets decreased by almost 16%. As a result of total lower emissions from 2003 through 2006 as compared to the baseline, the city of Boulder has earned 83 carbon financial instruments (CFI's), representing 8,300 mtCO₂ that can be banked or sold. As of December 30, 2007, CFI's were traded at approximately \$2 each.

LED Holiday Lights on Pearl Street Mall

CAP staff partnered with colleagues in the Parks and Recreation department and with Downtown Boulder, Inc. to develop a plan to replace the traditional incandescent holiday lights on the Pearl Street Mall with LED (Light Emitting Diode) lights, which are 90% more efficient than the incandescent variety. The three groups researched the current lighting situation on the mall and evaluated costs and quality of LED lights. Combined funds from all three sources led to the purchase over 400 strands of LED lights for permanent placement on the Mall. These energy saving strands reduced emissions by more than 7,000 lbs of CO₂ (annually) compared to the incandescent strands. This collaboration will continue next year with a goal to replace all of the holiday lights on the Mall with LED strands.

CONCLUSIONS

The programs, activities and policies established between 2004-2007 formed the foundation for practical, effective and more aggressive action to reduce emissions. 2007 represented the first year in which funding for the city's climate protection efforts were aligned with the comprehensive actions and programs necessary to begin making significant progress in reducing emissions. Lessons learned in previous years will be applied to future programs to ensure that Boulder's residents and businesses receive a high level of service and that city funds are spent wisely. The CAP team will continue to work with local and regional partners, other cities, counties, the Governor's Energy Office, Xcel Energy, University of Colorado and non-profit organizations, to leverage resources and share best practices.

The foundation building on the technical side is fairly well developed and will need to expand in future years, requiring additional budget. Education and outreach efforts initiated in 2007 will focus on the human side, helping people, whether residents, business owners or employees, make informed decisions to reduce their emissions. These interactions will inform the CAP staff about the tools and resources needed to take action.

Renewable energy is a highly important element of the CAP. In 2008 a primary focus will be to work with City Council to develop a renewable energy strategy for the community. Another key priority will be to increase renewable energy use by the city organization. Other strategies like incentives and regulation will also be evaluated in 2008 to determine the best combinations of strategies to more aggressively reduce emissions to meet or exceed the city's 2012 goal.





www.environmentalaffairs.com
www.beClimateSmart.com