Boulder City Council
STUDY SESSION

May 22, 2012
6-9 PM
Energy Future and Climate Action Work in Progress

City Council Chambers
Municipal Building
1777 Broadway

Submit Written Comments to City Council
ATTN: Alisa Lewis, City Clerk
1777 Broadway, 2nd Floor
P.O. Box 791
Boulder, CO 80306
or Fax to 303-441-4478
or E-mail: council@bouldercolorado.gov

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MEMORANDUM

TO: Mayor and Members of City Council

FROM: Jane S. Brautigam, City Manager
Paul J. Fetherston, Deputy City Manager
Tom Carr, City Attorney
David Gehr, Deputy City Attorney
Bob Eichem, Chief Financial Officer
David Driskell, Executive Director of Community Planning and Sustainability
Maureen Rait, Executive Director of Public Works
Susan Richstone, Deputy Director of Community Planning and Sustainability
Mary Ann Weideman, Assistant City Manager
Debra Kalish, Senior Assistant City Attorney
Jonathan Koehn, Regional Sustainability Coordinator
Kara Mertz, Local Environmental Action Manager
Lesli Ellis, Senior Planner
Elizabeth Vasatka, Business Sustainability Coordinator
Yael Gichon, Residential Sustainability Coordinator
Sarah Huntley, Media Relations/Communications Coordinator
Kelly Crandall, Sustainability Specialist II

DATE: May 22, 2012

SUBJECT: Study Session: Energy Future and Climate Action Work in Progress

I. EXECUTIVE SUMMARY

On January 31, 2012, City Council held a study session to discuss the 2012 work plan for activities related to Boulder's Energy Future, including next steps in the analysis of potential municipalization of Boulder's electric distribution system; and planning for the next generation of Boulder's climate action initiatives.

The purpose of this study session is to discuss work that has been done since the January study session and:

- Update council on municipalization work in progress, and
- Discuss and receive council feedback on climate action planning efforts, including evaluation of Climate Action Plan (CAP) programs to date, a new climate action commitment that would include short-term targets and benchmarks, the potential extension of the existing climate action plan tax; and Commercial Energy Efficiency Strategy work in progress.

These efforts are a major focus of the city's work program in 2012 and beyond. A summary work plan that outlines the sequence of major tasks for these efforts is provided in **Attachment A.**

To help frame the study session discussion, staff is seeking council feedback on the following staff recommendations:

Climate Action Planning:

- Use the independent consultant's findings about the effectiveness of the CAP programs to date as a basis for refining the existing CAP programs and working with consultants and the community to develop the first phase of the Energy Action Plan.
- Further discuss options for placing an item on the November 2012 ballot to extend the current CAP tax and bring relevant analysis forward for council consideration in July and August.
- Base forward-looking climate action work on a new long-term climate action commitment to be explored further with the community of "Climate Neutrality" with critical focus on near-term (five year) goals and annual targets linked to key metrics and reporting mechanisms.

Commercial Energy Efficiency:

- Move forward to work with stakeholders in developing a three-phased approach to increase energy efficiency in existing commercial buildings, building on existing (and expanded) voluntary programs and incentives and adding mandatory energy rating and reporting, followed by mandatory prescriptive measures and/or performance standards as described in more detail in Section V.

II. QUESTIONS FOR COUNCIL

Does council have questions or feedback about:

1. *The third-party analysis of the effectiveness of CAP tax investments to date and, in particular, the consultant's key findings? Are these findings appropriate as a basis for refining the existing CAP programs and working with the community and consultants to develop the first phase of the Energy Action Plan?*

2. *Options related to the existing CAP tax and the November 2012 ballot? Should staff focus its analysis for council consideration in July on Option 2: Extend the current CAP tax?*

3. *The draft process and schedule for developing a new climate action framework that builds on what we've learned, is responsive to changing opportunities and challenges, sets aggressive goals and targets, and is measurable and accountable. This includes the following immediate steps:*
    a. *Further explore the concept of "climate neutrality" (by a date to be determined, but considerably sooner than 2050) as Boulder's climate action commitment.*
    b. *Establish near-term (five year) goals and annual targets linked to appropriate measures and reporting mechanisms that are integrated into departmental master plans and the Energy Action Plan.*

4. *The proposed commercial energy efficiency strategy? Should staff focus on the three-phased approach as described in more detail in Section V?*

III. MUNICIPALIZATION UPDATES

A. Next Steps in the City's Municipal Utility Analysis

The city has been developing a strategy that will help it acquire the necessary data to determine the feasibility of a municipal utility. The city has hired counsel to assist with acquisition analysis and proceedings as well as counsel to advise staff about the many federal requirements associated with the creation of a municipal electric utility. A primary objective of these efforts is to determine whether it will be possible to acquire Xcel's system and create a city utility, given the voter-approved requirements of Charter Sec. 178 related to rate parity with Xcel Energy at the time of the acquisition. Additionally, staff has been exploring the opportunities and constraints related to municipalization as defined by laws at the state and federal levels.

The acquisition group is developing and implementing a work plan to create an inventory of the local distribution assets of the incumbent utility. This work includes identifying, cataloguing and mapping the local equipment. This will lead to the next step: valuation of the system. The acquisition group has been interviewing prospective consultants and experts who will assist in efforts to move towards valuing the distribution system. All of this work is precedent to updating the cost model on financial feasibility, considering the option of an "off ramp," and informing good-faith negotiations that must precede any condemnation action.

The staff team is also working on strategies designed to comply with state and federal regulatory requirements associated with utility formation. A great deal of legal and engineering work will be required to determine the feasibility of options related to power transmission and generation. Staff is researching and developing strategies with the objective of creating the utility while either avoiding or minimizing costs associated with acquisition and the start up of operations.

The city manager recently hired Heather Bailey as the executive director of energy strategy and electric utility development. Over the course of her 30-year-plus career in the utility industry, Ms. Bailey has worked as a regulator, utility executive and consultant. She will begin working for the city in early June and will manage the city's Energy Future project.

It is anticipated that Ms. Bailey will provide direction in the creation of both short- and long-term energy strategies, guide the city in the implementation of new methods of energy management and pursue next steps in the analysis of potential municipalization. Ms. Bailey will begin by gaining a solid understanding of the policy and strategy development that has been completed to date, and thereafter refine and modify those strategies to ensure consistency with the existing business and regulatory environment and the community's values. She will be charged with establishing an operations and business plan for the successful potential transition from Xcel Energy operations to city-run operations.

B. Resource Utility Modeling

As part of the 2011 work to study the feasibility of forming a city-owned utility, the city contracted with Robertson-Bryan, Inc. (RBI) to develop a municipalization cost model that compared Xcel Energy's forecasted fuel resource mix, associated costs and resulting GHG emissions against several possible resource mix scenarios under a city-owned utility. Following the council discussion at the June 14, 2011, study session, staff performed additional cost model analyses that included variables of interest rate, stranded costs, and acquisition (including SmartGrid) to include a reasonable high case, a reasonable medium case, and a reasonable low case for each variable.

The results of the modeling indicated that a municipal utility could compete financially with the incumbent utility, Xcel Energy, even assuming the following factors:

- Higher payment in lieu of taxes (PILOT) and Public Purpose Program Fund investments (e.g., efficiency and conservation and solar rebates)
- High rate of renewable deployment, entirely funded by operating revenues
- Significant reduction in carbon emissions compared to Xcel's projected fuel mix and Renewable Energy Standard
- Rate stability with a maximum 4 percent annual increase over 10 years.

A full summary of the 2011 scenarios and results of the model runs can be found in **Attachment C).**

While these modeling runs were critical in understanding whether a city-owned utility could deliver electricity at or below Xcel Energy's current rates with fewer greenhouse gas (GHG) emissions, they did not explore a broad range of supply options and evaluate the extent to which a city-owned utility could deliver more renewables cost effectively. Therefore, staff is initiating a more comprehensive resource modeling process this year. Resource modeling is being performed now to verify the feasibility of creating a new electric utility that can maintain rate parity at various levels of renewables.

This modeling effort will be based on various fuel mix scenarios and will look primarily at the following three factors:

1. Cost and rate impacts associated with various fuel resource mixes (i.e., varying degrees of renewables) using real-time pricing
2. Resulting GHG emissions associated with various resource mixes
3. Impacts of load reduction through energy efficiency and local generation (informed by work on "Phase 1" of the Energy Action Plan).

It is important to note that, while similar in nature, the modeling planned for 2012 is not intended to replace the full-scale Integrated or Electric Resource Planning (IRP) that will be necessary should Boulder proceed with creating a local electric utility. The resource modeling in 2012 will use the above factors as a foundational step toward performing a full IRP, which will provide the information necessary to develop a municipal energy portfolio. Resource modeling is not as detailed as full resource planning. For example, the 2012 modeling will use assumptions for regional market prices in the analysis,

whereas during the IRP process, the city would issue Requests for Proposals (RFPs) and use real-time wholesale power prices from vendors for the pricing analysis.

When, and if, Boulder chooses to create a local electric utility, an IRP will be a more detailed process using more sophisticated modeling tools, actual data from wholesale power providers and input from interested community stakeholders. The IRP will look at all options for resource acquisitions long into the future and will be developed by energy analysts. It is a comprehensive plan that identifies all aspects of energy from generation and integration to specific customer load projections. A full IRP will also include very specific Power System Analyses, which will evaluate regional transmission issues such as impacts to critical transmission infrastructure, matching generation and load, maintaining the scheduled interchange with other Balancing Authority Areas and maintaining the frequency in real-time of the electric power system.

2012 Resource Modeling Methodology
Staff is working with an ad-hoc modeling group comprised of local electric load modeling experts to develop the scope and methodology of resource modeling for 2012. A list of the modeling group members along with a preliminary summary of the process and schedule to complete the modeling effort in 2012 is included as **Attachment D**.

Next Steps
Council will be updated on this work following the development of the scope and scenarios with the modeling group in June. Additionally, staff will return to council this fall for a discussion of the modeling results.

IV. CLIMATE ACTION PLANNING

INTRODUCTION
This section provides a summary of the work to date on developing the next generation of climate action in Boulder, building on the successes and lessons learned from the city's efforts over the past five years. Included are:

- Key findings from an independent assessment of the effectiveness of the CAP tax-funded programs and services prepared by Rocky Mountain Institute (RMI).
- Issues and options related to placing a CAP tax item on the 2012 ballot, as the existing tax expires in March 2013. If placed on the ballot and approved by voters, the CAP tax would continue to fund energy-efficiency improvements in existing buildings.
- A proposed new climate action framework and a process and schedule for completing it, including a climate action commitment that builds on the Kyoto goal; a method for integrating short-term goals and targets into city master plans; and plans for developing a more robust and transparent reporting mechanism for tracking the progress the community is making.

STAFF RECOMMENDATIONS
Staff is seeking feedback on the following recommendations for how to move forward on Climate Action planning in the coming months:

- **Third-party Assessment of CAP Programs and Services to Date:** Staff recommends using the RMI findings as a basis for refining the existing CAP programs and working with consultants and the community to develop the first phase of the Energy Action Plan and related monitoring/reporting mechanisms.

- **CAP Tax Options:** Of the CAP tax options presented in section B below, staff recommends focusing its analysis for council consideration in July and August on Option 2: Extend the current CAP tax.

- **Climate Action Framework and Long Term Goal:** Staff recommends basing the climate action work on a climate action commitment that builds on the existing Kyoto goal; specifically, a commitment to "Climate Neutrality by 2050 or sooner" with near-term (five year) goals and annual targets linked to key metrics and reporting mechanisms.

ENVIRONMENTAL ADVISORY BOARD FEEDBACK

At the January 31, 2012, Study Session on the work plan for Boulder's Energy Future work efforts, City Council supported having the Environmental Advisory Board (EAB) take the lead on gathering public input and providing feedback to staff on Climate Action and Energy Action work efforts. To that end, over the past three months, EAB has held three public meetings that helped shape the work described below. Excerpts of the EAB meeting minutes from the March 22, April 26, and May 10 meetings where these issues were discussed are provided in **Attachment B**.

BACKGROUND

Climate Action Planning

In 2002, City Council adopted Resolution 906, which established a goal for the Boulder community to reduce its greenhouse gas (GHG) emissions 7% below 1990 levels by 2012, consistent with the Kyoto Protocol. Central to the resolution were concerns about preserving environmental and air quality, addressing the risk climate change poses to local communities, and ensuring a high quality of life and economic vitality. In 2006, the city adopted a Climate Action Plan (CAP) to achieve the Kyoto goal. This was supported in 2007 by the nation's first voter-approved carbon tax (the CAP tax) as a revenue source for implementing the actions outlined in the Climate Action Plan.

The city has learned a great deal in the years since CAP funded programs launched in 2007. The Kyoto goal inspired the community to action and there have been significant investments and actions in the community to reduce GHG emissions. However, in the years since it was adopted, climate science has shown that even more dramatic emissions reductions are needed to prevent dangerous changes to our global climate. At the same time, it has become clear that meeting and surpassing the Kyoto goal will require long-term systemic and technological change, particularly in the energy sector. The effort to analyze the feasibility of forming a municipal utility emerged from this recognition.

Energy Action Planning

Although not included as a topic for this study session, an important effort that is related to the climate action planning work and to the CAP tax is the creation of an Energy

Action Plan, a "master plan for energy" for Boulder. The Energy Action Plan will include three phases, the first of which is specifically related to the work described in this memo:

- Phase 1 will identify programs and services that could achieve the maximum possible energy efficiency in Boulder through demand-side management and conservation, as well as near-term localization efforts possible under current regulatory structures. The CAP tax, if continued, would be a funding source for implementing this phase. If a municipal utility is formed, Phase 1 programs and services would likely be incorporated into the operations of the utility.
- Phase 2 will outline the process and priorities for pursuing new and innovative options related to energy efficiency and local energy generation.
- Phase 3 will build on Phases 1 and 2 to create a business model for a new municipal electric utility.

ANALYSIS

A. Analysis of CAP-Tax Funded Demand-Side Management Programs to Date

Recognizing that Phase 1 of the Energy Action Plan will build on past and current demand-side management programs, the city contracted with the Rocky Mountain Institute (RMI) to analyze the climate impact and cost effectiveness of energy-related climate action programs to date, and contracted with the Brendle Group to recommend specific strategies that will be most effective moving forward. The RMI report is included as **Attachment E** and is summarized below. Work with the Brendle Group, informed by community and EAB input, is ongoing and will be discussed with council at the July 24 study session about what potential CAP tax revenues could fund in the future.

RMI's analysis focused on programs funded by the CAP tax from 2007 to 2011 that are designed to increase energy efficiency and conservation in existing homes and buildings. The analysis also examined the Solar Grant and Solar Rebate programs, which are funded by the city's sales and use tax on solar equipment. This scope was selected to identify (1) the cumulative impact of avoided emissions from energy efficiency and renewable energy investments over time, as distinguished from "one-off"[1] investments, and (2) determine common metrics for comparing programs and services with different lifetimes and impacts. Certain efforts were excluded from analysis because they do not have attributable energy or carbon savings (for example, the CAP tax funds staff who work on Colorado Public Utilities Commission matters).

Using deemed energy savings and CAP tax expenditures provided by staff, RMI applied a modified Utility Cost Text to 19 city programs.[2] While the city's reporting has traditionally focused on estimated annual emissions reductions and CAP tax expenditures, RMI's process considered the cumulative impact of city energy programs in reducing carbon. RMI assessed the technical assumptions used for energy efficiency and conservation measures (such as impact and lifetime) as well as parsing the estimated energy savings where merited due to other revenue sources, like federal funding, rebates

[1] Investments that contribute to a single year of emission-reductions only, unless they are renewed (e.g., Eco-pass, RECs)

[2] The RMI report goes into additional information regarding other options and why this particular approach was selected.

from the Governor's Energy Office and Xcel Energy, and, where available, public investment. Assumptions were made for each program regarding the appropriate allocation of personnel, overhead, and marketing/education. As RMI notes, this disproportionately impacted programs with upfront research and development costs with only one year of results, such as EnergySmart. The consultants performed an additional sensitivity analysis for EnergySmart services that considered changing fuel prices to project the efficiency of EnergySmart services over time.

RMI's work demonstrates that investments in energy efficiency and renewable energy to date are outliving the CAP tax dollars spent to leverage them. In other words, a one-time rebate that incentivizes a building owner to invest in an efficient HVAC system can generate energy savings for the building for as much as 25 years. This contrasts with purchases of renewable energy credits (RECs), which are annual investments for which the energy and carbon impacts are only annual.

<u>The RMI report makes the following key findings</u>:

1. As compared to previous city calculations of savings, which have typically been annual, the life-cycle assessment of program savings projected considerably more savings for each program.
2. Within the current portfolio of CAP programs, those above average in cost effectiveness include residential lighting programs, Commercial and Residential EnergySmart, 10 for Change, and Solar Grants.
3. Boulder has generated significant carbon savings at reasonable cost. Compared to other municipal programs in Connecticut and Oregon, Boulder's lighting programs are slightly less cost effective, Residential EnergySmart is considerably less cost effective, Commercial EnergySmart is similarly cost effective, and renewables programs are far more cost effective. The city also uses a different approach to calculating savings based on program investment than Connecticut or Oregon, and still has many programs that compare favorably in terms of cost effectiveness (see Appendix A for comparisons)[3].
    a. Commercial and Residential EnergySmart are still maturing as programs, and can be expected to improve over time. A sensitivity analysis of the likely future of these programs predicts improved cost effectiveness, which would make Boulder's programs significantly more cost effective than other, more mature municipal programs (such as Connecticut's programs).[4]
        i. The sensitivity analysis projects that with a maturation of EnergySmart, Residential EnergySmart cost effectiveness will improve from 100.7 to 21.5 $/mton of CO2e and Commercial Energy Smart will improve from 69.1 to 13.9 $/mton CO2e.
4. Boulder has attained impressive energy savings and emission reductions, and is well positioned to achieve future emissions reduction targets.

[3] Connecticut's examination of life-time saving from programs did not parse savings by cost contribution (CT also received ARRA funds to support some programs). Disaggregating savings by cost contribution makes Boulder's programs appear less cost effective.

[4] The sensitivity analysis also forecasted Boulder funding a higher percentage of EnergySmart and being able to take full credit for savings (based on the cost attribution approach discussed in Appendix B).

5. Ongoing programs should continue to be comprehensive (such as the existing Commercial and Residential EnergySmart), and become increasingly coordinated across sectors (i.e., recognizing interrelationships between emissions reductions from energy efficiency, renewable energy systems, and transportation technologies).
6. Boulder must push beyond the simple and easy programs and begin additionally encouraging residents and businesses to think longer term about their buildings, investment choices and energy use.
7. The City of Boulder needs to extend an overarching demand side program (which considers interactions with the supply mix) to hit future emissions reductions targets.

<u>RMI additionally made the following recommendations:</u>
The city far exceeds municipal standards for tracking data and assessing program performance. However, some improvements can be made to existing procedures:

1. The city should track yearly and lifecycle emissions reductions across all programs, and continue to estimate any potential double counting between programs. This analysis should include the demand implications of efficiency and renewable programs. Demand implications will prove a topic of singular importance if Boulder chooses to municipalize the energy provider role.
2. Boulder should determine disaggregated costs for each program to continue optimizing the programs selected to reach emissions reductions goals. Funding for programs from different city sources, external funding, and payments from residents should be categorized. This process will become significantly easier as ARRA funding expires, and would be crucial if Boulder decides to municipalize.
3. Investments in a comprehensive program database (including cost and savings data) will facilitate both of the prior recommendations. Data analysis will support not only the selective investment in programs or program activities, but also the optimization of ongoing programs.
4. Boulder should focus on improving carbon accounting to better understand the contribution of program-related savings[5] to the citywide carbon inventory. Improvements to calculations can be attained using macroeconomic factors (such as GDP growth, population growth, and population density), more detailed tracking and measurement procedures and improved data collection throughout CAP programs.

Staff is considering RMI's recommendations regarding data use and management in developing the process for the proposed new climate action framework. Additionally, staff suggests that the Brendle Group build on RMI's analysis and recommendations to inform Phase 1 of Boulder's Energy Action Plan: the set of strategies that could be funded under the CAP tax should the CAP tax be extended. This analysis will include an evaluation matrix for comparison of considered and recommended strategies based on a variety of metrics. The work with the Brendle Group will be coupled with a community engagement process to ensure that local expertise and stakeholder input informs the recommendations moving forward. Results from the Brendle Group's report and

[5] Currently CAP programs have a mix of unverified deemed, verified deemed and actual savings. See Table 4 for more.

recommendations on specific strategies to be continued or expanded as well as new strategies to pursue under Phase 1 of the Energy Action Plan will be available for discussion with council at the July 24 study session.

B. CAP Tax Issues and Options

The CAP tax is levied by a charge per kilowatt hour (kWh) of electricity consumed with differing rates by sector: residential, commercial, and industrial, and is used to fund programs and services to reduce greenhouse gas emissions. The 2006 ballot language (**Attachment F**) included minimum and maximum tax rates. In 2009, council authorized an increase of the tax to the maximum rates approved by the voters.

The current tax generates approximately $1.8 million per year. The current CAP tax expires in March 2013 and council's discussion at the May 1 study session suggested a strong interest in pursuing a ballot item in 2012 to continue funding energy efficiency and conservation programs and services.

Options for the future of the CAP tax

Staff has identified four options for the future of the CAP tax:

1) Do not place the CAP tax on the ballot in 2012
2) Extend the current CAP tax
3) Create a new CAP tax
    a. Modify the existing tax rates
    b. Change the purpose and/or scope of the tax
4) Replace the CAP tax with an increase to the Utility Occupation Tax

A description and analysis of the pros and cons of each option is presented below.

1. **Do not place the CAP tax on the ballot in 2012**

   Option 1 is not to place the CAP tax on the ballot this fall. Under this option, the tax would expire on March 31, 2013, at which point funding for current programs, services, and staff would end. Considerations that influence this option include:

   Pros

   - Eliminates the tax from customer electric bills (the average residential customer pays approximately $25/year in CAP tax).
   - Limits the items on the ballot this fall.
   - Allows more time to analyze other methods for generating funding to continue these types of programs and services.

   Cons

   - The approximately $1.8 million/year of funding for energy efficiency and related efforts would be discontinued unless another funding stream is identified. This is currently the only city funding stream for energy efficiency in existing buildings.
   - Progress towards meeting greenhouse gas emission reduction goals through energy efficiency in existing buildings would be slowed. Energy use in existing commercial and residential buildings represents the largest percentage (76%) of the city's current greenhouse gas emissions inventory.

- Alternative funding would need to be identified for some specific work program areas that cannot be easily discontinued, such as support for SmartRegs compliance (currently funded by the CAP tax).

2. **Extend the current CAP tax**

Option 2 is to extend the current tax. Extending the current tax would mean continuing the rates charged per sector and retaining the current collection mechanism. The current tax generates approximately $1.8 million/year. There are certain legal limitations in this option. If any of these factors changed, the tax would be considered a new tax (options 3 & 4) rather than an extension. These limitations include:

- The maximum tax rate charged per sector must remain the same; hence the maximum amount collected would remain the same[6].
- The purpose of collecting the tax must remain the same.

Considerations that influence this option include:

Pros

- Extending the tax would provide the simplest means for continuing, evolving or creating new DSM services in the City of Boulder at or below existing funding levels.
- The mechanism for collecting this tax is already in place.
- The ballot language for an extension would be simple and short. An example of draft ballot language extending the tax is included in **Attachment G.** By asking voters to extend an existing tax, it does not require including TABOR[7] language for a new tax.
- Continuation of the existing CAP tax would minimize confusion for voters, as compared to a new tax that may seem duplicative of the utility occupation tax approved last fall for funding the city's municipalization efforts.
- There is limited time before the expiration of the current CAP tax to analyze and put in place a new way to collect a tax (e.g., taxing other sources of carbon or basing a new tax on projected emissions by source). An extension would limit analysis needed to what the tax would fund rather than other ways to collect the tax.
- The current CAP tax programs have been refined over time to arrive at a suite of services that are successful and based on lessons learned from the past five years. The preliminary findings from RMI's independent analysis of CAP programs to date indicate that it is not necessary to "start over," but rather to fine-tune and find opportunities for innovation, improvement and enhancement. Extending the tax would allow for a seamless continuation of EnergySmart despite the expiration of Recovery Act funding.

[6] In 2011, of the $1.84M collected through the CAP tax, 62% was collected through the residential sector, 30% was collected through the commercial sector, and 8% was collected through the industrial sector.

[7] TABOR is intended to reduce growth in government by requiring the refunding of excess revenues from new taxes, based on the tax amount in the ballot measures, or for taxes that pre-dated TABOR's adoption in 1992, based on a prescribed formula. See Colo. Constitution, Art X, Sec. 20(3) & (7).

- The current tax structure allows flexibility about how the revenues from the tax are allocated across sectors through the city budget process as well as the goals, targets and specific strategies that can be funded through the tax, so long as the overall purpose of the tax (reducing GHG emissions) remains the same.

Cons

- Extending the tax would not allow for any changes to the maximum rate charged per sector. This could create an ongoing equity issue based on how the revenues are appropriated across sectors. For example, if a greater percentage of revenue is appropriated to a sector than that sector generates, it may be seen as unfair.

3. Create a new CAP tax

a. Modify the existing CAP tax rates

This option would involve modification of the current CAP tax rates charged by sector. The modification could include changing the rate charged by sector and/or the total amount collected. This option assumes keeping the collection mechanism the same, a charge per kilowatt hour of electricity consumed. It would require a new tax item for the ballot rather than an extension of an existing tax. Considerations that influence this option include:

Pros

- Modifying the current CAP tax rates would allow for changes in the current maximum rates charged by sector. Depending on council's priorities, a new rate structure could allow revenue collected to correspond more closely with how the revenue is appropriated by sector.
- Analysis to evaluate how rates are charged across sectors could be completed in the timeframe for a November 2012 ballot issue.

Cons

- The current tax collection mechanism would need to be modified to adjust for newly designed rate structures.
- The ballot language would read as a new tax, including TABOR language[8]. This would look more similar to the original CAP tax ballot language (**Attachment G**). Voters might not recognize this as a tax they have already been paying.
- Engagement and outreach to gather input from the public on new tax rates would be minimal in the timeframe available before the ballot language needs to be finalized.

b. Change the purpose and/or scope of the tax

This option would involve changing the CAP tax to create a new tax. Analysis would explore how the tax is levied, what is taxed, and who pays the tax (e.g.,

[8] A TABOR question ballot title must include the following elements: how much taxes will be increased annually and the amount of revenue that is anticipated to be collected at the full phase in of the tax. The amount of taxes collected does not have to be exact, but must be a good faith estimate. TABOR allows a taxing entity to request voter approval to give the City the authority to keep the excess revenues beyond those subject to the tax estimates in the ballot title. The existing CAP Tax has authority to keep excess revenues.

taxing other sources of carbon or basing a new tax on projected emissions by source). Considerations that influence this option include:

Pros

- Changing the CAP tax would allow the city to expand the scope and purpose of the tax.
- Analysis completed could reveal more innovative approaches to structuring the tax (i.e., how it is collected and what sources are taxed).

Cons

- Changing the tax would require a level of analysis that could not be completed in time to inform a decision to place the tax on the ballot this fall. This option would likely have to be pursued as a new tax in 2013 or later.
- As limited time is available for analysis, this would lead to the current tax expiring and curtailment or termination of the city's current greenhouse gas emissions reduction efforts related to energy efficiency.
- The ballot language would be for a new tax, including TABOR language.

4. **Replace the CAP tax with an increase to the Utility Occupation Tax**
   This option would involve increasing an existing tax, which would, in effect, create a new tax on the ballot. The UOT is currently used to fund the replacement of the franchise fee and the exploration of municipalization. The Utility Occupation Tax (UOT) is a tax on the utility's revenues collected from the sale of natural gas and the sale of electricity, which is then passed through to the customer. Since the tax is based on revenues, the UOT is not entirely based on energy consumption as opposed to the CAP tax, which is charged based on electricity usage. Xcel's approved gas and electric tariffs governed by the Colorado Public Utilities Commission (PUC) each include a provision by which Xcel is permitted to pass the tax through to the customer. Considerations that influence this option include:

Pros

- The UOT provides revenue reliability since the tax is governed by the state through the Public Utilities Commission (PUC). Xcel has an approved tariff as to how the tax on the utility is passed through to the customer.

Cons

- The distribution of the UOT is determined by the PUC; therefore, the extent to which various rate classes bear the tax burden[9] is outside of the control of council. This differs from the distribution of the CAP tax, which is completely under the purview of City Council, giving council the ability to decide the proportion of revenues that should be borne by various sectors.
- This tax has been on the ballot the past two years (in 2010 as a replacement for the franchise fee and in 2011 to fund the further exploration of municipalization). Placing it on the ballot for a third year as a replacement of the CAP tax could cause voter confusion and distaste.

[9] Business customers pay approximately 80 percent of the Utility Occupation Tax.

- The ballot language would be for increasing an existing tax including TABOR language.
- Engagement and outreach to gather input from the public on new tax rates by sector would be minimal in the timeframe available before the ballot language needs to be finalized.

Coordinating with a Potential Municipal Utility
If the CAP tax is extended, modified or changed, a decision will need to be made about how the tax coordinates with the potential formation of a municipal utility. The intention of funding Phase 1 Energy Action Plan strategies through a CAP tax is such that if a municipal utility were created, these programs and services would likely be incorporated into the operations and rates of the utility. While staff estimates that a decision on whether or not a utility will be feasible could take several years, it could be a few more years before the utility is operational. Language on the ballot could include a contingency that if a municipal utility were formed and these services were operationalized through the utility, the tax would sunset or be transferred to the utility operations.

Relationship to a Possible County Sustainability Tax
Boulder County has initiated the idea of creating a countywide "Sustainability Tax" that could be placed before the voters in November 2012. With this potential tax, Boulder County could be seeking funding for energy efficiency (namely EnergySmart), zero waste, local food, and forest health initiatives. At the time this memo was being written (in early May), Boulder County was conducting a survey of the community on the concept of this tax. Boulder County offered to oversample survey participants in the city of Boulder to ask a few questions relating to the possible continuation of the CAP tax to gauge whether the presence of two energy-related taxes on the same ballot would make respondents more, less or equally likely to support either tax.

The Board of County Commissioners has asked for conceptual feedback on this tax from two groups thus far:

1. Sustainability program managers from throughout Boulder County.
2. The Resource Conservation Advisory Board that advises Boulder County on its zero waste initiatives.

City staff has been in close communication with county staff on this tax. The county is awaiting the results of the survey before moving forward with any further decisions on this tax. Staff will report the survey results to council as soon as they are available.

Next Steps
Staff will return to council on June 5 for a first reading of the ballot language. The first reading will include draft ballot language for a CAP tax extension (Option 2) as well as other ballot options depending on council's discussion at this study session. At the July 24 study session, staff will return with a more complete analysis of Phase 1 of the Energy Action Plan and options for how CAP tax revenues could be allocated moving forward. Based on council feedback, staff will prepare a second reading of the tax for Aug. 7 and more substantial changes can be made to the ballot language at that time. A third reading, if needed could occur on Aug. 21.

Staff is planning to conduct a community survey about the CAP tax options later this summer, and the questions asked will be shaped by council's conversation on this topic. Additionally, a public meeting is scheduled for June 13 to gather input on the tax options outlined in this memo as well as how the tax revenues could be appropriated by strategy and sector. Future engagement throughout the summer would provide opportunities to explore options with the public (see engagement, section VI). Results of the input from the public meeting, the survey, EAB meetings and web-based outreach will be presented to council at the July 24 study session.

C. New CAP Framework

Background

The purpose of the new CAP framework is to establish the direction and goals for Boulder's climate action efforts in 2013 and beyond, including short-term goals, targets, and specific strategies and actions to achieve them. It is envisioned as a community-wide and organization-wide effort. The proposed work plan described below and in **Attachment H** is intended to be in line with best practices of next generation climate action plans and to integrate community plans and city operations. This framework is conceived as both an evolution of current CAP progress and a "living" plan subject to periodic update; it is not intended to do away with ongoing climate action efforts but rather to innovate, expand, and fine-tune, while "operationalizing" greenhouse gas reduction into all aspects of city services. Rather than a single plan or program, this new framework will reflect a comprehensive commitment from the community and the city.

Staff anticipates that the final framework will be developed in 2012 and early 2013, and include the following elements:

- A definitive climate action commitment for GHG reductions that builds on the existing Kyoto goal;
- Smart interim goals and targets to track progress consistent with that commitment;
- Metrics that align with the targets to ensure measurable progress;
- Reporting mechanisms and data management systems that support "real time" tracking of progress to the maximum extent possible and create transparency for the community in knowing how CAP funds are being invested and the results being achieved;
- Guidance for aligning city master plans more effectively with the climate action framework, including their impacts on emissions at the community and city operations levels; and
- Ongoing education and assistance about climate initiatives so that all individuals can take steps toward realizing climate action goals.

Community Engagement Process

Although the process is still under development, public engagement for this effort is expected to occur throughout the work plan described below. This engagement will take several forms:

- The Environmental Advisory Board (EAB) will play a critical role in guiding the climate action framework and advising Council;

- Other city boards and commissions will provide input and feedback, in particular on interim targets for GHG emissions and metrics;
- Local climate and technical experts and partner organizations will be invited to participate and share expertise; and
- Regular open workshops will provide forums to share information and seek input.

Work Plan

The CAP 2013 and Beyond Work Plan outlines the phases and tasks that will occur during 2012 and 2013 (see **Attachment H**). The five phases are:

1. Analysis
2. Climate Action Goal/ Commitment
3. Focus Area[10] Targets, Metrics, and Reporting, Coordination with City Department Master Plans (including the Energy Action Plan)
4. Long-term Funding and Implementation
5. Framework Preparation and Public Hearings and Adoption/ Acceptance

Several of these five phases may occur concurrently. During a sixth, ongoing phase of continual improvement, the city will measure, monitor, report, reassess, and update the climate action framework at communitywide and municipal operation levels. As the existing Kyoto Protocol goal sunsets in 2012, establishing a post-Kyoto climate action commitment is a key initial focus of the climate action framework.

Defining Boulder's Climate Action Commitment

Long-term climate action goals, like the Kyoto goal, serve as important reminders of the community's shared values. Yet these values extend beyond the environmental and impact the community's overarching vision of sustainability, including social and economic prosperity. Although Boulder will not meet the Kyoto goal by the end of 2012, both scientific findings and community values compel the city and the community to continue shared efforts to impact the global climate through local action.

Local, state, and federal governments increasingly are adopting long-term emissions goals that vary in rationale and scope. Staff reviewed more than 40 climate action plans adopted by U.S. local governments to identify their long- and short-term GHG climate action goals and the basis for those goals.[11] Those findings are summarized in **Attachment I**.[12] Out of local governments identified as similar to Boulder in delivery of climate action services in **Attachment I,** a growing number are converging on two main goals:

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[10] In the current CAP, there are six strategy areas: Reduce Use, Build Better, Ramp Up Renewables, Travel Wise, Waste Not, and Grow Green. To avoid confusion with emissions reduction strategies, it seems prudent to rename these as "focus areas."

[11] Although a number of communities also set goals related to power supply mix (e.g., 50% renewable power by a certain date), this preliminary research focused primarily on emissions reduction goals. Goals related to the community's energy resource mix will be considered as part of the Energy Action Plan.

[12] Communities are organized based on those that are most relevant, somewhat relevant, or least relevant to Boulder. The classification of a community's CAP as "most relevant" was based on the aggressiveness of its post-Kyoto goals, its level of detail, how recently and frequently it has been updated, and whether the community has comparably advanced policies and service offerings to Boulder's.

1. 80-95% Below 1990 Levels by 2050

Out of the nine local governments whose CAPs were identified as "most relevant" to Boulder's climate action goal-setting, all but one have some kind of long-term community goal that requires reducing emissions by at least 80% by 2050, with varying base years. Generally, they also set interim goals, such as a 20% reduction by 2020, that require them to reduce absolute emissions by approximately 2% annually. These local governments typically account for energy, transportation, and waste emissions within their geographic area, and exclude emissions from commuting, consumer goods, and food production.

2. Carbon or Climate Neutral

Two of the nine local governments whose CAPs were identified as "most relevant" to Boulder have a long-term goal of carbon neutrality by 2050 for the community: Seattle, Washington, and Davis, California (which also has an interim goal of reducing emissions by 80% below 1990 levels by 2040). Closer to home, CU-Boulder has adopted a *Conceptual Plan for Carbon Neutrality*.[13] They generally define neutrality as "net zero" GHG emissions, determined by minimizing GHG emissions as much as possible and then subtracting carbon offsets, local sequestration, or renewable energy credits (RECs) to "net out."[14] Generally, the sources and accounting methods are similar among cities with climate-neutral goals and those with 80% by 2050 goals; both consider RECs, carbon offsets, and technological change as possible ways to meet deep emissions reductions. "Climate neutral" rather than "carbon neutral" may more effectively convey that the GHG emissions to be measured and targeted are anthropogenic rather than naturally occurring.

In researching possibilities for a new climate action commitment for Boulder, staff identified several issues or challenges to consider. Among them are planning for future uncertainties, addressing scientific necessities, and defining an appropriate range of GHG emissions sources to account for. This research and analysis is summarized in **Attachment I**.

Based on this research, staff identified the following six considerations to frame the discussion and selection of a new climate action goal for the Boulder community:

1. Is it built on the best available scientific data?
2. Does it inspire the community to action?
3. What is the specific timeframe for the goal?
4. How does it build on the Kyoto Protocol target?
5. Does it position Boulder as a sustainability leader?
6. What is the scope of emissions sources covered by the goal?

Proposed Climate Action Commitment for Boulder

Based on these considerations, staff initially proposed a long-term GHG reduction goal of climate neutrality by 2050 or sooner. Staff has since had feedback from the community,

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[13] Available at http://ecenter.colorado.edu/carbonplan.

[14] NREL provides some generally accepted definitions: http://www.nrel.gov/applying_technologies/climate_neutral/definitions.html.

from council (at the May 8 Energy Roundtable) and from the Environmental Advisory Board (at a May 10 public hearing) that:

- Describing this as a "long-term goal" does not sufficiently convey the level of action and commitment needed to address the pace of climate change;
- The timeframe needs to be more aggressive; and
- The connection between the commitment and the short-term targets should be strengthened.

For this reason, staff proposes using "climate neutrality" as Boulder's *climate action commitment* and further exploring the timeframe and specific goals and short term targets with the community in the coming months.

A climate neutrality commitment would mean transitioning the Boulder community to net-zero harmful GHG emissions.[15] Climate science indicates that developed countries will need to reach at least 80 to 95% below 1990 levels of GHGs by 2050. Neutrality would push the Boulder community beyond 95% below to taking responsibility each year for reducing and mitigating its emissions. Far from abandoning the Kyoto goal, Boulder would meet and then surpass it on the path to climate neutrality.

Ultimately, a climate neutral commitment tied to short-term goals and targets addresses scientific concerns, keeps Boulder on the path to meet and exceed the Kyoto goal, and positions the community among international leaders. Defining the climate action framework and refining the commitment and short-term targets over the next year will involve deliberate and thoughtful discussions about when and how Boulder will achieve climate neutrality, including the role of behavior-changing strategies and other means of offsetting emissions. Defining the timeline encourages the city to achieve the end goal sooner, based on ongoing research and discussion, and progress toward the interim targets that will be set through master planning as described in the next section. Climate neutrality potentially provides members of the Boulder community with a defined end goal distinct from measurement against a distant, prior-year baseline, and translates into a clear per-capita goal.

Short Term Goals, Annual Targets, Metrics, and Master Plan Coordination

Boulder's post-Kyoto climate action framework will be an iterative process—a roadmap with interim targets that can be revisited based on new information and progress to determine what is possible on the way to the long-term commitment of climate neutrality.

The climate action framework will connect current CAP focus areas with other city climate action goals, analyze potential new strategies based on gaps, and integrate climate action into standard city operations. Already, funds and efforts beyond the current CAP tax support climate action work; this process will highlight existing resources and align the city organization and goals in supporting climate action. To reduce municipal and community emissions, all city staff should see themselves as integral members of a "climate action team."

[15] In contrast to "carbon neutral," which implies that natural carbon sources would be mitigated.

Many city programs and services are already working toward GHG emission reduction, guided by master plans. The Transportation Division's work to reduce vehicle miles traveled (VMT) through the Transportation Master Plan (TMP) is one example. While the TMP's current VMT goals are not measured and reported for their direct contribution to GHG emission reduction, the metrics can be converted to GHG emissions, and reducing VMT has an almost direct correlation with reduced GHGs. However, the TMP does not necessarily contain the full range of possible strategies that could reduce GHG emissions, such as fuel-switching or changes to the fleet mix. Through a collaborative process, GHG reduction goals could become better integrated and aligned.

Part of identifying appropriate focus areas in the third phase of the climate action work plan in **Attachment H** is aligning those focus areas with related city Master Plans. This process will enhance the prominence and consistency of climate action goals across the city organization, and particularly among those plans that guide department-wide services provided to the public and/or internal services. For example, some Master Plans have both a significant effect on **community GHG emissions** and align closely with a CAP Focus Area: Travel Wise with the Transportation Master Plan (TMP), and Waste Not with the Zero Waste Master Plan (see **Table 1:** Aligned CAP Focus Areas and Master Plans).

Table 1: Aligned CAP Focus Areas and Master Plans

CAP Focus Area	Related City Master Plan	Status of Master Plan Update	Responsible Department/ Division
Communitywide			
1. Reduce Use	Energy Action Plan	Being developed concurrently with Climate Action Framework	Community Planning & Sustainability (CP&S) / Local Environmental Action Division (LEAD) and Regional Sustainability
2. Build Better	Energy Action Plan (EAP)	Concurrent	CP&S / LEAD and PW/ Building Construction
3. Ramp Up Renewables	Energy Action Plan (EAP)	Concurrent	CP&S / Regional Sustainability
4. Travel Wise	Transportation Master Plan (TMP)	Beginning 2012, update being conducted incrementally	Public Works (PW) / Transportation
5. Waste Not	Zero Waste Master Plan	Developed 2006 - update on hold	LEAD
6. Grow Green	Urban Forestry, Visitor Master Plan, Parks and Recreation Master Plan; OSMP Visitor Master Plan; Acquisitions and Management plan; Forest Ecosystem Management Plan; Grasslands Ecosystem Management Plan	No Urban Forestry plan, yet; Visitor Master Plan being updated; Parks and Recreation Master Plan being updated	Open Space & Mountain Parks (OSMP), Parks and Recreation
Other topics? (e.g., Water- Energy nexus)	Wastewater Utility Master Plan; Water Utility Master Plan	Wastewater Utility Master Plan updated in 2011. Conservation study underway.	Public Works/Utilities
Municipal Operations			
City as Leader	Facilities and Asset Management (FAM) Master Plan and Fleet Strategic Plan	Updates in progress	PW/Facilities Asset Management (FAM) & Fleet Services

An ongoing process will be necessary to align plans – to assess existing plan goals and set targets and metrics. Coordination is underway with staff, boards and commissions for the master plans that significantly contribute to community GHG emissions goals and emissions, as well as city operations (i.e., the Energy Action Plan, TMP, Zero Waste Master Plan, and FAM plans). That will follow for Open Space and Mountain Parks, Parks and Recreation, Urban Forestry, Utilities, and possibly other areas. It may take beyond 2012 for all city departments and master plans to incorporate and "speak a common climate action language," to identify possible new interim targets, metrics, and implementation mechanisms (including available funding). During master plan updates, it will be important to test targets and weigh the benefits of GHG reductions against other priorities.

The climate action framework also will focus on identifying measurement responsibility and mechanics for tracking, ensuring regular reporting of progress to inform annual decision making related to city budget priorities, technology opportunities, and other factors and uncertainties. In addition, central to the "living plan" concept is identifying how and when the CAP framework should be updated and how frequently near-term goals and interim targets may need to be adjusted.

Master Plans Affecting Municipal GHG Emissions

Not all master plans have significant effects on community GHG emissions, but all have some impact on municipal operations and emissions (e.g., Facilities and Asset Management Master Plan, Police, and Fire Master Plans). These plans may develop targets and contribute data for a municipal operations GHG inventory.

Next Steps

Some master plan integration is already taking place, particularly for the Energy Action Plan and Transportation Master Plan, as described below.

- ***Energy Action Plan Integration***

  The energy strategies to be addressed through the Energy Action Plan (EAP, or "energy master plan") are important because energy contributed 76% of the 2010 GHG inventory. The energy-related areas of climate action overlap with much of the strategic planning for the EAP; therefore, the EAP will address those relevant CAP focus areas, targets, and metrics. The proposed EAP's relation to the municipalization process and timing is a major driver and focus in 2012 that will likely extend into 2013. The EAP work is also directly connected to the discussion about CAP tax policies.

  By June, EAP Phase 1 recommendations will be complete (i.e., demand side services and programs to fund with a CAP tax). After that, the focus of Phase 2 will shift to a community process to identify localization (supply-side) options. Additionally, the commercial energy efficiency strategies currently under development may provide a model for a potential new set of strategies and targets for the Energy Action Plan focus areas.

- ***Transportation Master Plan Integration***

The TMP is an excellent model for determining how to further integrate GHG-related goals and measures and a citywide sustainable operations framework into master plans. The TMP Report on Progress is also a model for reporting out results to the community (available at http://www.bouldercolorado.gov/files/Transportation/Transportation_Report_on_Progress_2012.pdf). As noted above, the TMP already addresses GHG emissions, at least as an indirect goal. In Boulder, transportation accounts for 21% of GHG emissions, so the TMP and its goals are an important piece of the emissions pie.

Boulder will be updating the 2008 TMP using a phased approach. Staff and Transportation Advisory Board (TAB) anticipate addressing the plan incrementally relative to the TMP's four focus areas. As the TMP is a mature plan with long-standing policies, its overall direction will not fundamentally change, but the update could result in new and improved policies, strategies and metrics.

- ***Sustainability Framework Development***

Parallel to the integration of climate action goals into master plans, the city is currently piloting a new approach in the Fire/Rescue Master Plan update to more fully integrate the community's sustainability goals in the master plan update process. The purpose of this effort is to ensure that council and community priorities are reflected in the evaluation of current city operations and programs, and in defining priorities for program improvements and capital investments. The draft Fire/Rescue Master Plan incorporating this sustainability framework approach is scheduled for consideration by City Council in June. As the framework evolves and is applied in other master plan efforts, staff will work to integrate GHG reduction targets and metrics within this larger effort.

- ***Data Management***

RMI recommended that staff adopt best practices in measuring and tracking the impacts from climate action programs and correlating them with the community GHG inventory. Staff is working on several fronts to operationalize this recommendation and sees it as having two parts. The first part is about maintaining internal quality control. Staff is evaluating the needs for demand-side management (DSM) program planning and evaluation to ensure that future DSM portfolios will be based on good data and will include effective tracking and measuring. The second part is about effective reporting to the community. The climate action framework process will include both community discussions regarding meaningful metrics as well as internal coordination with Information Resources and other departments to more dynamically report on climate action progress. Staff is considering virtual resources and dashboards to promote interactivity.

V. COMMERCIAL ENERGY EFFICIENCY

INTRODUCTION

The purpose of this section of the memo is to update council on the proposed approach to the Commercial Energy Efficiency Strategy (CEES) and request feedback. This strategy

is designed to make Boulder's businesses and existing commercial building stock more energy efficient, helping them reduce their monthly energy costs over time in addition to reducing greenhouse gas (GHG) emissions from the community's largest emissions source.

Since the beginning of the city's Climate Action Plan (CAP), the city has been working to increase energy efficiency in Boulder's commercial building stock; and, the city's services to support these efforts have evolved over time. As the *EnergySmart* services for both residents and businesses rolled out in 2011, the city turned its focus to developing a comprehensive CEES. Work with large commercial property owners was initiated in 2011, in addition to engaging with national working groups, conducting research on other communities and tracking "lessons learned" in the roll-out of *EnergySmart* for businesses and related efforts. The resulting 2012 framework for this effort was presented to council at its Jan. 31 study session. At that time, council expressed interest in regulatory approaches to promote energy efficiency in the commercial sector.

The proposed CEES outlines a phased approach that considers the lessons learned from Boulder's experiences and the *SmartRegs'* process, draws upon best practices from other communities' commercial energy efficiency programs and policies, and aligns efforts with the timing of the Energy Action Plan (EAP). The approach attempts to balance incentives and regulations to increase energy efficiency and reduce GHG emissions without negatively impacting (in fact, striving to positively contribute to) the community's economic vitality and social sustainability. This kind of comprehensive approach would ensure that Boulder remains an attractive community for businesses, stimulating and creating opportunities for them to move and grow in Boulder.

STAFF RECOMMENDATION

Staff recommends the following three-phased approach to increasing energy efficiency in the existing commercial building sector. The phases are as follows:

> **Phase 1: Continued and Enhanced Voluntary Programs,** which includes continuing and enhancing voluntary efficiency services and incentives, while adding an incentive for buildings to be rated and for property owners to voluntarily report on their buildings' performance. Additional research will be conducted to assess the scope of future ordinances. As part of this, the city will be working with Xcel Energy (Xcel), commercial property owners and tenants to access businesses' energy use data and facilitate building rating and reporting.
>
> **Phase 2: Mandatory Energy Rating and Reporting**, which includes the development of an ordinance that would require commercial property owners to rate or "benchmark" their whole buildings' energy performance and report the rating to the city. Staff will continue to work with community stakeholders to identify barriers, appropriate timelines, and city processes to trigger Phase 2 and lay the ground work for Phase 3. In addition, concurrent with development of Phase 2 of the city's Energy Action Plan (EAP), the city, stakeholders and council will identify any state legislation that may be required to enable energy use data transfer to facilitate the rating and reporting process.

Phase 3: Mandatory Prescriptive Measures and/or Performance Standards, which would align with Phase 3 of the EAP and build upon the first two phases over several years that will include requirements that buildings meet energy efficiency standards. Phase 3 includes the development of an ordinance requiring commercial property owners to meet specific prescriptive measures and/or performance standards, based on the performance ratings of existing buildings that were reported through implementation of Phase 2.

To operationalize these efforts, an update will be included in the July 24 council materials accompanying the EAP, prior to seeking council direction on the future of the CAP tax.

ENVIRONMENTAL ADVISORY BOARD FEEDBACK

On March 22, 2012, staff presented to Environmental Advisory Board (EAB) on the initial CEES goals, guiding principles and evaluation considerations. On May 10, staff presented the proposed three-phased strategy and requested EAB feedback on the recommendation. Board members' provided the following feedback:

- Requested to review and provide additional feedback on the development of the strategies.
- Expressed importance of stakeholder engagement from a variety of commercial sector representatives, including builder associations, small and medium-sized businesses.
- Emphasized their support for commercial energy efficiency as a priority this year.
- Affirmed their interest in ensuring that the strategies encouraged economic development and supported Boulder's ability to attract businesses.
- Commented on the fairness to the taxpayers, and the importance of ensuring there is equity with incentives for all size businesses and property owners.

PUBLIC FEEDBACK

Since March, the city has conducted targeted outreach to receive feedback on the CEES efforts outlined in this memo. First, the city held one-on-one meetings with primary commercial building stakeholders such as: The W.W. Reynolds Companies, Gibbons-White Incorporated and The Association of Building Energy Coaches. Additionally, on April 24 in collaboration with the Boulder Chamber and Boulder Economic Council, the city met with a small focus group that included business leaders, property owners and property managers to review the proposed CEES phases. The list of attendees and the focus group meeting summary is included in **Attachment J.** The general feedback was:

- Business leaders, property owners and managers are supportive of the CAP goals and are committed to helping the city develop the CEES; however, the prevailing interest is to achieve it through voluntary programs.
- Continue to provide voluntary programs and incentives to make energy efficiency improvements.
- Energy advising (or technical assistance) services are instrumental in helping businesses and property owners with understanding their energy use and helping to identify contractors, review bids and fill out rebate applications. This is particularly true for small to medium-sized businesses that do not have staff resources to navigate the complexities of improvements.

- Commercial property owners appreciate being able to differentiate themselves in the marketplace by implementing energy efficiency and/or renewable energy projects.
- Businesses need more information and resources to help them evaluate the return on investment (ROI) for efficiency measures.

Feedback on Existing CAP Programs
The city has been requesting and gathering input on existing commercial CAP programs, services and incentives since mid-2011 to determine which are most valuable to commercial building stakeholders. The city has specifically targeted property owners with large commercial building portfolios to identify programs, services and incentives that take advantage of economies of scale and increase owners' (and the city's) ROI. For details on this outreach, and specifically on the outcomes of a city hosted a commercial property owners' charrette on June 9, 2011, see **Attachment K.**

BACKGROUND
In 2006, the City of Boulder's CAP identified that energy use makes up 76 percent of the community's GHG emissions. The electricity consumption of the industrial and commercial sectors accounts for nearly 83 percent of those emissions. In response to this information, the city established several programs for businesses and commercial buildings to begin addressing this issue.

Throughout the past five years, the city's commercial CAP programs and services have evolved to increase their effectiveness. Below are brief descriptions of these programs for reference. A full listing and evaluation of commercial CAP programs can be viewed in the Rocky Mountain Institute (RMI) Analysis Report in **Attachment E**.

A. Early Commercial CAP Programs (2007-2009)
Commercial services prior to 2008 focused on business and property owner communications. This outreach was designed to inform and assist commercial properties of the demand-side management (DSM) programs offered through Xcel Energy.
As a result of this outreach, the "split incentive" barrier (i.e., those responsible for paying energy bills are different from those responsible for making the capital energy efficiency improvements decisions) became evident, at which point, the city with assistance from private sector partners, created the *10 for Change* program that caters to business tenants. This program is a voluntary challenge for participating businesses to reduce their energy use by 10 percent.

Through a robust community engagement process, some existing emission reduction strategies were re-tooled in 2009 based on the model of "Two Techs and a Truck" – a one-stop shop for residents, businesses and property owners to access information, resources and rebates. A CAP Commercial Technical Team was formed to help develop a concept and model for the commercial/business sector. This work laid the foundation for the commercial *EnergySmart* program.

B. Efforts to Increase Commercial Energy Efficiency (2010-2012)

Beginning in 2010, the city and partners committed to expanding CAP services beyond communications, outreach and programs to connect property owners to existing rebates. Several new programs and services were designed and piloted to help businesses and property owners overcome barriers and support their efforts to invest in efficiency. The successful programs included energy advising services and were incorporated into *EnergySmart*, which launched in 2011. Since 2011, *EnergySmart* has provided commercial services and rebates to more than 1,700 businesses and property owners in the City of Boulder. Of the customers receiving advising service, 40 percent have undertaken projects and received over $446,027 in *EnergySmart* rebates, saved 5,102,836 kWh in electricity, 407 therms and avoided 3,599 $mtCO_2$ emissions.

ANALYSIS

A. Approaches Used by Other Communities

Several cities (including Boulder) and states employ a variety of strategies to reduce energy consumption in commercial building stock. It is not likely that a single strategy will achieve Boulder's ambitious GHG reduction goals, so the city has evaluated various strategies from other communities.

A matrix summarizing communities' commercial energy efficiency incentives and policies can be found in **Attachment L**. These incentives and policies are described in more detail below.

1. Continued and Enhanced Voluntary Programs

The most common starting point to increase energy efficiency in the existing commercial building sector is to develop voluntary programs. These programs help educate, provide technical assistance and incentives to assist businesses and property owners and managers to become aware of energy saving opportunities, reduce waste and implement energy efficiency improvements. Many communities, including Boulder, have implemented a variety of voluntary commercial energy efficiency programs either through sustainability initiatives or, most commonly, through utility companies that are required to provide demand-side management programs. Voluntary programs that employ energy advisors have seen the greatest success by increasing awareness of energy consumption, identifying the sources of inefficiencies, and determining the scope of the investment opportunities in energy efficiency.

Examples of Other Communities' Experiences

Portland, Chicago and Denver all have aggressive climate action plan strategies and have implemented voluntary programs that entice and foster leadership through the commercial real estate sector. Throughout the country, it is realized that there are information gaps in how to measure and track energy use in commercial buildings. It is critical to understand the building sectors' inventory, business environment, vacancy rates, available data and potential barriers to receiving additional data that may prevent progress in increasing energy efficiency improvements in commercial buildings.

Boulder's Experience
Boulder is currently at the leading edge of full-service implementation of commercial energy efficiency services, through *EnergySmart* and the *10 for Change* programs. *EnergySmart* is a one-stop shop service and rebate program to make energy efficiency upgrades easy and affordable for Boulder residents, commercial property owners, and rental property owners. *10 for Change* assist businesses, mostly business tenants, in providing the available information, resources and a platform for peer-to-peer networking on how to best implement sustainability practices. CAP commercial programs, services and their cost effectiveness can be reviewed in the RMI Analysis Report in **Attachment E**.

The city and its partners have learned many lessons while managing the *EnergySmart* and *10 for Change* programs. Businesses and commercial property owners have communicated that they do not have the resource capacity to navigate, let alone implement, energy efficiency upgrades on their own. For small to medium-size businesses, it is a bigger challenge - it is rare, if ever, that an employee has energy efficiency improvement responsibilities in their job description. Additionally, due to the voluntary participation in these programs, community-wide benchmarking is a challenge. At best, the city will be able to benchmark and track the energy data provided by the program's participants. Since CAP goals are community-wide, this small data set is inadequate to accurately track commercial energy data throughout Boulder.

2. Mandate Energy Rating (or Benchmarking) and Reporting (or Disclosure)
Since 2007, some cities and states have required government, commercial, and in some cases, multi-family buildings to rate their whole buildings' energy performance. In all of the examples described below, the governing body has led by example, and municipal and/or state buildings have been the first to comply with the requirements. Data and information on existing buildings' energy performance has traditionally been missing in commercial real estate. Benchmarking is a term that is used to rate a building's energy performance, and disclosure is the act of reporting the rating to the governing jurisdiction and public. These actions are currently being employed to help create access to more energy use data and make it public to appropriate parties to assist in instituting energy efficiency as value-added for the commercial real estate market.

Examples of Other Communities' Experiences
Benchmarking and disclosure ordinances have been adopted in five cities and two states, including Seattle, Austin, and Washington D.C. These ordinances work within the market-based structure to help overcome informational barriers of valuing energy efficiency in existing buildings. Property owners have responded favorably to ordinances that allow them to differentiate their buildings through market competition. Seattle staff reported that their ordinance was successful at the time of adoption based in part on the robust stakeholder engagement process that preceded adoption. Some of these ordinances require energy audits that enhance the availability of information and cost-benefit analysis for the property owners. All of the communities studied report that it is critical for property owners and tenants to be able to access information about their energy use in a streamlined format that minimizes manual data entry and maximizes differentiation

between premises. In Washington, there is a state law that requires utilities to provide energy use data in a format that is easily utilized for building rating.

Across the country, large property owners and managers have recommended using standardized performance rating tools and simple compliance paths to provide consistency and ease compliance across municipal and state boundaries. The Environmental Protection Agency's (EPA) Energy Star Portfolio Manager web-based energy (and water) tracking software is the most prevalent rating tool being used across the country, providing a way to collect widespread energy data and compare performance to standard building uses. This tool also allows differentiation between the energy used by the building envelope (building asset) and the energy used in the business processes (business operations).

All the cities surveyed cite the importance of providing clear information on any pending or adopted ordinance, and tailoring educational materials to the various commercial building industry professionals.

Boulder's Experience

Currently, businesses or commercial property owners can benchmark energy (and water) use on a voluntary basis through the EPA's Energy Star Portfolio Manager's tracking tool. Prior to adoption of SmartRegs, the city's energy efficiency standards for rental housing, it was imperative to gather representative energy performance data, upon which the standards for improvement could be set. In the commercial sector, buildings are much less homogeneous and ownership structures vary considerably. This calls for a much more robust data gathering stage before any standard energy efficiency requirement can be determined.

3. Mandate Prescriptive Measures and/or Performance Standards

Mandating prescriptive energy efficiency measures (e.g., lighting upgrades) and/or performance standards (e.g., meeting a specific energy performance rating) in the existing commercial building stock will create an even playing field for property owners and could accelerate the timeline estimated for achieving the CAP and EAP targets and goals in the commercial sector.

Examples of Other Communities' Experiences

Two examples of cities that have implemented prescriptive measures and/or performance standards are Berkeley and New York City. The City of Berkeley has had a commercial energy conservation ordinance (CECO) since 1994. However, the city is currently evaluating an update to its CECO. One reason for the update is that Berkeley's existing ordinance is not strictly enforced and the penetration rate of the current program has only reached an estimated 1,000 buildings, about 7 percent of businesses in the city. The current thinking there is to add a requirement for benchmarking and disclosure. The rating would be disclosed to a public website and buildings with high ratings could publicly display the rating and receive business recognition.

The most comprehensive phasing of existing commercial building sector regulations is in New York City, where commercial buildings account for 80 percent of the city's GHG

emissions and $15 billion a year is spent in energy costs. In 2009, New York's City Council passed four laws to phase in energy efficiency requirements. The first law addresses energy code improvements for existing buildings, augmenting the state energy code. The second law requires annual energy and water benchmarking and public disclosure of the rating. With the last two laws requiring specific energy efficiency improvements over several years. (Energy and water benchmarking and disclosure are one of the six strategies outlined in the *Greener Greater Buildings Plan*, which is a key component of the city's *Pla*NYC, New York City's climate action and sustainability plan aimed at reducing the city's GHGs by 30 percent by 2030.)

In New York, the largest buildings were required to comply first. Large buildings tend to have property managers that are accustomed to analyzing energy usage and compliance is relatively straightforward for their existing business models. NYC has seen that several of the large property managers have hired consultants to help them comply with the regulation. This has given rise to the development of new industry professionals and diversified existing business models for consulting companies. It also helps NYC maintain quality standards by working with a smaller number of compliance contractors who serve a large number of large property owners and managers.

Boulder's Experience

Many lessons were gleaned from the city's experience developing and implementing SmartRegs. A few of them are noted below.

- Establishing goals early in the process is critical to the project's success.
- Identifying the guiding principles and evaluation considerations for the strategy process is necessary when working with stakeholders.
- Collecting and analyzing the right data and providing case study information are essential components to understanding costs and impacts of program implementation.
- Creating simple business processes and phased implementation are critical steps in developing successful regulations.

B. Best Practices for Implementing Phased Approach

Before developing the proposed CEES phased approach for Boulder, the city reviewed the lessons learned from the other communities and from the CAP commercial program experiences. The best practices are summarized below and organized by the approach.

Voluntary Programs

1. Continue and expand existing voluntary programs for the commercial sector. (The energy advisor model has proven to be successful in Boulder and around the country.)
2. Provide market-based incentives for energy consultants and contractors would start the data collection for rating a whole buildings' energy performance.

Mandate Energy Rating and Reporting

3. Foster support from utility providers for energy use data transfer. (This is critical for ease of compliance and to facilitate access to whole building utility data from multi-tenant properties.)

4. Engage and collaborate with stakeholders during the program and ordinance development phases to ensure successful policy adoption and program implementation.
5. Utilize a standardized benchmarking tool to ensure consistency across geographical markets.
6. Simplify and standardize compliance processes can correlate to high compliance rates.
7. Collect energy performance information from the community's existing commercial buildings is necessary to identify energy efficiency upgrade opportunities and to develop programs that can assist with future energy and GHG reductions.
8. Encourage energy consultants to develop services and help property owners comply with regulations.
9. Provide multiple methods of education, outreach and assistance and broadly communicate compliance requirements.
10. Require public buildings to comply with the ordinance before the private sector. (Jurisdictions that have adopted benchmarking policies have learned that it is fundamental to lead the effort by example).
11. Require the largest private commercial buildings to comply first (as this can lead to higher compliance rates).

C. Evaluation Considerations for Commercial Energy Efficiency Strategy Incentives and Regulations

The city evaluated other communities' existing programs and policies to develop three CEES phases. Each phase will be evaluated based on the following considerations:

- Is it feasible to implement, including available or proposed funding?
- Does it further the city's energy efficiency and greenhouse gas reduction goals?
- Is it cost effective to businesses and commercial property owners?
- Does it increase access to energy data and energy use transparency, thus providing better energy management?

The proposed commercial energy efficiency strategy phases' evaluation considerations can be viewed in **Attachment M.**

PROPOSED COMMERCIAL ENERGY EFFICIENCY STRATEGY

Three-Phased Approach

The three phased approach was designed to help the city achieve the commercial efficiency goals outlined in the CAP without burdening local business and property owners with regulations that inhibit their ability to remain competitive.

The three phases are modeled after best practices in other cities and are coordinated with the Energy Action Plan phases. Each of the phases employs varying levels of city and property owner investments. Further development of Phases 2 and 3 will require additional analysis and stakeholder engagement to ensure the success of program design, implementation, and compliance. Aspects of these two phases may also be dependent on the allowed authorities outlined in the Energy Action Plan, ultimately implemented in conjunction with a municipal electric utility.

Phase 1: Continued and Enhanced Voluntary Program
Description: Continue providing voluntary programs and incentives to businesses and commercial property owners/managers who make operational changes and building equipment upgrades to increase energy efficiency. Expand incentives in 2012 to include support for property owners willing to rate and report out on their buildings' performance. Incentives include, but are not limited to, the following:

1. Advising service, which includes free assessments,
2. Rebates for efficient building equipment,
3. Energy rating or benchmarking assistance

Details on these incentives after 2012 will depend on the availability of CAP tax or other funding sources. The city will work cooperatively with commercial property owners and tenants to obtain energy use data from Xcel in a format conducive to rating the whole buildings' energy performance.

Phase 2: Mandate Energy Rating and Reporting
Description: In addition to enhanced programs to encourage voluntary investment in energy efficiency, implement an energy rating (or benchmarking) and reporting (or disclosure) requirement that will require property owners to use a standardized tool to rate a building's performance. The results of the rating will be reported to the city and possibly disclosed to real estate and financial professionals, and/or the public. Based on the ease with which businesses are able to obtain their buildings' energy usage data, legislative changes may be required to compel the state's utilities to release this type of data in a format that is conducive to performance rating.

Phase 3: **Mandate Prescriptive Measures and/or Performance Standards**
Description: Based on the critical data gathered from Phase 2 mandatory rating and reporting, the city will determine the most appropriate energy efficiency standards that advance Boulder's energy efficiency, GHG reduction and economic vitality goals, with improvements phased in over a period of years and supported by a customer-focused assistance program. The timing of Phase 3 will correspond to Phase 3 of the Energy Action Plan, as the effectiveness of this type of energy efficiency standard would be enhanced by the existence of a municipal electric utility or other entity with the ability to support financing based on cost savings and other implementation tools.

PROPOSED PROGRAM DEVELOPMENT PROCESS

A. Guiding Principles for the Process

Throughout the development and implementation of the commercial energy efficiency strategy, the following principles will guide the process:

1. Continue to collect and analyze data to understand the types, sizes and energy efficiency opportunities in Boulder's commercial building sector.
2. Learn from past and present initiatives and build on what has worked.
3. Make the process clear and transparent.

4. Collaborate with commercial building industry and professional energy consulting and research stakeholders on best practices and cost effective means to increase energy efficiency in the commercial sector.
5. Leverage partnerships and business organizations to share in compatible messages about the best ways to reduce energy use, increase efficiency, and save money.

B. Stakeholder Process

The stakeholder process will include and balance commercial building industry and business stakeholders and possibly leverage members from past and present focus groups.

Commercial building industry stakeholders involved will be property owners and managers, contractors, real estate brokers and business tenants. Business tenants will be included because one primary goal of benchmarking and disclosure policies is to develop energy transparency in the commercial real estate market. Providing prospective and existing tenants, buyers and investors more information of a building's performance rating, will create awareness for valuing energy efficiency.

Additionally, the city will engage business-related stakeholders who participated in February and March Energy Future focus groups. This outreach is a result of these stakeholders expressing interest in having city staff attending their existing networking meetings to provide more information on the process.

Outreach and education is occurring and a formal stakeholder process will assemble in the summer. This stakeholder group's role will be formalized once the city receives council feedback. Ongoing one-on-one meetings will continue throughout the process to ensure feedback and input is received by commercial building stakeholders.

C. Process and Timeline

Generally, the project will occur during six steps identified below, with the data collection, analyses and evaluation continuing throughout the project. **Attachment N** is a proposed process and timeline graphic.

1. Continue to conduct data and research on other communities' incentives and policies (ongoing through April 2012).
2. Develop, evaluate and receive feedback on initial strategy phases through one-on-one meetings and focus group meetings (March to May 2012).
3. Refine strategy following council's feedback (April to July 2012).
4. Phase 1: Voluntary program continuation and expansion for 2013 and beyond (May to November 2012).
5. Phase 2: Policy and program development concurrent with the development of the Energy Action Plan. Discuss options with Xcel Energy for accessing and transferring the necessary data needed for simply compliance with a benchmarking and disclosure ordinance. The city will develop a research paper during the third quarter of 2012 aimed at identifying alternative state-level options to access energy usage data. If the city deems that state legislation is required for effective electronic data transfers, the ordinance may be delayed until that option is pursued, possibly to the end of 2013 or early 2014.

6. Phase 3: Policy and program development and implementation (third quarter 2013 and beyond) aligning with Energy Action Plan. May be coordinated with the creation of an electric municipal utility.

NEXT STEPS
Staff is requesting feedback from City Council on the recommendation for a three-phased approach for the CEES, the project schedule, and the proposed stakeholder engagement. Based on that feedback, additional stakeholder outreach will inform a refined strategy that will be integrated into the appropriate phases of the Energy Action Plan.

VI. COMMUNICATIONS AND PUBLIC INPUT

The city has continued to engage in communications and outreach related to Boulder's Energy Future. Much of the focus over the past couple of months has been on informing people about the climate change motivation behind the community's desire to set new goals – and determine the best approach for meeting those goals.

Earlier this month, staff launched an educational speakers' series. The city partnered with the organizers of the RASEI Big Energy Series to offer a wide variety of speakers and topics related to energy supply and climate change issues. Three of the speaking events were coordinated and hosted by the city. The audience size varied at these, but each of the events resulted in lively discussion and participation. Several staff members attended these speaking events and were available to answer questions related to the city's efforts.

Over the past few months, community members have had several other opportunities to interact with staff members, including a new informal, drop-in style approach session that the city called Walk-In-Wednesdays. Five of these sessions occurred in March, April and May. On the plus side, each of these events resulted in staff interactions with at least one community member who had not been previously engaged in the conversation. Attendance, however, was sparse, and city staff has decided that continuing these is not the best use of employee resources.

Instead, team members will provide Energy Future information at the city's booth at the Farmers' Market the fourth Saturday of every month throughout the summer. The city is also planning a public workshop centered on the new climate action framework and potential ballot measure on June 13. Lastly, staff is anticipating there will be ample opportunities for public information and participation at council sessions planned for June, July and August.

Here's a quick look at some of the city's other efforts since the last council memo:

Monthly e-newsletter

- Two issues have been distributed so far, and a third one is in the works.
- As of the end of April, more than 400 people had viewed the first newsletter on www.BoulderEnergyFuture.com.
- Statistics show they spent an average of 4 minutes on the site, suggesting they found at least one article that interested them.

- Other distribution methods included our Energy Future listserv. To date, nearly 400 people have signed up to receive updates from the city through this platform.
- The city has also printed 500 copies of each edition to place in city buildings, recreation centers and libraries, as well as cooperating coffee shops and churches.

Website

- The Energy Future home page is the 94th most viewed website out of the 5,564 city websites tracked by Google Analytics.
- Between January 2012 and the end of April, more than 4,000 people had accessed this website. There were 3,658 unique views.

Over the next few months, the city will be utilizing several additional approaches to sharing information about the ongoing exploration of municipalization, climate action planning and the creation of an Energy Action Plan. These include:

- A new display for use at the Farmers' Market and other community events
- An updated Community Guide
- Participation in a pilot program using MindMixer, a web-based platform that gives community members the opportunity to provide feedback and engage with the city on important matters without coming to public meetings.

VII. NEXT STEPS

Following council's discussion and feedback on May 22, staff will:

- Continue with the next steps in exploring the possibility of forming a city-owned electric utility as described in **Attachment A**.
- Return to council on June 5 with a summary of this study session
- Prepare a CAP tax 1st reading ordinance for June 5 based on Option 2 (extend the existing tax) and other options recommended by council
- Hold a public workshop on CAP Tax Options June 13
- Prepare Phase 1 of the Energy Action Plan with the Brendle Group and input from the community for council consideration at the July 24 study session on the CAP tax. Include in the study session materials options for how CAP tax revenues could be allocated moving forward. Based on council feedback, prepare a second reading of the tax for Aug. 7.
- Conduct a community survey on CAP Tax Options in June.
- Continue with the development of a new CAP Framework as shown in **Attachment H** or as modified based on council feedback.
- Host additional Commercial Energy Efficiency stakeholder outreach and develop a refined strategy to integrate into the appropriate phases of the Energy Action Plan.

VIII. ATTACHMENTS:

A: Energy Future 2012 Work Plan
B: Excerpt of EAB Minutes from the March 22, April 26 and May 10 Meetings
C: Summary of 2011 Cost Model Analysis Scenarios and Model Results
D: 2012 Ad Hoc Resource Modeling Group
E: Rocky Mountain Institute Report
F: 2006 CAP Tax Ballot language
G: Draft 2012 CAP Tax Ballot Language Under Option 2 (Extend the Current Tax)
H: CAP Framework Work Plan
I: Other Communities' Climate Action Long and Short Term Goals
J: April 24 Focus Group Meeting Attendee List and Meeting Summary
K: Outcomes of the City of Boulder Commercial Property Owner Charrette
L: Other Communities' Commercial Energy Efficiency Incentives and Policies Matrix
M: Proposed Commercial Energy Efficiency Strategy Phases' Evaluation Chart
N: Process and Timeline Graphic

ATTACHMENT A

2012 Path to Boulder's Energy Future

www.BoulderEnergyFuture.com

	January - May	June - September	October - December	2013 & Beyond
City Council Input & Direction Direction and Decisions from City Council	**January 31 Study Session:** Council feedback and direction on 2012 Work Plan: framework of the Energy Future work efforts, goals, priority activities and timeline for each effort **May 22 Study Session:** Council feedback on • New draft climate action framework and Energy Action Plan outline & new long-term aspirational GHG reduction goal • Criteria and measures to evaluate energy efficiency (demand-side) and supply-side strategies • Whether to include a CAP (energy action) tax on the Nov. 2012 ballot, and, if so, which tax options/ funding scenarios to analyze further • Draft scenarios for utility renewables modeling • Commercial energy efficiency strategy: initial options for incentives and ordinance development	**June 5 Council meeting:** 1st reading of possible energy action tax ordinance **July 24 Study Session:** Council feedback on • Commercial energy efficiency strategy goals and refined options for ordinance development (Note: could be August) • Climate action framework: Goals and near-term targets by strategy area • EAP: Near-term city-funded demand-side/ energy efficiency programs (Phase 1 of EAP) • Refined energy action tax options for Nov. election **August:** • 2nd reading and public hearing on energy action tax ballot language for Nov. 2012 • 3rd reading if needed • Feedback & direction on legislative options research	**October 23 Study Session** Council feedback & direction on • New climate action framework and implementation Measures • Draft localization options and Phase 2 EAP direction • Commercial energy efficiency ordinance	Continued direction on Energy Future work efforts
Public Involvement & Input Input from Residents, Businesses, Property Owners, Experts, Organizations and other Stakeholders	**February 28 and March 5:** Targeted focus group input on when and how to get information and provide input on each of the energy future work efforts **March - May** Speaker series involving topics related to municipalization, local generation strategies and DSM/ efficiency programs **March – April** Ad hoc Utility Modeling Group provides input on renewables utility modeling: what scenarios should be modeled? Focus group input on commercial energy efficiency strategy goals and initial options for incentives and ordinance development	**On-going:** Bi-weekly open Office hours Environmental Advisory Board (EAB) considers public comments & discusses and provides recommendations on Energy Future work **June** • Public opinion poll on possible energy action tax (extension/ revision of existing CAP tax) • Public Forums on energy action tax options • Commercial sector stakeholder working group as sounding board for commercial energy efficiency strategy	**November** • Possible ballot item on energy action tax • Continue commercial sector stakeholder working group	
Exploring Creation of a City-Owned Utility Exploring "municipalization" -- creation of a city-owned electric utility	• Hire new Executive Director of Energy Strategy and Electric Utility Development • Contract with acquisition and Federal Energy Regulatory Commission counsel • Develop negotiation and litigation strategy • Ongoing technical research and analysis regarding inventory, appraisal of existing system, separation plans and annexation issues & options • Identify utility renewables modeling software & scenarios to model	• Develop scope of work for legislative options research paper • Finalize results of the utility renewables modeling	• Ongoing technical research and analysis regarding inventory, appraisal of existing system, separation plans and annexation issues & options • Finalize legislative options research	Continued work on potential formation of a municipal utility and anticipation of first formal off-ramp discussion
New Climate Action Framework Creating long-term goals and near term targets to reduce GHG emissions from all sources in the community	• Independent third-party analysis of the effectiveness of CAP strategies to date • Research other communities' plans, goals & strategies • Develop new climate action framework: purpose, outline & relationship to other city plans • Draft a new long-term aspirational GHG emissions reduction goal (based on research & EAB input) • Identify metrics of success (GHG emissions, economic savings, etc) • Identify and analyze options for energy action tax (CAP tax extension/ revision as bridge until muni formed or not), including relationship to proposed county tax	• Refine & further analyze energy action tax options: different funding levels & tax structures • Summary of lessons learned from CAP effectiveness study & recommended strategies moving forward (see Phase 1 EAP) • Finalize long-term aspirational goal • Identify goals by strategy area (e.g., energy, transportation, waste), working with departmental Master Plan update processes and near term targets and overall city sustainability framework	• Finalize new climate action framework, including implementation measures • Finalize metrics for monitoring and evaluating short and long term goals	Implement & monitor new climate action Framework
Energy Action Plan (EAP) Developing a Master Plan for energy that moves us toward greater energy independence and cleaner energy sources	• EAP framework: purpose, contents/ outline & relationship to other city plans • Identify criteria and metrics for evaluating energy efficiency (demand-side) and supply-side strategies • Develop draft EAP, including table of contents, purpose, strategy areas and general framework	• Preliminary gap analysis: what's missing in current city-funded energy efficiency (demand-side) programs/ strategies? • Phase 1 recommendations: select services & programs to fund with energy action tax • Develop methodology and process for localization option strategies, including technologies, policies, funding options, etc • Refine and further analyze recommended strategies for Phase 1 EAP	• Begin community process to identify localization options to include in Phase 2 of the EAP	• Identify strategies to include in Phase 3 of the EAP, the new "utility model" • Implement Phase 1 and 2 of the EAP • Create new partnerships to enact Phase 1 and 2 strategies
Commercial Energy Efficiency Strategy Developing a strategy to make Boulder's existing commercial building stock and businesses more energy efficient and reduce GHGs	• Gather data and conduct peer city research • Develop goals, policies and initial options and analysis related to balance of incentives and ordinance options	• Refine goals, strategy options and policy directions • Develop ordinance options, timelines and business processes	• Refine ordinance for final consideration	• Develop preferred Commercial Energy Efficiency Strategy and implementation steps • Prepare new ordinances and incentive programs
Building Energy Codes Incorporating Climate Action goals into residential and commercial building code updates (for remodels and/or new buildings)	Research the 2012 International Energy Efficiency Code (IECC), International Green Construction Code (IGCC), and National Green Building Standard (NGBS), for development of amendments and adoptive ordinance language.	Seek advisory board and other public input on the proposed code adoptions and incorporate the information such as energy efficiency level required in the code adoption program.	Propose the code adoption ordinances to council for approval.	2012 code updates become effective and are implemented.

ATTACHMENT B

Environmental Advisory Board Feedback

The following is a summary of feedback and recommendations provided by the Environmental Advisory Board (EAB) at the March 22, April 26 and May 10 board meetings.

Climate Action Framework

- The board unanimously agrees with the new Climate Action Framework presented by staff

- The board believes that the development of the city's Climate Action Plan has forced changes in programs and polices to reduce greenhouse gas reductions. The Board also believes that there has been much work done already on developing the underlying document of the CAP.

- The Board urged staff not to reinvent the wheel because the document is an incredible template for local efforts to do climate action work.

- With regard to the Energy Action Plan (EAP) the board feels that it is extremely valuable and wise of the City to focus early on Phase I where it is continuing to work on energy efficiency, demand-side and reduction efforts. In terms of looking at Phase II, realistically you need to look and have information about costs for options.

- The board mentioned that they hope to be more aggressive with our transportation greenhouse gas emission goals. The Board encouraged staff and all boards to consider ways to increase the priority on transportation related emissions.

- The board would like to continue providing feedback on the CAP options. The stakeholder process outlined by staff seems like a very influential group of builders and they would like to see builder associations incorporated into the process of gathering feedback. The board recommended a formal notice process inviting potential stakeholders to participate.

CAP Programs to date (May 10 only)

- The board stated that it would be interesting to see how many people have participated in EnergySmart relative to 2008-2009 figures for DSM participation rates. One member mentioned surprise that PV related programs being some of the most cost effective.

- The board suggested ensuring CAP dollars are spent in a way that adds value.

- The board acknowledged that investments in programs were more expensive in the beginning but believe the programs will show value over time.

- The board suggests that we need to have good information and data about effectiveness of programs to be able to communicate to the community about what value we are getting from the CAP tax. The nature of the study and bringing in the third party to do this analysis is very helpful to get an objective view. Many of the findings are reinforcing what we have been discussing, observing and expecting, which is nice to see particularly as it will show the return on investment over time, which is a very positive outcome. There will be a lot of good data for evaluation. The board believes it is important to look at the life-cycle analysis to understand those things that are short-term vs. long-term benefits. Has also been helpful to disaggregate the costs because we have had so many different funding streams that we have been working with (federal and other government programs). Good to see what specifically can be attributed to the CAP tax as that will be the primary funding stream as we go forward. Commented that it was a very well constructed study built on limited information that will build a good foundation for other discussions.

CAP Tax Options and Climate Action Commitment

- Geographic constraints prohibit us from accurately measuring greenhouse gas emissions specific to the boundary limits of the city, e.g. PPM of CO2. Wants to focus on types of programs that are specific, measurable and that can incentivize us in terms of demand-side management and supply-side management.

- The board noted that the approach city staff is taking with setting a high-level long – term climate action goal paired with short term metrics seems ideal. They mentioned that staff should look to the scientific consensus in establishing the goals.

- The Board also noted that if the goals are going out very long term, carbon neutrality by 2050 is a good long-term aspirational goal. Easily measured and easily conveyed to the public for the shorter term goals. That said, the board also believes that we could evolve from the phase of aspirational goal setting due to having 10 years experience of what it takes to reduce greenhouse gas emissions. Along with setting a long-term aspirational goal, the board suggests thinking about goals differently such as setting more focused, measurable smart goals.

- The board suggested that it was helpful to see comparisons and goals that have been set and how those goals actually translated into programs.
  The board generally agreed that given the political climate, extending the current tax is the most appropriate action moving forward. The board did support keeping the option open to modify until we can get some public input on the subject later this summer.

- The board advised considering a sunsetting tax tied with the Climate Action goals, caveated further if municipal utility is created. Could sunset that with rate recovery.

ATTACHMENT B

- The board suggests manipulating the goal to make it more inspirational and concrete so the average citizen can understand what we are trying to do so that we can extend it out as far as possible.

- The board suggested a consideration about transferring the burden among sectors to put more of the burden on commercial/industrial to allow flexibility.

- The board agreed that a 2050 goal was not aggressive enough. Suggest looking at options closer to 2025 or 2030. Setting something that is more aspirational is important. Noted that not everyone can use renewable energy credits to offset others emissions to achieve climate neutrality applicable worldwide.

- The board suggested looking at whole communication around what we could accomplish with different level of taxes. Would be nice to keep the flexibility as we go forward as we do the analysis of the effectiveness of programs.

- The board believes midterm goals should be a significant part of our goals. Climate neutrality vs. emissions down should be the goal. As for the timeframe, it is reasonable for us as a community to want to do something about anthropogenic emissions as soon as possible. Would like to see timeline pushed up while emphasizing meeting goals. Must reduce fossil fuels use to reduce GHG. Beneficial to economic development.

- One board member stated that climate neutrality is very unclear. He also stated that it takes a very quantifiable goal as we have had for these past 10 years of reducing our greenhouse gas emissions below 1990 levels by 7% and it turns it into something that is very hard to communicate. He suggests that climate neutrality does not translate well to the general public. It captures the end goal of reducing our impacts on anthropogenic climate change but thinks having a very specific goal would be good. Likes idea of having a near term, goal such as a 10-year goal-setting horizon, and gives us the opportunity to re-assess. Would suggest that we think about it from projecting and forecasting from today to where we can get to in 10 years. Look at different trajectories from current progress and as programs are ramping up, look at different vectors, which should lead us to what our goal should look like. Ties goal to tax to what we are doing and how good our forecasts are. Leveraging private investment depending on the economy and other factors. Another problem with neutrality is the whole REC (Renewable Energy Credit) issue. We have made a decision as a community that we did not want to meet the Kyoto goals by buying RECs. Wants to see a focus on hard reductions in emission as a 10-year goal and as a projection from our current situation to that 10 years, looking at different forecasts based on how aggressive we want to be.

ATTACHMENT B

Commercial Energy Efficiency Strategy

- The Board commented they are encouraged to hear that we are as engaged as we are this year with the process and that staff has responded to make the commercial energy efficiency a priority in the 2012 work program. They continued by recommended that staff reach out to small business/land owners be involved in the process.

- Members of the board suggested adding a goal around fairness to taxpayer and large and small commercial operations—social equity balance, and the inclusion of a goal of economic development/economic support, which makes Boulder attractive.

- The board would to see more action in all sectors. There are realities and experiences from other communities for better or worse, which are good. We need to understand some of the nuisances and how we actually kick that in if there were ever going to be regulations to move that action. That will take time and the board is not sure whether that might be a year out before we have really got our feet underneath us and have a coalition of stakeholders available to really move that through Council to make requirements for energy efficiency upgrades in the commercial sector. With the loan program, services and rebates that we have, he hopes we make a lot of headway over the next nine to twelve months. Makes sense that voluntary programs continue and agrees with staff recommendations. Does believe that there will be a need for benchmarking our facilities. Does not know how the City, other than with intervention from State Legislature with Xcel, will streamline the process of getting the aggregated energy data out to the public. Part of phased approach will be City staff working to figure out how we are going to make that benchmarking available to the public without an overly burdens of cost when we could be driving those costs to do action and upgrades.

- The board also agreed that while the phased approach is a good approach they suggest pushing for mandatory programs, such as 24-7 lights and sensors. It is good business and is part of the values of our community so it should be required to have to do that. The EnergySmart program has come about and we find that there are some things such as lighting and other programs that people can tell you which ones are more cost effective. If you put that economic analysis onto a loan and you are not paying anything more to do this, and in fact your rates are not going to raise, then that too should be a mandatory program. Those that have businesses and can show people how to save money, those are the businesses that we should be working with to get the other businesses to comply. There is no cost to them and they are being given all the tools to be able to do this at no cost. Three-phased approach is somewhat sound, but we have to push those mandatory issues up to the first level. They have come to the table.

  In addition, the board stated that the phased approach is stable and would perhaps reduce the risk of rebellion in the business community. The timeline of the Climate Action Plan is about 40 years and the timeline for Phase 3 for mandatory changes starting up is January 2013. Obviously, getting some measures through as soon as possible will be great. In respect to comments made from some of the businesses

surveyed, they talk about the need for incentives to create a level playing field and if it is regulation across the playing field, that does the job too.

- One board member stated that she thinks the phased approach is excellent. The structure in going forward with benchmarking and mandatory data disclosure is supported in phases. Ultimately, thinks we need to have regulations but believes the phased in approach as they did in New York makes a lot of sense. Early adoption credit is something this City should look at as part of the City initiated package. In terms of benchmarking and data collection, but to the extent that we have the funds, audits should also be incorporated into the process.

- Another board member agrees with the Phased approach, as we still have some things to learn. As we look at the voluntary program, suggests adding City facility disclosure in Phase one, as a way to show leadership and as a way for us to think through the program and see what it looks like and develop ratings so that when we role out a rating/benchmarking program we have data and examples to share with stakeholders. As far as the mandatory energy rating and reporting, understands it, and thinks the value of that is giving us a good idea of where we are today and using that as a baseline. Building on the lessons learned from SmartRegs, it would be handy if City could put a date out when programs would roll out the mandatory energy rating and reporting. Go forward with the voluntary programs and businesses will be incentivized to "put affairs in order" before they have to disclose. As much as he would like to see change in the commercial sector, he is concerned about economic competitiveness in that we don't have a level playing field. We only in the City of Boulder control what happens in the City of Boulder. Businesses have the opportunity to move wherever. He is very sensitive in putting into place programs that disadvantage Boulder against other communities that are competing for commercial businesses. Would be more inclined to recommend an incentive based program. He thinks it would be worthwhile to have performance standards or performance objectives. Do the benchmarking to define where we are today, and set the objectives of where we want to get to. That sends a clear message to the commercial community what values the City has. Then, we can construct some very targeted incentive programs to help get there, then let the market innovate. Those that want to be leaders and want to differentiate their business/property to attract tenants will jump on board and do things sooner rather than others who might fall behind. Rather than mandating changes, would like to see more of a program where we are setting goals we want to accomplish. We structure an incentive program that helps those reach the goals and foster those businesses that come into the marketplace to work with those businesses to see that happen. It would create an attractive environment for retaining our businesses here in the community. We are motivated as a community to accomplish these reductions and businesses are motivated to be in this community. Would like to see the Phased program more incentive driven.

2011 Additional RBI Cost Model Analysis

After the original Cost Model was created and discussed with City Council in June 2011, a request was made to modify the renewable energy scenarios from the business plan to include natural gas as the energy that comes from non-renewable resources, and to reduce electric rates from any excess revenues that result. This attachment includes a summary of the results of this analysis and an addendum to the business plan which provides details of the analysis.

Background
In the original feasibility study and business plan, the municipal utility would cover its net short energy position (load minus generation) with wholesale market energy. While this approach may reflect the initial mode of operation for a local utility, it does not significantly reduce the coal component of the energy mix.

The following business plan addendum summarizes the greenhouse gas emission reductions and renewable energy development, financed from utility revenues rather than from initial bonding, if the municipal utility would cover its net short position with natural gas generation instead of wholesale market energy. Natural gas generation would consist of simple cycle gas turbine for the firming of the wind resource and combined cycle gas generation for the net short. For the purpose of this analysis, both types of gas plants are shown to be contracted under Power Purchase Agreements rather than being owned by the city.

Importantly, this analysis is not a resource planning effort. It is an illustrative example of a way to mitigate carbon by increasing renewable energy and natural gas. If a local utility is formed, a resource planning effort would be initiated, and various other approaches would be explored and developed, based on the goals of the utility.

Model Runs
The additional model runs are as follows:

Case 1: Initial cost model case replacing net short position with combined cycle natural gas instead of wholesale market energy

Case 2: Initial cost model case adding wind energy generation firmed with natural gas, replacing net short position with combined cycle natural gas instead of wholesale market energy

Case 3: Initial cost model case adding solar PV generation with combined cycle natural gas, replacing net short position with combined cycle natural gas instead of wholesale market energy

All of the additional model runs incorporate the following assumptions:

- Increased Payment in Lieu of Taxes (PILOT) and Public Purpose Program Funds from the initial case

- Addition of a solar incentive program to add distributed generation at the rate of 2.2MW per year, totaling 22 MW by 2020

- Reinvestment of the revenue margin (currently modeled at $5 million)

- City-owned hydropower

- The renewable energy cases are designed to add the maximum amount of renewable resources and maintain rate parity with Xcel's projected rates.

- The renewable energy cases set the net present value to zero to maximize the amount of investment in renewable energy.

Summary of Results

- The renewable energy cases result in long term savings from avoided energy purchases from the wholesale market. These savings are $9.1 million in 2020 for Case 2 (wind) and $11.7 million in 2020 for Case 3 (PV solar).

- While the Renewable Portfolio Standard percentages in these cases are less than Xcel's projected system-wide RPS, the carbon reductions are much greater as these scenarios do not rely on coal as a resource.

Case	Renewable Energy Resources	Carbon Reductions (% reduction compared to Xcel's projected fuel supply)	Local RPS	Rate Impact (% compared to Xcel's projected rates)
Case 1: Natural Gas	• 22 MW PV • City owned Hydro	24%	5%	-7%
Case 2: Maximum Wind	• 22 MW PV • City owned Hydro • 41 MW Wind	29%	11%	0%
Case 3: Maximum PV Solar	• 75 MW PV • City owned Hydro	28%	10%	0%

The addendum to the business plan shows that the municipal utility could still compete financially with the incumbent utility, Xcel Energy, under the following factors as compared to the initial model run:

- Higher PILOT and Public Purpose Program Fund investments
- High rate of renewable deployment, entirely funded by operating revenues
- Significant reduction in carbon emissions compared to Xcel's projected fuel mix and RPS
- Rate stability with a maximum 4 percent annual increase over 10 years

The full Business Plan Addendum is included in the August 3, 2011 City Council materials found at www.boulderenergyfututre.com

Resource Modeling Group and Methodology

Individuals were selected based on their significant expertise and experience with traditional and non-traditional energy generation, distribution and/ or energy demand-side strategies. The following individuals were recruited for the modeling team. The group first met on April 16 to discuss the details of the resource modeling including scoping and methodology, along with the specific software needs.

Dave Corbus
Dave is the Lab Program Manager Electricity Systems at NREL. He is currently a test engineer working on wind turbine loads testing for the Small Wind Research Turbine (SWRT) project. The SWRT project will produce the first complete set of loads and furling measurements for a small wind turbine. Dave has been involved with other wind turbine testing; including certification loads measurements, and power performance, safety and function, and duration testing. Previously, he worked on system design and integration for small wind systems and hybrid power systems. This work included feasibility studies, system modeling, design, system integration, and installation of small wind pilot projects in international off-grid settings. To understand the performance of these systems, Dave helped develop monitoring systems to measure important system parameters and to characterize system performance. This extensive expertise in the design and deployment of off-grid small wind systems resulted in the development of various end-use applications for these systems. Prior to working at the NWTC, Dave worked in the Analytic Studies Division at NREL conducting technology evaluations of emerging battery and fuel cell technologies.

Puneet Pasrich
Puneet is the program manager for the Renewable and Sustainable Energy Institute's electrical grid research and education program, named REgrid. He is also an adjunct faculty member in the Interdisciplinary Telecommunications Program's Digital Energy Program. Much of his research is under the auspices of the Renewable and Sustainable Energy Institute, RASEI, a joint institute between National Renewable Energy Lab and the University of Colorado.

Puneet has a strong background in engineering, R&D, and analytics. With a Master's degree in Electrical Engineering, 13 years of experience as a practicing engineer, and a long-term commitment to systems optimization, it is a natural fit to contribute to the further deployment of sustainable options. Puneet has developed and implemented energy management projects since 2003. He is well-suited to advancing Smart Grid applications as he has a background in communication networks, sensors, data logging, control systems, the electrical grid, and demand side management (DSM) programs. The confluence of this expertise and his multi-disciplinary background allow him to contribute to developing a path for substantial, renewable energy options in the marketplace. He was the lead editor & co-author of a Smart Grid overview and recommendations white paper to the Colorado Governor's Smart Grid taskforce.

Ken Regelson
Ken is the owner of Five Star Consultants. Ken helps clients develop, analyze, and implement the products, policies, and programs needed to create a more sustainable energy future. Areas of expertise include utilities, net metering, inverters, municipalization, renewable energy, energy

efficiency, and city and state policies and programs in renewable energy and energy efficiency. He has been very active in the passage, rulemaking, and implementation of Colorado's Amendment 37 - a renewable portfolio standard passed by the citizen's of Colorado in 2004.

Ken has intervened at the Colorado Public Utilities Commission several times on net metering and implementation of Amendment 37. Ken has worked at Bell Telephone Laboratories and Precision Visuals, Inc. Since 1989

Sam Weaver

Sam is a co-founder of Cool Energy, Inc., a power conversion equipment company located in Boulder, CO. Sam holds a B.S. degree in engineering and applied science from the California Institute of Technology and is an inventor named on fourteen issued U.S. patents. In addition to renewable energy, he has experience in a range of markets including telecommunications, data storage, and aerospace.

Sam previously co-founded Colorado Photonics, a profitable small business providing telecom equipment distribution, and has led multiple engineering development efforts at startup companies during his career. Sam holds six U.S. patents and has authored numerous technical publications. Sam holds a B.S. in engineering and applied science from the California Institute of Technology, and is a member of the Board of Directors of the State of Colorado Clean Energy Development Authority.

Ted Weaver

Ted is the President of First Tracks Consulting Services. He has almost 30 years of experience in the energy industry, including management positions with the consulting firm Barakat & Chamberlin, Inc. and the national energy service company PG&E Energy Services. Mr. Weaver founded First Tracks Consulting Service in 2000 to provide strategic consulting services to clients in the utility, energy service, and energy technology industries.

Mr. Weaver is a nationally recognized expert in the areas of integrated resource planning, energy efficiency, and sustainable energy regulation. Mr. Weaver has developed over a dozen integrated resource plans and energy efficiency plans for clients throughout North America, and has also helped clients procure resources for over 2,000 MW of generation supply and dozens of energy efficiency programs. He has testified over a dozen times before state public utility commissions, and taught training courses on integrated resource planning for the Electric Power Research Institute, the Canadian Electrical Association, and private clients.

Alison Burchell

Warren Wendling, PE

Mr. Wendling has over 25 years of experience in utility regulation. Most recently he was Chief Engineer for the Public Utilities Commission of the State of Colorado, where he spanned the electric, gas and communications disciplines. Prior to working at the PUC, Mr. Wendling was Senior Engineer at Public Service of Colorado where his responsibilities included bulk power transmission system planning as well as distribution engineering. He is very familiar with all aspects of the transmission and interconnection process, and provides current knowledge of the

many transmission initiatives that are in process in Colorado and surrounding states, where he has helped clients apply technology well as an independent consultant.

Tom Asprey

Electrical engineer, BSEE from New Mexico State University (1979). Performed various programming, hardware an integrated circuit design an electrical modeling tasks for Hewlett-Packard Corp. (1980-2005) and Intel Corp. (2005-2006). Retired in 2006. Travel and independent projects (2006-2010). Was part of the citizen model team working to understand the economics and practicality of high penetrations of renewables in a Boulder energy supply.

Draft Resource Modeling Methodology

Step 1: Develop Scope & Key Assumptions/Sensitivities (April-June, 2012)

Over the next few months, the modeling team will identify and review options and key assumptions to include in the modeling effort, including reliability criteria and other operational constraints and performance-measuring planning objectives.

Develop a base case forecast of projections for key system level assumptions such as:

- Current and projected load growth rates
- Current market fuel availability and prices
- Emission assumptions of existing fuel sources
- Develop planning horizon (where do we want to be by when?)
- Identify existing and required data needs, e.g. better load data, storage, wind, etc.

Step 2: Determine Modeling Data and Process (May-June, 2012)

- Identify capabilities and cost of modeling software options
- Screen available future resource types on a full life-cycle, present value levelized cost over a range of potential capacity factors.
- Eliminate from consideration, resources that are unable to compete economically over the study horizon.
- Determine whether modeling consultant is required; develop, release RFP and select accordingly.

Step 3: Determine Scenarios to be Modeled (June-July, 2012)

- Determine specific scenarios to include in initial modeling runs. Examples of specific variables include:

    - Modeling for Generation Resources
        - Existing Central Station Generation Resources
        - Existing Non-Central Station Generation Resources
        - Existing Demand Side Resources
        - Existing Transmission Resources

- Resource Options
  - Options Overview
  - Generation Options
- Other Assumptions
  - Renewable Options
  - Demand Side Options
  - Transmission Options
- System Reserve Margin Requirements
- Specific Forecasts
  - Demand Forecast
  - Fuel Forecast
  - External Market Forecast
  - Economic Forecast
- Modeling to specific scenarios
  - Emissions Scenario
  - Energy Efficiency Scenario
  - Renewable Energy Scenario
  - Energy Efficiency with Renewable Energy Scenario
  - Combustion Turbines Only Scenario

These scenarios are illustrative only. Specific scenarios will be developed by the modeling group.

Step 4: Perform Initial Modeling and Release Results (July-September, 2012)

- Perform initial model runs
- Develop process to publicly release the results of the first round of scenarios modeling

City of Boulder Climate Action Plan Analysis Report

Final Report for City of Boulder
May 14th, 2012

Prepared by: Rocky Mountain Institute
Roy Torbert, James Newcomb, Ellen Franconi, Mathias Bell, Kendra Tupper

Prepared exclusively for the City of Boulder, and remains the property thereof.

Executive Summary

Since 2007, the City of Boulder has been progressively implementing a Climate Action Plan (CAP) to lower greenhouse gas emissions and meet Kyoto Protocol goals by 2012. Boulder offers a variety of programs to reduce electricity use in commercial and residential buildings, improve building standards and codes, install renewable energy, and optimize transportation options.

Through a mix of significant efficiency savings and increased community purchases of RECs since 2007, Boulder is expected to achieve 43% of the total reductions targeted for 2011-2012[1]. Boulder now possesses data regarding the costs and results of each individual program comprising the larger Climate Action Plan (CAP), and can strategically reshape the initiative to cost effectively reach future targets.

To assist in determining the optimal approach to program design, Rocky Mountain Institute (RMI) worked with the City of Boulder to conduct a thorough analysis of all Boulder demand side management (DSM) programs funded through the Climate Action Plan Tax[2]. Specifically, RMI examined 19 residential, commercial, and renewable energy programs using a modified utility cost test (UCT) approach to determine their full lifetime emissions reductions and the cost/benefit ratio for each program. This analysis differed from the current City of Boulder approach of calculating year-to-year emissions impact and cost-effectiveness.

The most cost-effective emissions reductions come from residential lighting programs, commercial lighting programs and audits, and solar rebates and grants. Yet these emissions reductions produced by existing programs thus far will not be enough to reach current CAP targets. Even with the full cumulative (25 years) of savings from all examined CAP programs, Boulder would not reach the 2012 Kyoto based emissions reduction target. The focus on potential shift in energy supply, which led to the current exploration of municipalization, could significantly augment Boulder's ability to meet its CAP goals in conjunction with ongoing and enhanced energy efficiency efforts.

Key Findings:

1. As compared to previous city calculations of savings, which have typically been annual, the life-cycle assessment of program savings projected considerably more savings for each program.
2. Within the current portfolio of CAP programs, those above average in cost effectiveness include residential lighting programs, Commercial and Residential EnergySmart, 10 for Change, and Solar Grants.

[1] Discrepancies exist between City of Boulder carbon inventory accounting and deemed savings due to programs. Further examination is required to merge carbon accounting and program savings.
[2] The CAP tax bill was passed in 2006, took effect in April 2007 and expires March 31, 2013.

3. Boulder has generated significant carbon savings at reasonable cost. Compared to other municipal programs in Connecticut and Oregon, Boulder's lighting programs are slightly less cost effective, Residential EnergySmart is considerably less cost effective, Commercial EnergySmart is similarly cost effective, and renewables programs are far more cost effective. The city also uses a different approach to calculating savings based on program investment than Connecticut or Oregon, and still has many programs that compare favorably in terms of cost effectiveness (see Appendix A for comparisons)[3].
    a. Commercial and Residential EnergySmart are still maturing as programs, and can be expected to improve over time. A sensitivity analysis of the likely future of these programs predicts improved cost effectiveness, which would make Boulder's programs significantly more cost effective than other, more mature municipal programs (such as Connecticut's programs).[4]
        i. The sensitivity analysis projects that with a maturation of EnergySmart, Residential EnergySmart cost effectiveness will improve from 100.7 to 21.5 $/mton of CO2e and Commercial Energy Smart will improve from 69.1 to 13.9 $/mton CO2e.
4. Boulder has attained impressive energy savings and emission reductions, and is well positioned to achieve future emissions reduction targets.
5. Ongoing programs should continue to be comprehensive (such as the existing Commercial and Residential EnergySmart), and become increasingly coordinated across sectors (i.e., recognizing interrelationships between emissions reductions from energy efficiency, renewable energy systems, and transportation technologies).
6. Boulder must push beyond the simple and easy programs and begin additionally encouraging residents and businesses to think longer term about their buildings, investment choices and energy use.
7. The City of Boulder needs to extend an overarching demand side program (which considers interactions with the supply mix) to hit future emissions reductions targets.

Recommendations for Tracking and Measuring Performance

The city far exceeds municipal standards for tracking data and assessing program performance. However, some improvements can be made to existing procedures:

1. The city should track yearly and lifecycle emissions reductions across all programs, and continue to estimate any potential double counting between programs. This analysis should include the demand implications of efficiency

[3] Connecticut's examination of life-time saving from programs did not parse savings by cost contribution (CT also received ARRA funds to support some programs). Disaggregating savings by cost contribution makes Boulder's programs appear less cost effective.
[4] The sensitivity analysis also forecasted Boulder funding a higher percentage of EnergySmart and being able to take full credit for savings (based on the cost attribution approach discussed in Appendix B).

and renewable programs. Demand implications will prove a topic of singular importance if Boulder chooses to municipalize the energy provider role.

2. Boulder should determine disaggregated costs for each program to continue optimizing the programs selected to reach emissions reductions goals. Funding for programs from different city sources, external funding, and payments from residents should be categorized. This process will become significantly easier as ARRA funding expires, and would be crucial if Boulder decides to municipalize.
3. Investments in a comprehensive program database (including cost and savings data) will facilitate both of the prior recommendations. Data analysis will support not only the selective investment in programs or program activities, but also the optimization of ongoing programs.
4. Boulder should focus on improving carbon accounting to better understand the contribution of program-related savings[5] to the citywide carbon inventory. Improvements to calculations can be attained using macroeconomic factors (such as GDP growth, population growth, and population density), more detailed tracking and measurement procedures and improved data collection throughout CAP programs.

[5] Currently CAP programs have a mix of unverified deemed, verified deemed, and actual savings. See Table 4 for more.

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Cumulative Impact of CAP Programs

Progress Since 2007

In 2002, the City of Boulder passed Resolution 906, setting the goal to reduce greenhouse gas (GHG) emissions by seven percent compared to 1990 levels by 2012. The bulk of these reductions were to come from commercial, transportation, and residential sectors (comprising 90% of Boulder's 2007 total emissions[6]).

However, despite impressive program performance, Boulder has not met the initial ambitious emissions reductions targets. For the time period of 2011-2012, projections indicate that Boulder has achieved 42.6%[7] of intended carbon reductions, and only 11.2% of commercial and residential energy use reduction targets stated in the 2006 CAP Report. As noted in the 2010-2011 CAP Progress Report – to meet 2012 emissions goals would require an immediate 25% decrease in the carbon intensity of Boulder's supply mix.
Many of the programs assessed in relation to Kyoto targets have long timescales and accrue efficiency benefits over a number of years. Assessing programs over one or two-year timescales distorts the long-term benefits of certain programs. Due to the limitations of a short-term analysis, RMI and the City of Boulder allocated each program the realistic carbon reduction potential by examining savings over the useful life of the program[8].

Process

To assess lifetime carbon reductions, RMI created a model[9] to forecast program savings over the useful life of each program, disaggregate costs based on program funding, and determine cost effectiveness for each program. The cost effectiveness approach used was a modified utility cost test (UCT)[10], which incorporated the lifecycle costs and benefits of each program, to determine a net present value (NPV) and a dollar value per metric ton of CO2e avoided.

RMI and the City of Boulder also reviewed each of the pre-existing methods for calculating savings for programs, identified areas for improvement, and incorporated certain aspects in

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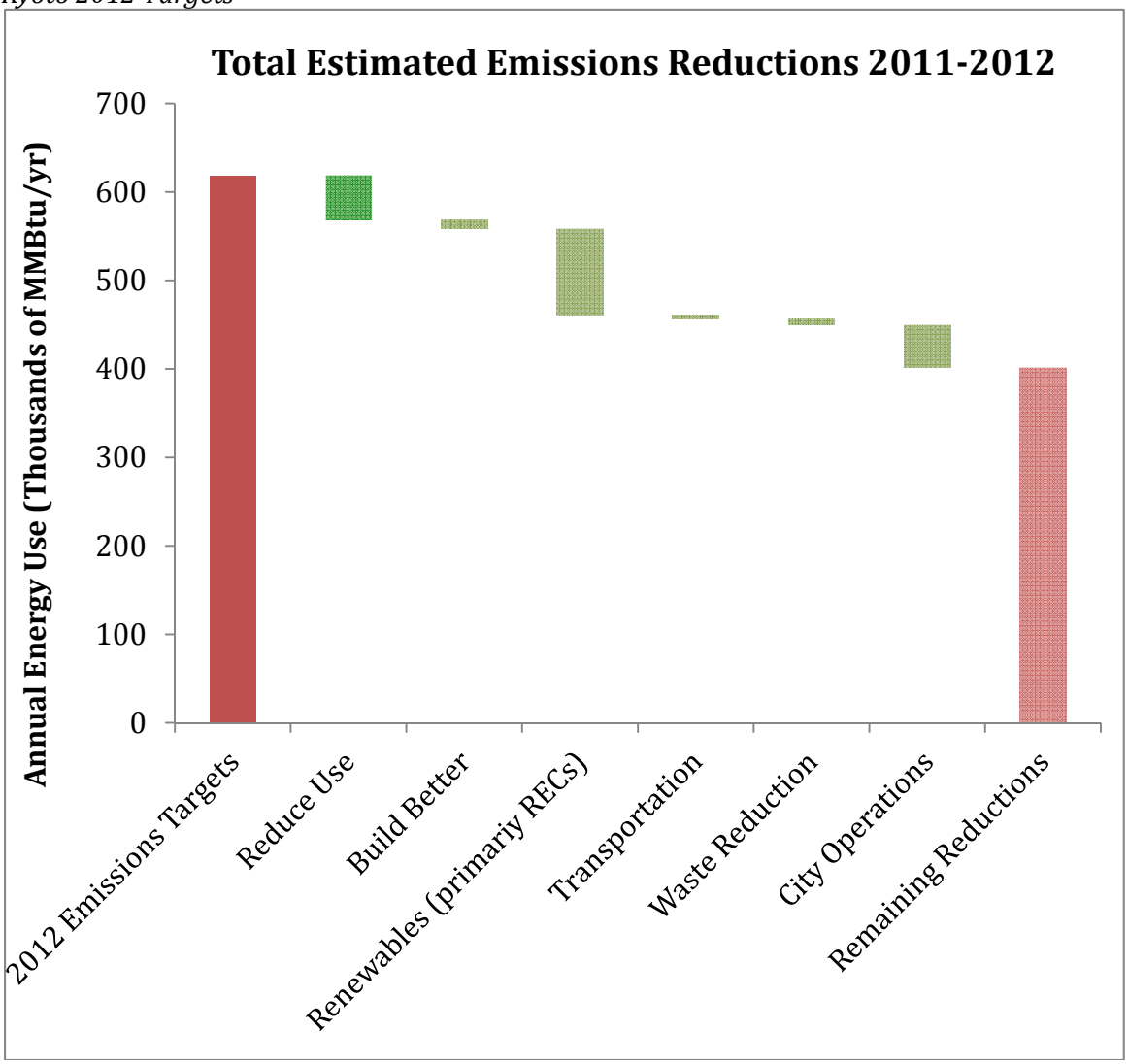
[6] Figures include emissions from the industrial sector, which recent Boulder analyses have included in the commercial category.
[7] In 2011-2012, Boulder reduced an estimated 222,701 $mtCO_2e$ versus 521,032 $mtCO_2e$ required to meet Kyoto targets for 2011-2012.
[8] The useful life of the program was defined either by the recorded types of equipment installed, by an average of equipment recommended, rebated, or installed, or by industry standards.
[9] The model is publicly available
[10] The approach was categorized as 'modified' because demand implications were not considered (demand implications are essential for a utility and should be incorporated if Boulder municipalized). The analysis also disaggregated the costs to determine the impact of specifically CAP taxes (a method not commonly used by utilities). Lastly the end benefits were expressed in GHGs avoided as well as simplified cost avoidance. The analysis otherwise corresponded to standard industry UCT calculations, as specified by the Ontario Energy Board. Link:
http://www.ontla.on.ca/library/repository/mon/11000/255871.pdf

the new savings calculation methodology. As compared to previous city calculations of savings, which have typically been annual, the life-cycle assessment of program savings projected considerably more savings for each program.

Utility analyses typically account for free ridership of programs (program participants may already have been intending to purchase upgrades), but not the impacts of jointly funded programs (between the utility and the state or federal government). Due to project scope constraints, this analysis assessed free ridership only for programs highly impacted by it (rebates, renewable energy systems, and 10 for Change). For programs that were funded in large part by non-CAP tax sources (such as federal grants, GEO funding, and Xcel funding), the analysis parsed out savings by cost contribution – which reduced the share of emissions reductions attributable to city investment, and made certain programs rank as far less cost effective. This analysis most accurately estimates the cumulative impact of CAP tax funding, but is atypical when compared to standard utility or municipal analyses (which take full credit for savings independent of funding sources). This approach accounts for CAP tax funding only as far as it directly funded programs, however some of the programmatic funding from the CAP tax was used to attain other funding sources.

These comparisons based on funding source are limited, as Boulder's climate action goals go beyond the programs funded by the City, and include a number of other reductions sources: city operations (not assessed in this examination), impacts of building codes, non-City directed renewable installations, transportation programs, waste programs, and urban forestry. For a more accurate comparison – the chart below shows the modeled savings from CAP funded programs, as well as other projected savings from the 2011-2012 CAP Update.

*Chart 1: Modeled and estimated savings as compared to amount of reduction needed to reach Kyoto 2012 Targets**



**All programs except 'Reduce Use' used City of Boulder 2010-2011 CAP Progress Report estimates.*

When compared to current Boulder emissions reduction targets, both projected savings decreased by CAP tax cost share – as well as total emissions reductions prior to attribution by financial share – do not reach 2012 emissions targets. Reductions on the scale of ~400,000 metric tons of carbon dioxide equivalent ($mtCO_2e$) remain to be instituted for Boulder to reach climate goals as currently defined. However, Boulder has attained impressive energy savings and emission reductions, and is well positioned to achieve future emissions reduction targets.

Opportunity to Continue Successful Programs

In 2007, Boulder began implementing laudable and aggressive strategies, based on adoption of Kyoto targets (Boulder adopted Kyoto targets in 2002). These targets, and the

ensuing programs, make Boulder a nation-leading city in climate action. Despite not achieving the overall emissions targets, Boulder has attained significant energy and carbon savings. Boulder now has an opportunity to refocus and clarify the strategy for meeting and exceeding climate targets. The first step in this process will be an examination of prior programs, to help inform a future strategy.

The programs listed below have all yielded significant carbon savings, though more recent programs (such as Commercial and Residential EnergySmart and SmartRegs) have not had multiple years of recorded savings, and, through learning curves, will become more effective at producing savings. A sensitivity analysis of these three programs (see Appendix F) shows that projected savings from Commercial EnergySmart, SmartRegs, and Residential EnergySmart will (with projected continuation of existing, early-stage programs) be the largest source of reductions.

Table 1: The ten largest analyzed programs*

PROGRAM	MtCO2e	Useful Life
Energy Assessments (REAP)	8,097.78	10 years
Commercial EnergySmart	6,785.13	16 years
Neighborhood Sweep Kits	6,733.25	9.5 years
Solar Grants	5,324.55	20 years
10 for Change	5,105.22	8 years
LED Holiday Light Exchange	3,498.95	25 years
EnergySmart/SmartRegs	2,982.01	15.5 years
Multifamily Performance Program (MPP)	2,687.26	9.2 years
Residential EnergySmart	2,025.34	15.5 years
ClimateSmart at Work Audits	1,862.75	9 years

**Programs are listed by cumulative greenhouse gas reductions summed over the useful life[11] of the program. Adjustments were made to narrow savings to those attributable to CAP tax expenditures. Actual savings to Boulder are higher than those displayed above (See Chart 3).*

Cost Effectiveness Study

Approach

RMI and the City of Boulder completed an intensive cost effectiveness analysis built upon two core concepts: 1) Disaggregation of all CAP tax funding by program, and 2) Allocation of program savings based on technical potential, participation, and/or share of Boulder CAP tax expenses to the total program funding. The technical derating method is a standard approach for utilities, but the funding disaggregation is non-standard among utilities. The

[11] For certain programs (largely lighting programs), data collection was specific enough to forecast savings from each specific piece of equipment installed. In these cases, each category of equipment was given a useful life specific to that sort of equipment. For other programs, average useful lives were determined either through industry standards, or averages of typical equipment used in the program. These average useful lives were used to calculate lifetime emissions reductions.

funding disaggregation was applied to this analysis primarily to better compare between programs[12].

1. Funding Disaggregation

Boulder spent between $700,000 and $1,600,000 of CAP tax funding per year since 2007 to achieve these results. Actual subsequent expenditures have closely followed original CAP tax projections. As part of the cost-effectiveness analysis, RMI and the City of Boulder disaggregated the total CAP tax expenditures to each of the 19 programs (See Appendix C for a description of the cost disaggregation methodology).

This cost disaggregation helped to clarify the CAP tax-funded costs of each program (listed as a cumulative figure below in Table 4) and allowed a cost comparison. However this cost attribution may be misleading for a number of reasons:

- Some programs were structured as pilot programs and had significant research purposes or were implemented for social sustainability goals (such as Small Building Tune-Up Program and Weatherization[13]). These programs have benefits beyond energy savings, and can be used to strengthen other programs.
- Some programs were only embarking on a long-term plan for producing energy savings and required significant design and start up costs (Commercial and Residential EnergySmart and SmartRegs). Savings from these programs will be understated at this point in their lifecycle – as initial costs for the program are generally higher, some of the specifically energy-saving elements of the program may not have begun, and learning curves are just beginning to appear.
- As seen below in Chart2, the analysis forecasts a sharp decrease in attributable emissions reductions in 2016. This is due to the beginning of the expiration of savings from lighting programs, 10 for Change, and ClimateSmart at Work – according to their projected useful lives. However, residents and businesses can be expected to learn from the efficiency measures implemented, and will likely continue to make purchasing and investment decisions emphasizing energy efficiency. This effect was not modeled as part of this analysis.

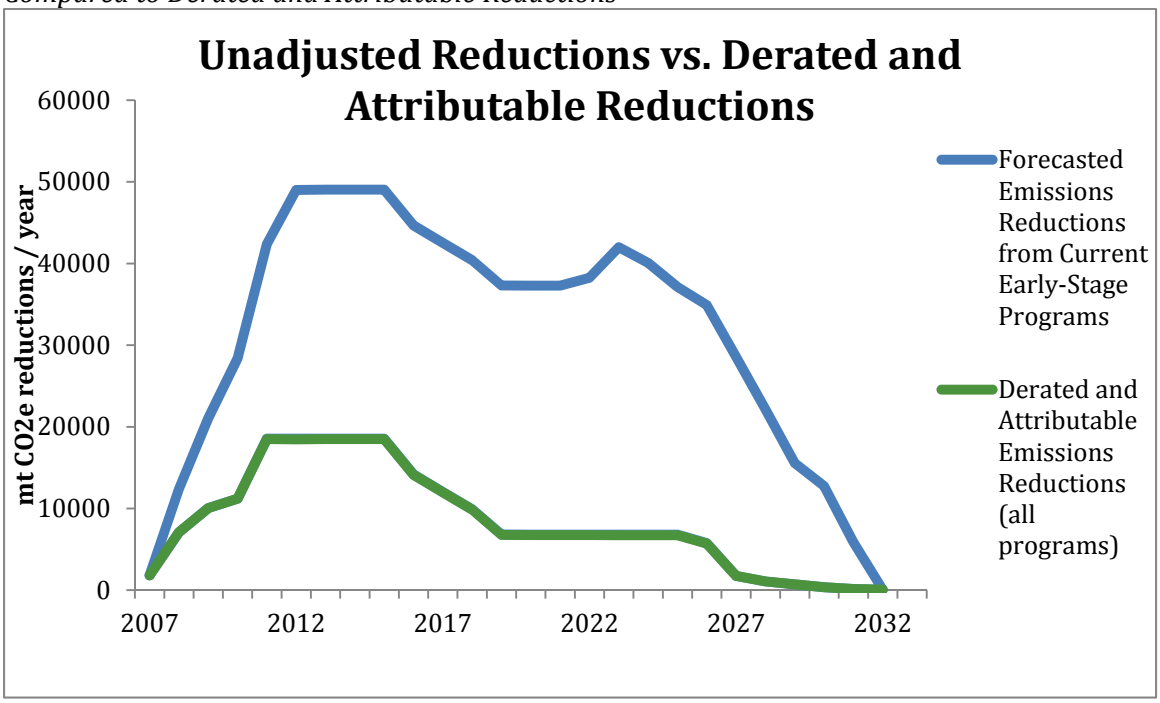
However, the programs so far contributing to emissions reductions in Boulder have often been funded from a variety of sources, such as federal grants and private sources. To determine with some precision the impact of CAP tax dollars, the team allocated savings for programs incorporating a majority of external program funding (this would include Xcel, federal funding, or GEO funding) based on CAP funding's share of total funding. For some programs, specifically Commercial and Residential EnergySmart, this apportioning removed 82-88% of total savings (see Appendix B and E for more details on costing).

To account for these differences, RMI ran a sensitivity analysis on these six difficult to quantify programs[14] – to determine possible Boulder savings if Boulder assumed the full

[12] Otherwise programs funded largely outside of the CAP tax mechanism would appear far more cost-effective.
[13] Other examples (not modeled) include the Home Energy Makeover and Utility Bill Analysis programs
[14] These six programs were: Commercial and Residential EnergySmart, SmartRegs, REAP, Weatherization, and the Small Building Tune-Up Program.

costs of these programs and if newly instituted programs are allowed to mature. See Appendix F for the results of this sensitivity analysis).

Chart 2: Forecasted Reductions (including sensitivity analysis of early-stage programs) Compared to Derated and Attributable Reductions



For certain programs (such as Solar Grants, Solar Rebates, Lighting Coupons, and other rebate only programs) an adjustment was made to reflect that the rebate was a small portion of the total price paid (and likely did not incent every participant or purchaser). The allocation approach primarily affected programs that are largely externally funded rebate or coupon programs which provide only a small portion of incentives (EnergySmart, SmartRegs, and Rebate Programs). See Appendix B for the full description of cost disaggregation.

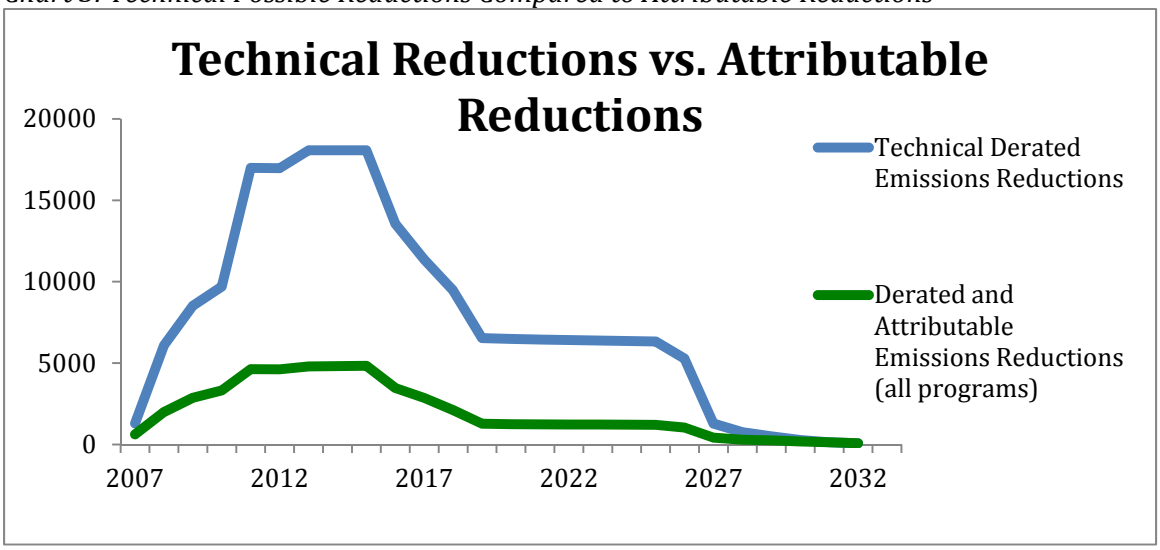
2. Derating Process

Technical factors (adjustment made to programs due to predicted savings not showing up or not remaining for the full useful life) also negatively impacted the predicted savings. The largest derating due to technical factors was for programs (such as REAP and MPP) that needed to incorporate a participation rate (based on the likelihood of participants pursuing efficiency measures). For technical derating processes, only very minor decreases in estimated savings occurred, largely because the city used accurate procedures to estimate program savings. See Appendix E more.

RMI and the city maintained a conservative approach throughout the methodology of attributing savings. This approach, when in doubt, underestimated the total emissions

reductions of CAP funded programs, but provides clearer insights for comparison between programs. The largest impact on forecasted savings occurs when savings are strictly limited to those attributable to the CAP tax expenditures (see Chart 4 below).

Chart 3: Technical Possible Reductions Compared to Attributable Reductions[15] [16]



Results

The examined CAP programs range across Residential, Commercial, and Renewable Energy sectors. Nineteen programs were examined, with five of them primarily lighting programs (Neighborhood Sweeps, CU Green Teams, Lighting Coupons, LED Holiday Light Exchange, and LED Exit Sign Exchange (commercial). These programs generally handed out efficient light bulbs (either directly in light exchanges or through home visits called "Sweeps"). Audit programs included REAP (provided by Xcel and supplemented by the City[17]), the Multifamily Performance Program, the Small-Building Tune-Up Program, and ClimateSmart at Work (provided by Xcel and supplemented by the City). 10 for Change is a commercial program that sets goals for commercial partners and provides resources to help them meet their goals. Rebates were provided for solar thermal, insulation, and solar photovoltaic (PV) systems (as well as rebates associated with EnergySmart). Weatherization was a small-scale residential offering which provided free weatherization and included limited data tracking (pre- and post- installation).

[15] Unadjusted refers to the full technical potential of all programs and full attribution to Boulder. Attributable refers to the share to which CAP funding is responsible for achievable emissions reductions. Essentially – attributable savings are unadjusted savings after removing some program savings that are not expected to appear due to technical reasons (such as participation, free ridership, and removing portions of program savings due to programs largely funded by sources other than the CAP tax.

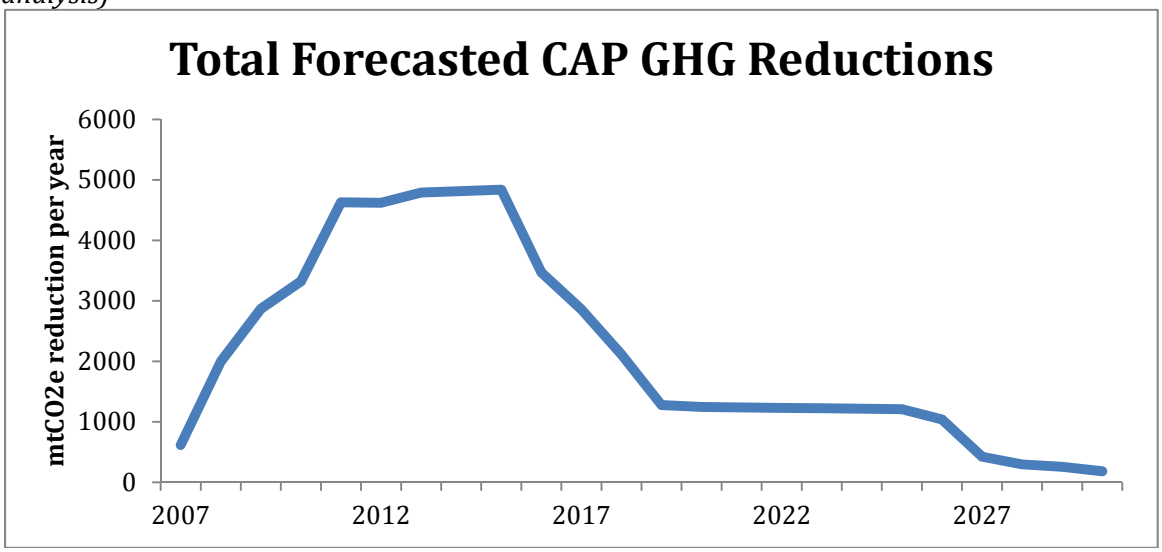
[16] As described earlier, this analysis is an industry standard analysis – with the exception of the derating based on cost participation.

[17] Starting in 2008, Xcel had contractors perform the audits and the City of Boulder contracted with those auditors to add natural gas (not just electricity) audits and offer follow-up services. In 2007, the city provided the audits for those programs (prior to Xcel's program start).

Residential EnergySmart has become the centralized program to offer rebates for deeper retrofits, audit to action, and simple upgrades. Residential EnergySmart now programmatically encompasses Neighborhood Sweeps and other lighting offerings, and equipment rebates. SmartRegs is supported by EnergySmart, which offers a track for rental owners (subject to SmartRegs energy efficiency requirements) to upgrade their buildings to meet codes. The SmartRegs EnergySmart track provides assistance and rebates to promote regulatory compliance[18]. Commercial EnergySmart provides services to commercial and industrial buildings including Discover (low and no-cost equipment and education), Optimize (providing contractors to tune-up systems and provide simple new components), and Upgrade (offering energy advising services and assisting with equipment replacement). Commercial EnergySmart is the successor to the Small-Building Tune-Up program and the ClimateSmart at Work Audits program (and also encompasses free lighting upgrades and rebates).

RMI also examined renewable energy programs include Solar Grants (providing direct payments to install solar for verified non-profits and affordable housing) and Solar Rebates (refunding 15-16% of city sales tax paid for solar PV systems).

Chart 4: Derated and Attributable Reductions from Modeled CAP Programs (no sensitivity analysis)



[18] Includes programmatic responsibility for some rebates.

Table 2: Cost Effectiveness Results for Emissions Reductions over the Lifecycle of each Program (derated based on technical and cost factors).
This is the modified UTC approach

RESIDENTIAL PROGRAM	kWh	TH	Cost	mtCO2e	$/GHG reduced
Residential EnergySmart*	893,891	262,948	$204,006	2,025.34	$100.73
SmartRegs*	1,322,367	386,323	$519,896	2,982.01	$174.34
Neighborhood Sweeps*	8,509,119	138,500	$153,277	6,733.25	$22.76
Energy Assessments (REAP)	5,201,506	835,104	$413,187	8,097.78	$51.02
Multifamily Performance Program	2,488,569	175,835	$93,909	2,687.26	$34.95
Weatherize*	217,844	53,091	$82,747	435.27	$190.11
CU Green Teams & Greek Sustainability	453,102	-	$33,705	319.41	$105.52
Lighting Coupons*	2,567,409	-	$22,612	1,809.85	$12.49
LED Holiday Light Exchange*	4,963,518	-	$49,025	3,498.95	$14.01
Rebates - Solar Thermal*	-	28,568	$23,940	151.58	$157.93
Rebates - Insulation*	17,954	104,764	$133,058	568.53	$234.04
ReNew Our Schools PTO Fundraiser	1,052,476	116,020	$45,275	1,357.53	$33.35
Average	*2,307,313*	*175,096*	*$147,886*	*2,555.56*	*$57.87*
BUSINESS PROGRAM					
Commercial EnergySmart*	9,508,941	15,446	$468,763	6,785.13	$69.09
Small-Building Tune-Up Program*	718,200	130,800	$336,082	1,200.31	$280.00
ClimateSmart at Work Audits	2,680,273	(5,025)	$453,841	1,862.75	$243.64
10 for Change	4,216,779	401,935	$207,170	5,105.22	$40.58
LED Exit Sign Exchange*	279,620	-	$3,705	197.11	$18.80
Average	*3,480,763*	*108,631*	*$293,912*	*3,030.11*	*$130.42*
RENEWABLES					
Solar Grants*	7,553,256	-	$112,813	5,324.55	$21.19
Solar Rebates*	1,242,869	-	$100,452	876.14	$114.65
Average	*3,900,915*	-	*$51,084*	*2,749.89*	*$30.49*

*Savings from these programs are based on verified implementation data collected by the City of Boulder (others use assumed implementation rates)[19].

[19] This is a crucial distinction for clarifying the actual emissions reductions (particularly in light of differences between deemed savings and carbon accounting).

Table 3: Cost Effectiveness Results for Emissions Reductions over the Lifecycle of each Program (only derated on technical factors)

This is the unmodified UTC approach

RESIDENTIAL PROGRAM	kWh	TH	Cost**	mtCO2e	$/GHG reduced***
Residential EnergySmart*	7,449,095	2,191,237	$204,006	16,877.83	$12.09
SmartRegs*	6,611,833	1,931,615	$519,896	14,910.05	$34.87
Neighborhood Sweeps*	8,509,119	138,500	$153,277	6,733.25	$22.76
Energy Assessments (REAP)	5,779,451	927,894	$413,187	8,997.54	$45.92
Multifamily Performance Program	2,488,569	175,835	$93,909	2,687.26	$34.95
Weatherize*	217,844	53,091	$82,747	435.27	$190.11
CU Green Teams & Greek Sustainability	453,102	-	$33,705	319.41	$105.52
Lighting Coupons*	8,558,029	-	$22,612	6,032.85	$3.75
LED Holiday Light Exchange*	4,963,518	-	$49,025	3,498.95	$14.01
Rebates - Solar Thermal*	-	228,544	$23,940	1,212.65	$19.74
Rebates - Insulation*	128,983	752,614	$133,058	4,084.29	$32.58
ReNew Our Schools PTO Fundraiser	1,052,476	116,020	$45,275	1,357.53	$33.35
Average	*3,851,002*	*542,946*	*$147,886*	*5,595.57*	*$26.43*
BUSINESS PROGRAM					
Commercial EnergySmart*	63,392,940	102,971	$468,763	45,234.22	$10.36
Small-Building Tune-Up Program*	718,200	130,800	$336,082	1,200.31	$280.00
ClimateSmart at Work Audits	17,868,485	(33,502)	$453,841	12,418.34	$36.55
10 for Change	42,167,789	4,019,353	$207,170	51,052.20	$4.06
LED Exit Sign Exchange*	279,620	-	$3,705	197.11	$18.80
Average	*24,885,407*	*843,924*	*$293,912*	*22,020.44*	*$13.35*
RENEWABLES					
Solar Grants*	9,441,571	-	$112,813	6,655.69	$16.95
Solar Rebates*	24,857,375	-	$100,452	17,522.82	$5.73
Average	*17,149,473*	-	*$51,084*	*12,089.25*	*$8.82*

*Savings from these programs are based on verified implementation data collected by the City of Boulder (others use assumed implementation rates)

**This cost is specific to CAP tax expenditures on programs. Actual program costs are much higher. See Appendix E for more.

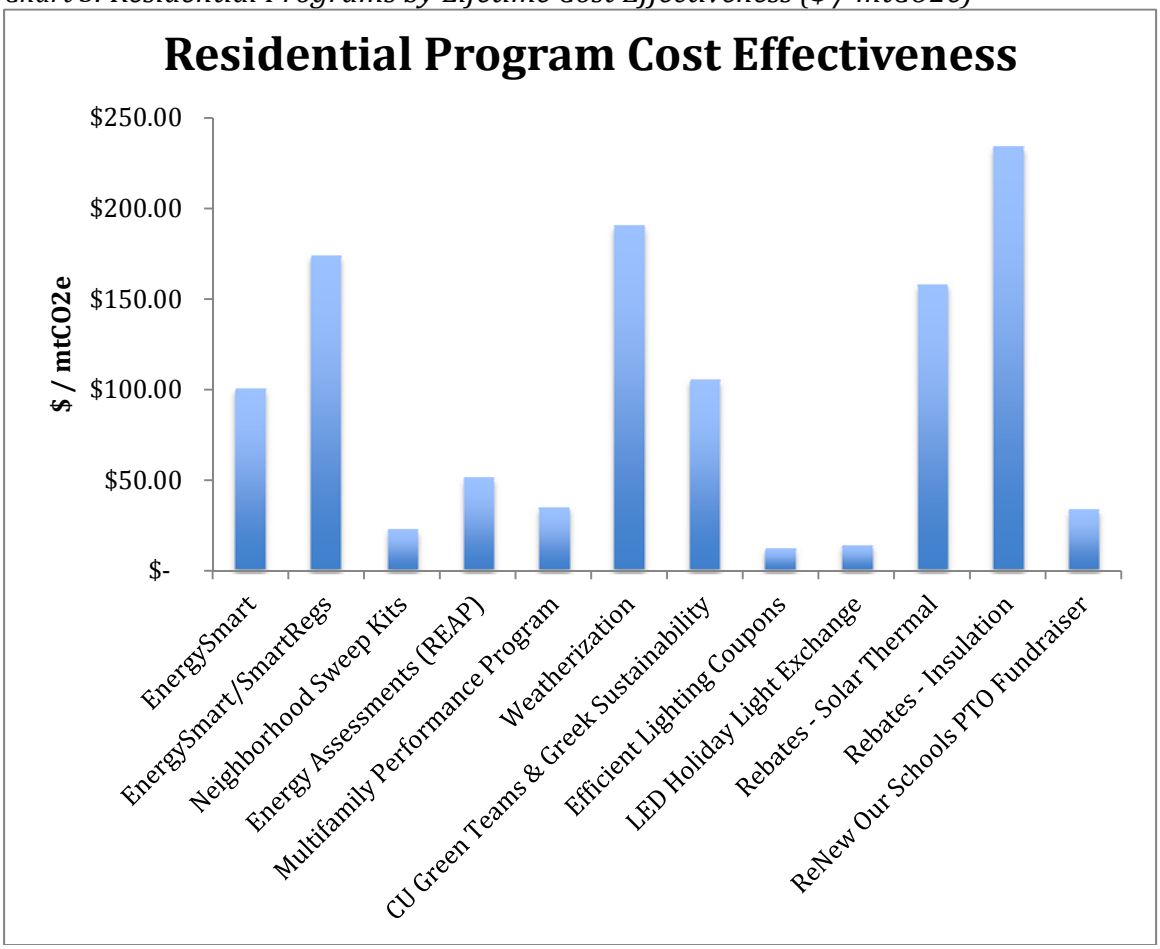
*** This $ per GHG reduced is also based on CAP tax expenditures per program, and not on full program costs.

Program Insights

Lighting programs clearly offered the most cost effective savings. These programs produce clear and straightforward benefits and have savings that persist as long as the equipment is operational. Efficient lighting coupons are highly cost-effective (largely due to low total program expenditures), but may only be rewarding buyers already intending to purchase efficient lighting, a problem utility analysts call free-riding, (Weaver, et. al).

Clear behavior change is difficult to establish for many of the lighting programs. One exception to this is the Neighborhood Sweeps Program – which offered the third best return on investment ($23 in program costs for each $mtCO_2e$ reduced) -- directly installed more-efficient lights, water saving equipment, and provided information about other Boulder energy programs. This program has now been incorporated into Residential EnergySmart and now improves the effectiveness of the larger program – while gaining the programmatic benefits from being part of a more comprehensive program. The least effective lighting program examined was the CU Green Teams and Greek Sustainability (classified as lighting because most savings came from lighting upgrades) with $234 / $mtCO_2e$ saved. This program should be examined, and possibly reframed with additional metrics to measure success in persistent behavior change to ultimately attain more significant direct savings.

Chart 5: Residential Programs by Lifetime Cost Effectiveness ($ / mtCO2e)



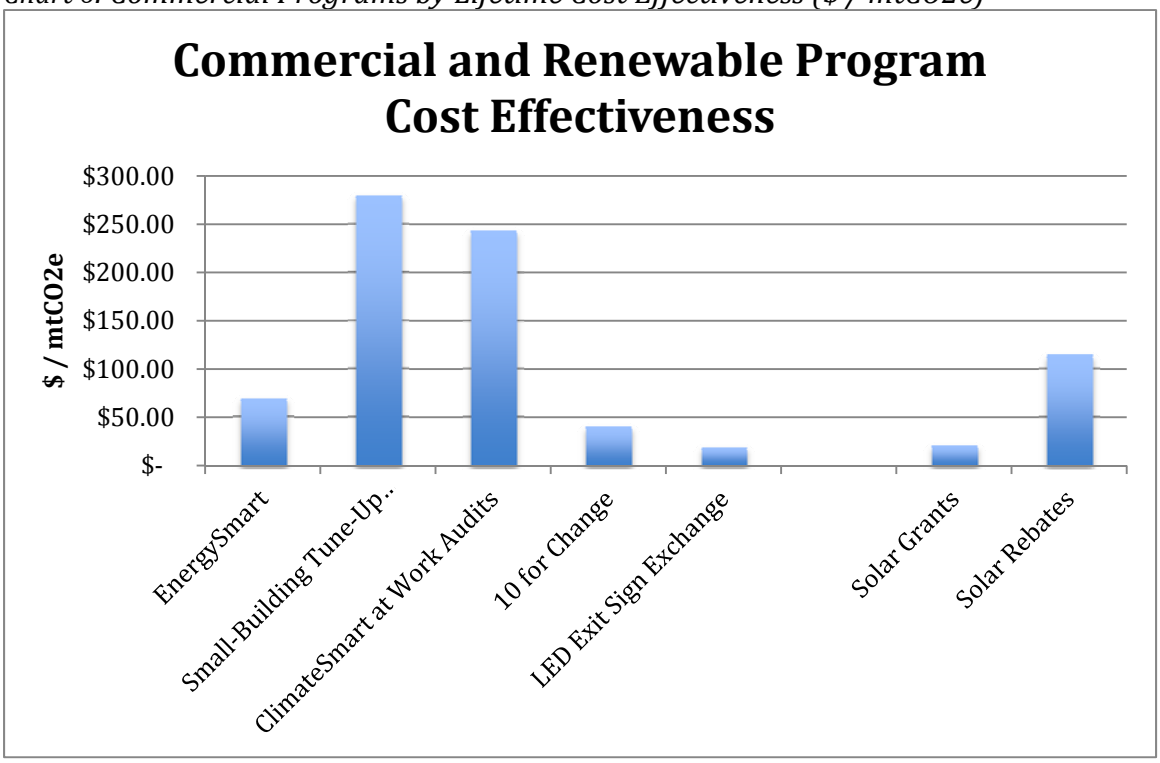
EnergySmart, SmartRegs, Sweeps, and Weatherization are verified deemed savings, vs. assumed deemed savings for REAP, the MPP, and other lighting programs.

Residential programs outperformed commercial programs (weighted average $/$mtCO_2e$ reduced for residential was 58 versus 97 for commercial). This is largely due to comprehensive lighting programs (most influentially the Neighborhood Energy Sweep program) being large and highly effective. Less comprehensive residential lighting programs (such as lighting coupons and LED light exchanges) were also very effective, but

had smaller total savings. The PTO Fundraiser, despite being seemingly unique among municipal programs, serves as a cost effective measure, and appears an effective method of engagement.

However, some commercial programs appear highly cost effective. EnergySmart and 10 for Change[20] are both extremely cost effective. ClimateSmart (and now EnergySmart) audits provide clear and actionable recommendations and plans, and will see improved cost effectiveness as programs continue. 10 for Change provided less actionable tools, but was performed at much lower cost. Both of these programs are also excellent conduits into the business community for further programs. Developing strong connections and instituting processes to disseminate information is critical to the success of an integrated program with aggressive goals. As the commercial/industrial sector produces the largest share of Boulder's emissions, significant emissions reductions require participation from businesses.

Chart 6: Commercial Programs by Lifetime Cost Effectiveness ($ / mtCO2e)



Renewable energy systems, incented through rebates and grants, offer above average returns. This was largely due to long system life, even after accounting for system degradation over time. Solar grants appear to be the more cost effective approach[21] – based entirely on the share of savings attributed to the influence of the program. Solar rebates – though persuasive, are likely not as impactful as solar grants on the decision-making of possible participants. The renewable energy sector, predicted to be a major component of reaching Boulder's 2012 goals, resulted in the largest total gap between predicted CAP

[20] 10 for Change savings proved particularly difficult to quantify – however the results of a survey of 10 for Change participants provided valuable insights into the degree to which 10 for Change was inspiring participants to improve energy efficiency.
[21] Solar grants are only available to 501(c)(3)s and affordable housing.

reductions and actual CAP reductions. Transitioning beyond purchases of RECs to significant distributed renewables will be a crucial part of the long-term emissions solution for Boulder.

Certain programs displayed less than average cost-effectiveness, in part because they were short-term pilots. Most of an early-stage program's costs can be expected to be administrative, and while the cost attribution did not allocate a higher level of administration, it can be expected that the billed expenses for the program were often not directly leading to savings. These programs provided significant research benefits and would be expected to improve total savings and cost effectiveness dramatically if scaled up (See Appendix F for more).

Programs displaying less than average cost effectiveness include the Small Building Tune-Up Program, Weatherization Program, and Solar Thermal and Insulation Rebates. The Small Building Tune-Up Program was structured as a pilot program, and never reached the scale necessary to show significant savings at reasonable cost[22]. The Weatherization Program also reached few homes and would see improvement if scaled up.

Commercial and residential EnergySmart, as well as SmartRegs, appear less cost effective than the average program. Yet EnergySmart institutes some long-lasting and high-saving equipment, while incorporating prior (and proven) programs. The RMI project team determined that EnergySmart will be far more cost effective in the future than the current analysis shows. As discussed above, this underrepresentation is due to a confluence of factors:

- The programs are early in their programmatic cycle,
- Significant (>75%) derating factors have been assigned to the cost effectiveness analyses due to external funding sources.

It is important to note that savings from these programs did impact Boulder, by benefitting businesses and residents, improving buildings, and reducing emissions. However, not all of the resulting emissions reductions can be directly attributed to CAP tax funding.

After funding from the American Recovery and Reinvestment Act (ARRA) expires, Boulder could move to more fully fund EnergySmart, at which point the program would appear far more cost-effective, without any significant changes in programmatic approach. EnergySmart should also dramatically improve due to learning curves and procedural efficiency as the programs mature.

Commercial and residential EnergySmart offer major emissions reductions, a simple and compelling conduit for businesses and residents, and represent a cost-effective future for Boulder's climate action. Apparent higher than average costs at such an early stage should not detract from the convincing value of EnergySmart. The sensitivity analysis projects that with a maturation of EnergySmart, Residential EnergySmart cost effectiveness will improve from 100.7 to 21.5 $/mton of CO2e and Commercial Energy Smart will improve from 69.1 to 13.9 $/mton CO2e.

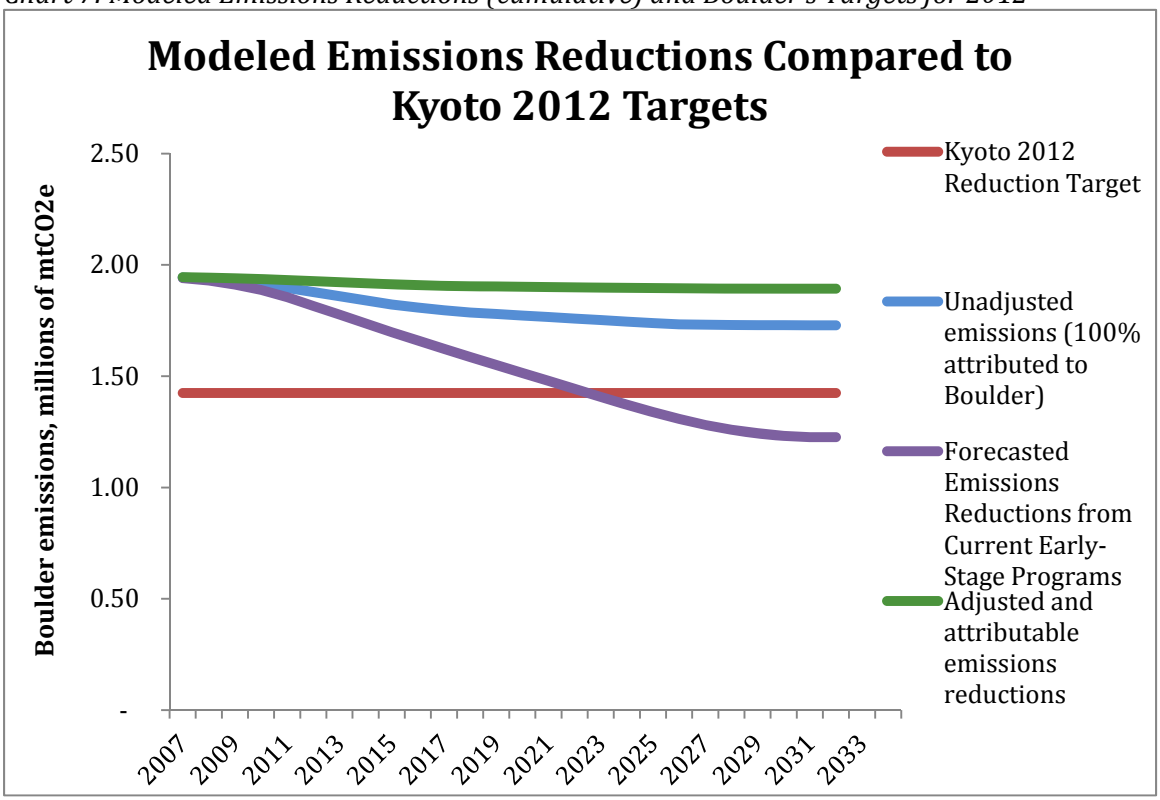
22 The Small Building Tune Up Program also served as the precursor to Commercial EnergySmart and much of learning is currently being implemented.

A deliberate progression of the CAP program requires further analysis into the projected returns from additional investment into each of these programs. Some programs may be reaching saturation, and others may improve as the program progresses. Programs (such as various lighting programs and the Multifamily Performance Program), which have been incorporated into EnergySmart, are excellent candidates for particular emphasis and investment.

Preliminary Recommendations for Action Beyond 2012

RMI's model indicates that Boulder's current programs are insufficient to reach the Kyoto goal by 2012, or even by the year 2035. Additional programs (such as Boulder's municipalization, Xcel's DSM or supply mix changes, transportation savings, RECs purchases, and others) can dramatically improve or degrade these modeled emissions reductions. However, as projections include no forecasted energy increases due to GDP growth, the model likely understates the underlying growth in Boulder emissions.

Chart 7: Modeled Emissions Reductions (cumulative) and Boulder's Targets for 2012



No saturation rates for programs were assumed.

The Boulder CAP must be modified to reach climate action targets designed for a more reasonable timeframe. This means that the city should adopt a longer-term approach to calculating savings and allocating funding to reduce emissions from the CAP tax and other funding sources. The city will likely continue to jointly fund programs and partner on program and service delivery, while inspiring private investment to reach a greater potential carbon savings. The CAP program must also be expanded. When attributing all

program savings to the Boulder community, the model projects that 2012 targets will not be met.

However, when (as described in the sensitivity analysis) Boulder continues Commercial and Residential EnergySmart and SmartRegs[23] the model shows that 2012 emissions reductions targets will be met in 2023.

Recommendations for Future Action

The city must balance prudent financial stewardship with public demands for emissions reductions. A future strategy to optimally reduce emissions requires in-depth analysis. However, RMI has provided some initial recommendations for the future of Boulder's community climate action.

Scaling and Sorting:
Existing Boulder programs require additional resources and marketing to reach significant levels of implementation. Lighting programs have been effective and widely used, and may in the future require scaling back if Boulder approaches market saturation[24]. However, EnergySmart (including realistic future projections) and 10 for Change are clearly cost-effective options for expansion. Weatherization and Insulation Rebates have been more expensive, but larger programs will improve return on investment.

Investment and Continuity
Programmatic investments may need to be longer-term to create more prominent programs engaging a wider range of businesses and residents. Larger and better-funded programs will better tap into learning curves and gain momentum. In particular, residential and commercial EnergySmart offer the largest potential future savings, but must be funded without the support of ARRA (See Sensitivity Analysis – Appendix F). These programs have only just begun to accrue savings, and the learning curves of carrying out the program should dramatically improve costs (see Appendix D).

Comprehensive and Integrated Programs
Boulder's investments thus far appear cost-effective and well managed. Programs in other municipalities have had similar results, and often focus on lighting and short-payback improvements. Results from Oregon and Connecticut show similar reductions. However, predicted emissions do not reach 2012 goals or match up with carbon inventories. Further analysis is required to make clear determinations of how programs are affecting Boulder as a whole. Boulder must push beyond the simple and easy programs and begin encouraging residents and businesses to think longer term about their buildings, investment choices, and energy use. EnergySmart advisors can be trained on the processes of deep retrofits and whole-systems thinking, to better analyze and propose integrated solutions that offer

[23] With projected increases in each program's savings and decreased costs due to learning curves
[24] Although RMI did not forecast the impact of new technology, lighting technologies in particular appear to be improving – allowing for updated programs to support newer systems and greatly reduced wattages. This effect would avoid the possibility of market saturation.

greater than 30% energy savings[25]. Incentives specific to deep energy savings, combined packages of improvements (bundling), and load-reducing efficiency measures[26] can improve the financials of more comprehensive energy retrofits for deeper savings.

The possible municipalization of the city's energy supply is an excellent example of an aggressive effort that can fundamentally reshape Boulder's relationship to energy and emissions. Citizens would have an unprecedented stake in efficiency projects (as efficiency in the portfolio will lower the costs and barriers to municipalization) while distributed renewable energy generation and storage would become a shared priority. A municipalized system would make a net-zero or off-grid home program (such as the Connecticut Zero Energy Challenge) far more valuable.

As efficiency and renewable programs become more aggressive and aim for larger savings, they necessarily become multi-tiered and interactive. For example, implementing more efficient lighting has a small impact on lowering cooling loads in the summer – but daylighting and proper shading reduces not only lighting energy, but also cooling (and possibly heating) loads, while contributing to documented health and productivity benefits. When combined with better insulation, these improvements can dramatically lower HVAC loads – possibly avoiding major capital expenditures or required home renovations. And when a highly efficient house also implements solar PV, system impacts become more complex with larger impacts on daily load profiles, and periodically exporting electricity to the grid. The city needs to train EnergySmart auditors on the implications and possibilities of deep savings for program participants, while examining the system-wide implications of more aggressive programs. These analyses will deepen savings for residents, and reveal possible programmatic efficiencies across sectors.

RMI's analysis of Boulder's program was thorough in determining cost allocations and likely savings from programs; however, there are a number of strategically important factors that were not addressed. Future cost analyses, as well as demand reduction program, would ideally include consideration of these factors. These factors would support programs aiming for deeper energy reductions and include:

i. Additional benefits specific to the program
    1. Social benefits from specific programs (such as Neighborhood Sweeps, Weatherization).
    2. Societal benefits from lower utility costs
    3. Societal benefits from changes in awareness and behavior that contribute to compounded actions and improvements over time
    4. Health benefits from residential programs
    5. Health and productivity benefits from highly efficient commercial spaces

[25] For industrial facilities – integrative energy-focused workshops can help convince recalcitrant energy managers, and explore collaborative arrangements (often for reuse of waste streams) with other businesses. For the city as a whole - strategic audits and incentives can help reduce energy use, while improving the economics of investment in Boulder industries. RMI research in other communities indicates industrial facilities can reduce energy use by 27% (Reinventing Fire, RMI) at significant profit.

[26] Daylighting, insulation, and thermal storage are good examples – and are often not cost-effective unless considered as a bundle.

6. Increased economic opportunities for businesses and job creators

ii. Risk mitigation shared due to cumulative CAP action
   1. Improved environment (waste, urban forestry, water conservation)
   2. Reduced costs from fuel price volatility
   3. Improved economic growth (reinvestment due to utility savings, lower future capital expenditures on energy-intensive equipment, and positive impressions of Boulder)

With a longer term and more comprehensive approach, many more programs will appear as viable alternatives for emissions reductions. These programs should also utilize a life-cycle costing approach (instead of simple payback) to evaluate and recommend possible measures (whenever appropriate). Boulder's programs, particularly audit to action programs, should focus on assessing and recommending deeper and integrated energy savings[27] in homes and businesses. Training, integrative workshops, and collaborative (multi-resident or multi-business) working groups can facilitate more comprehensive energy efficiency and reuse of waste streams. Numerous case studies (many here in Boulder) have documented the attractive financial returns from highly efficient offices or residences. RMI estimates that comprehensive energy retrofits (addressing multiple systems) leads to easily achievable and cost effective energy savings of 38%[28], with far greater savings available through integrative design. This would address Boulder's largest source of greenhouse gas emissions by inspiring residents and leveraging existing programs.

RMI also supports the transition to distributed renewables, and sees municipalization as one attractive path to that future. Boulder businesses from Serious Energy, Namaste, Tendril, juwi, and many more are already betting on a future of clean, renewable, and distributed energy. Boulder has an opportunity to not only engage citizens, but also develop a sustainable, dependable, model for other municipalities and make Boulder businesses the first innovators in a major distributed energy system. Efficiency projects, particularly more aggressive projects that include controls, peak load management, and thermal storage, will make the prospect of muncipalization a less expensive proposition. Likewise, distributed renewables can support the sort of major building renovations to allow net-zero buildings and major efficiency savings.

To reach climate targets, Boulder must transition a variety of programs, as well as new programs, into a cutting-edge, multi-sector and long-term plan. This will require taxpayer funding – but also offer significant economic and societal savings on that investment. Cities have increasingly begun to address climate change and greenhouse gas emissions, and a significant and integrated climate action framework would make Boulder a global leader.

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27 Deep savings primarily come from integrated design, where a diverse team first assesses needs, reduces loads, right sizes equipment, and maintains a whole-systems approach.

28 Primary energy use, or energy before it is converted into useful forms (such as heat or electricity). See RMI's book Reinventing Fire for more: http://www.rmi.org/Reinventing_Fire

Appendix A: Similar Programs to Boulder's CAP Programs

Results of the comparative study – comparison of energy and GHG of city-selected Boulder demand-side and supply-side programs to other municipal programs:

Table: Programs Similar to CAP Programs

Program:	Similar Programs
RESIDENTIAL PROGRAM	
EnergySmart	"Connecticut Energy Efficiency Fund, Connecticut Light & Power, United Illuminating Connecticut Efficient Healthy Homes Initiative D.C. District Department of the Environment Free Home Energy Rating Program Commonwealth Edison Home Assessment National Grid Free in-home energy evaluation: EnergyWise"
EnergySmart/SmartRegs	"Focus On Energy (WI) Apartment and Condo Programs and Services Center for Energy and Environment Rental Energy Loan Program "
Neighborhood Sweep Kits	"-Pacific Power Energy Efficiency Education -Gainesville Regional Utilities Home Fix Rebate -Southern California Edison, Southern California Gas Community Language Efficiency Outreach (CLEO) Program"
Energy Assessments (REAP)	"Connecticut Energy Efficiency Fund, Connecticut Light & Power, United Illuminating Connecticut Efficient Healthy Homes Initiative D.C. District Department of the Environment Free Home Energy Rating Program Commonwealth Edison Home Assessment National Grid Free in-home energy evaluation: EnergyWise"
Multifamily Performance Program	"Efficiency Vermont Multifamily Housing Program New York State Energy Research and Development Authority Multifamily Performance Program Energy Trust of Oregon, Northwest Natural Gas, Pacific Power, Portland General Electric Incentives for Small Multifamily Properties"
Weatherization	Efficiency Vermont Affordable Housing Weatherization Services
CU Green Teams & Greek Sustainability	Avista Utilities Power Down, Add Up
Efficient Lighting Coupons	"Arizona Public Service ENERGY STAR(R) Residential Lighting Program Puget Sound ENERGY STAR(R) Residential Lighting Program Pacific Gas & Electric Upstream Lighting Program"
LED Holiday Light Exchange	Nova Scotia Power LED Holiday Light Exchange
Rebates - Insulation	"New York State Energy Research and Development Authority Home Performance with ENERGY STAR(R) NSTAR & Electric Berkshire Gas Company Home Performance with ENERGY STAR(R) MassSAVE Program"
Rebates - Solar Thermal	"Hawaiian Electric Company Honolulu Solar Roofs Initiative Loan Program Iowa Energy Center Alternate Energy Revolving Loan Program (AERLP)"
ReNew Our Schools PTO Fundraiser	
BUSINESS PROGRAM	

EnergySmart	"Energy Trust of Oregon, Northwest Natural Gas, Pacific Power, Portland General Electric Building Tune-Up and Operations Program Center for Energy and Environment (MN) Commissioning/Retrocommissioning BC Hydro Continuous Optimization For Commercial Buildings"
Small-Building Tune-Up Program	"Pacific Gas and Electric East Bay Energy Partnership NYSERDA Technical Assistance Program NSTAR Engineering Services"
ClimateSmart at Work Audits	"Southern California Gas ""Energy Challenger"" Energy Savings Finder Xcel Energy Analysis Connecticut Energy Efficiency Fund, Connecticut Light & Power, United Illuminating Small Business Energy Advantage"
10 for Change	Southern California Edison 20/20 Summer Savings Program"
LED Exit Sign Exchange	MassSAVE, National Grid Existing Facility: Lighting & Controls Puget Sound Energy Commercial rebates - LED Exit Sign Consolidated Edison C&I High Efficiency Equipment Upgrades - Lighting & Lighting Controls
MISCELLANEOUS	
Solar Grants	Vermont Department of Public Service Clean Energy Development Fund: Grants
Solar Rebates	Connecticut Clean Energy Fund CCEF Solar PV Rebate Los Angeles Department of Water & Power Commercial Solar Power Incentive Energy Trust of Oregon Government/Nonprofit Solar Electric Incentives

Connecticut Municipal Electric Energy Cooperative Program Results:
This program serves 14,000 customers.

Program	Lifetime kWh Savings	Program Budget	Lifetime mtCO2e Reduced	$/ mtCO2e avoided
Residential Home Energy Savings Program	54,824,153	$1,666,500.00	38,647.42	**$43.12**
Efficient Products (Lighting)	24,216,731	$250,400.00	17,071.20	**$14.67**
Efficient Products (Appliances)	820,849	$223,600.00	578.64	**$386.42**
Commercial - Prescriptive Equipment Replacement	965,365	$49,600.00	680.52	**$72.89**
Commercial and Industrial Existing Facility Retrofit	48,005,319	$3,154,800.00	33,840.59	**$93.23**
Renewables	782,640	$940,000.00	551.71	**$1,703.79**

Oregon's Results (general reporting across programs):

Oregon Energy Trust's programs report energy efficiency reductions and new renewable energy generation of 3777 MWh and 17.8 million therms (between 2002 and 2010) and six million tons of carbon dioxide. Estimated program costs for 2010 were $123 million. Based

on these figures, Oregon Energy Trust's programs estimated $ per tons of carbon reduction (lifecycle) is likely between $40 and $80 $/ton. Oregon Energy Trust serves over 400,000 customers.

Portland General Electric Building Tune-Up and Operations Program shows levelized cost of 4¢ per kWh saved (double their target for the program). A rough estimate of Commercial EnergySmart also yields 4¢ per kWh saved. However, this is not an appropriate comparison to Boulder's programs because typical levelized cost assessments (based on the total resource cost approach) include the cost to the ratepayer, which this analysis did not.

Appendix B: Program Cost Disaggregation Methodology

The team first identified all the billable expenses for each of the nineteen programs. These, along with the total CAP tax revenues, total administrative expenses (not including salaries), total marketing and education expenses, residential and commercial sub-totals, and residential and commercial personnel allocations, served as the inputs to the team's disaggregation of the total CAP tax expenditures.

The components were combined in the following weighted shares:

Expense Component	**Allocation Method**
Billable Expenses	Directly allocated (already identified by program and recorded yearly)
Total administrative expenses	Allocated at 10% of total billable expenses for that year. (i.e. the ReNew Our Schools PTO Fundraiser had $10,863 in billable expenses in 2011 – making the estimated overhead expenditure for the program $1,086).
Total marketing and education expenses	First the team defined a subset of all programs, which incorporated marketing and education. Then the yearly total education and marketing expenses were allocated to each program at a rate of 20% of expenses for that year (only for programs in the subset).
Residential and commercial personnel allocations	The City of Boulder had already divided expenses between the residential and commercial programs (as well as minor expenses for transportation and special projects). All personnel expenses were strictly divided between residential and commercial. For this analysis, each program's share of billable expenses in the relevant category (residential or commercial) determined the allocation of residential and commercial personnel expenditures. Then City of Boulder staff reviewed the figures and made adjustments based on their understanding – which were directly incorporated into the allocations.
Residential and commercial Remaining Admin	The residential and commercial sub-totals are composed of billable expenses and personnel costs. However – some additional carry-over (the sum being greater than the parts) occurred. This was allocated to programs based on each program's share of billable expenses in the relevant category (residential or commercial).

The formula to determine allocated CAP funding per program is:
Total Cost =Billable Expenses + .1 *{for administrative purposes}* * Program Billable Expenses + (Program Billable Expenses/Total Sector Billable Expenses)*Sector Personnel Costs + .2 * Program billable expenses *{for outreach – only applicable to programs that used outreach funding}* + (Program Billable Expenses/Total Sector Billable Expenses)* Remaining Residential or Commercial Admin Personnel Time.

For the marketing, education, administrative, and personnel expense components – the final figures were reviewed and adjusted by City of Boulder personnel. When comparing

program totals (estimates from all assessed CAP programs) to the total CAP tax (for each year 2007-2001), there is a discrepancy. This discrepancy averages $215,000 per year, and can be attributed to general research, admin, and other general organizational expenses. This can be considered a minor source of uncertainty in determining cost-effectiveness, but serves a crucial service in planning, program evaluation, awareness, data collection, and other administrative tasks.

Appendix C: Utility Cost Test for CAP Programs

The Utility Cost Test for Boulder's programs was an abbreviated analysis and only included the life cycle costs of utility expenses (electricity and natural gas). This should not be used as a definitive cost analysis for the future economic impacts of Boulder's climate programs. This report focuses on the greenhouse gas emissions potential of CAP program funding – and not on the economics of efficiencies within each program.

RESIDENTIAL PROGRAM	**kWh**	**TH**	**Cost**	**NPV**	**Benefit/ Cost**
EnergySmart	893891	262948	$204,006.41	$40,562.99	0.20
EnergySmart/ SmartRegs	1322367	386323	$519,895.89	$(159,788.61)	-0.31
Neighborhood Sweep Kits	8509119	138500	$153,276.85	$749,822.32	4.89
Energy Assessments (REAP)	5,201,506	835,104	$413,187	$673,459	1.63
Multifamily Performance Program	2488569	175835	$93,909.06	$269,830.75	2.87
Weatherization	217844	53091	$82,746.56	$(30,687.41)	-0.37
CU Green Teams & Greek Sustainability	453102	0	$33,704.93	$9,076.25	0.27
Efficient Lighting Coupons	2567409	0	$22,611.78	$219,621.42	9.71
LED Holiday Light Exchange	4963518	0	$49,025.25	$353,943.57	7.22
Rebates - Solar Thermal	0	28568	$23,939.51	$17,337.59	0.72
Rebates - Insulation	17954	104764	$133,057.89	$65,836.98	0.49
ReNew Our Schools PTO Fundraiser	1052476	116020	$45,275.35	$192,928.84	4.26
Average	*2,307,313*	*175,096*	*$147,886*	*$200,162*	*$1.35*
BUSINESS PROGRAM					
EnergySmart	9508941	15446	$468,763.44	$360,528.15	0.77
Small-Building Tune-Up Program	718200	130800	$336,081.90	$(169,119.95)	-0.50
ClimateSmart at Work Audits	2680273	-5025	$453,841.26	$(203,522.46)	-0.45
10 for Change	4216779	401935	$207,169.80	$486,559.97	2.35
LED Exit Sign Exchange	279620	0	$3,705.21	$22,662.61	6.12
Average	*3,480,763*	*108,631*	*$293,912*	*$99,422*	*$1.66*
RENEWABLES					
Solar Grants	7553256	0	$112,813.24	$531,520.19	4.71
Solar Rebates	1242869	0	$100,452.41	$6,151.73	0.06
Average	*4,398,063*	-	*$106,633*	*$268,836*	*1.99*

The analysis used a discount rate of 3.2% (standard for municipal analyses).
The analysis also incorporated forecasted electricity prices increases according to Xcel and natural gas price increases according to EIA.

The analysis does not include:
-Comprehensive household benefits
-Ratepayer benefits (or ratepayer expenses)
-Societal benefits
-Social benefits

-Future generation costs
-Future supply mix
-Demand curves

The project team did not discount future energy savings (as Boulder's emissions targets are focused around carbon reductions – not the cost implications of energy savings). For the limited UTC analysis, the cost impacts of those energy savings were discounted. ORNL standard for this is 3.2% per year.

A much more thorough analysis could accurately determine the cost impacts of each program on the city, Xcel or a municipal utility, and ratepayers/taxpayers. A comprehensive TRC test (including demand charges and ideally including social and societal costs) as well as life-cycle assessments of Boulder's carbon intensity, economic growth, and emissions external to city limits would more accurately examine programs' effectiveness and provide guidance for future emissions reduction plans. Depending on Boulder's path concerning municipalization, this may become a necessity.

Appendix D: Strategic Recommendations for CAP Program Management

Data management:
The City has done a laudable job of collecting and managing the data from their emissions reductions programs. However – this process could be improved by instituting better knowledge management (storage and labeling of specific reports, data sets, and conclusions) – specifically to file documents under the specific name of the program. Contractors should be subjected to a more stringent set of requirements for data collection and methodology. Similar to the reporting instituted for EnergySmart, each program can be structured to undergo a periodic review to assess program performance, ideally including data gathering and reporting.

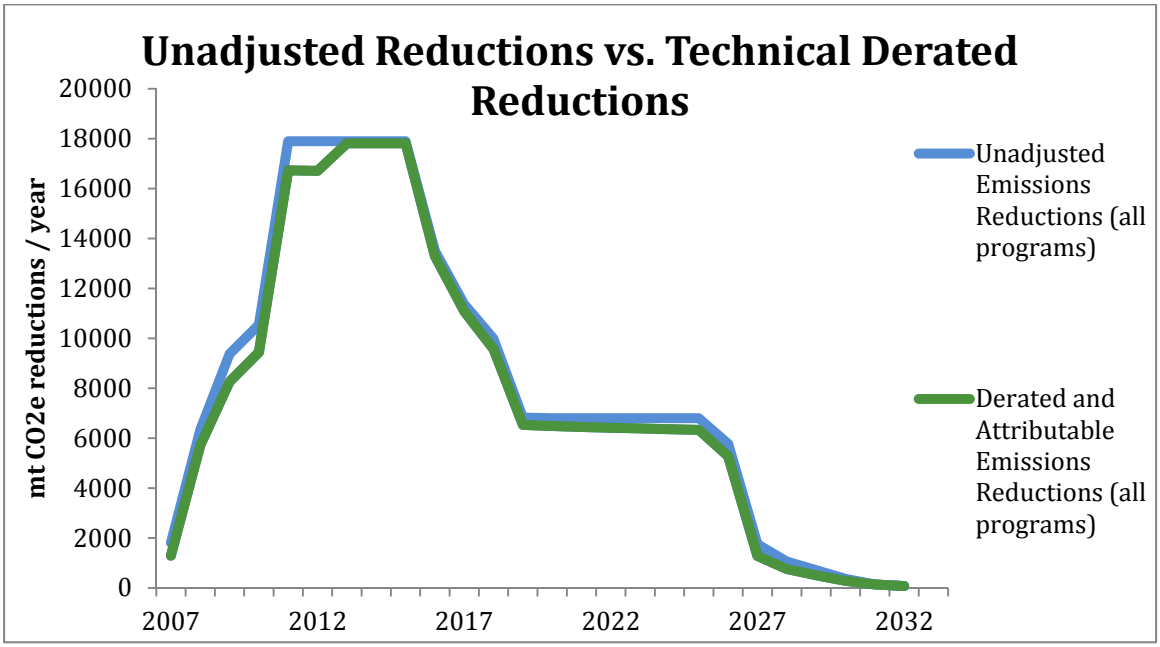
Centralized databases of measures, audits, or rebates applied will help with the calculation of savings. Databases require some investment to manage, but yield results –particularly when more comprehensive programs are in operation.

Improve on cost effectiveness analysis:
Ideally the City would focus data collection for efficiency projects on the identification of energy savings for each program (and element of the program). Building upon the Salesforce system, programs should track the recommendations for each participant, any verified upgrades, and iteratively improve the predictive elements of the programs.

Data collection can do more than help guide program selection and investment. Operationally, the data collected during the programs and at the time of engagement for new program participants can yield significant improvements to the process of turning potential participants into efficiency proponents. Simultaneously, data analysis can help to lower costs and best apply segments of programs to the most appropriate audience. For example, data collected on Neighborhood Sweeps already provides basic conversion rates for neighborhoods – but could also include cross-comparisons with applications to other programs and success indicators for inspiring broader efficiency efforts.

Appendix E: Allocation and Useful Lives by Program

Technical factors (adjustment made to programs due to predicted savings not showing up or not remaining for the full useful life) also negatively impacted the predicted savings. The largest derating due to technical factors was for programs (such as REAP and MPP) that needed to incorporate a participation rate (based on the likelihood of participants pursuing efficiency measures).



Many efficiency programs have documented decreases in energy savings over the life of the program (or persistence). The team adjusted for these either using industry averages (where research was available) or by taking a more conservative approach to the life of the program than equipment manufacturers and industry observers forecast.

RESIDENTIAL PROGRAMS	Useful life of program	Allocation Factor	Average Derating (% decrease)	Notes
EnergySmart	15.5 years	Share of savings based on funding	88%	CAP taxes fund only 12% of the program The useful life of the program was derated by 6% to account for persistence of savings
EnergySmart/ SmartRegs	15.5 years	Share of savings based on funding	80%	CAP taxes fund 20% of the program
Neighborhood Sweep Kits	~9.5 years	NA		
Energy Assessments (REAP)	10 years	Neutral	50% 10%	-Based on participation rates (benchmarked from EnergySmart) -Based on 10% overhead costs for Xcel (standard in cost attribution approach). *The useful life of the*

				program was derated by 8% to account for persistence of savings.
Multifamily Performance Program	9.2 years	Customer Behavior	61%	Data from Ingrid Rohmund and Greg Winkler (Assessment of Achievable Potential)
Weatherization	20 years	Persistence of savings	14%	Data from ORNL (Non-energy Benefits from Weatherization)
CU Green Teams & Greek Sustainability	9.126 years			
Efficient Lighting Coupons	9.126 years	Share of savings based on rebate value	70%	Based on the prices of bulbs purchased and average rebate value
LED Holiday Light Exchange	25 years	NA		
Rebates – Solar Thermal	20 years	-Share of total funding -Share of savings based on rebate value -Persistence	50% 75% 8%	-GEO funded half of the project costs. -The rebates were a small share of total solar thermal system prices -Solar thermal systems typically degrade over time
Rebates - Insulation	20 years	-Share of total funding -Share of savings based on rebate value -Persistence	52% 71% 5%	-GEO funded more than half of the program. -The rebates were a small share of total insulation expenditure -Data on persistence from ACEEE
ReNew Our Schools PTO Fundraiser	5 years	Participation	20%	Some portion of listed participants may not take action – 20% was the estimate
BUSINESS PROGRAMS				
EnergySmart	16 years	-Account for the 'Optimize' Program -Double counting -Share of savings based on funding	+1% 5% 85%	-The 'Optimize' program was not accounted for and corresponded to ~1% of all projects -Some double counting occurred with 10forChange -Federal funding (85%) -EnergySmart derated 10% for persistence
Small-Building Tune-Up Program	6 years	Neutral		The useful life of the program was derated to account for persistence of savings
ClimateSmart at Work Audits	9 years	Neutral	85%	- To account for the total percentage of Xcel's audit costs paid for by Boulder (estimated by Xcel) *10% useful life derating for persistence*

10 for Change	8 years	-Free ridership -Efficiency programs reported in survey	- 90% - +20% kWh and +15% natural gas	-Based on survey results, 10 for Change only initiated a small portion of commercial partners' efficiency projects. -Reported efficiency projects saved more than the average of reported utility bills
LED Exit Sign Exchange	10 years	NA		Life provided by City – could be higher
RENEWABLE				
Solar Grants	20 years	-Dirt/Snow -Panel degradation -Attributable savings	-5% -13% -20%	-PV Watts can underestimate Dirt/Snow/Inverter/Wiring losses -Panels steadily degrade in performance -Based on size of grant vs. average PV prices
Solar Rebates		-Dirt/Snow -Panel degradation -Attributable savings	-5% -13% -99%	-PV Watts can underestimate Dirt/Snow/Inverter/Wiring losses -Panels steadily degrade in performance -Based on size of rebate vs. average PV prices

The derating approach is a high-level assumption for all programs that does not quantify the granular investments, personnel time, outreach, and elbow grease that make these efficiency programs work. In general, the City of Boulder has contributed far more than the simple calculation of percent share of total funding indicates. However, to keep programs treated the same, cost attribution was kept standard between all jointly funded programs.

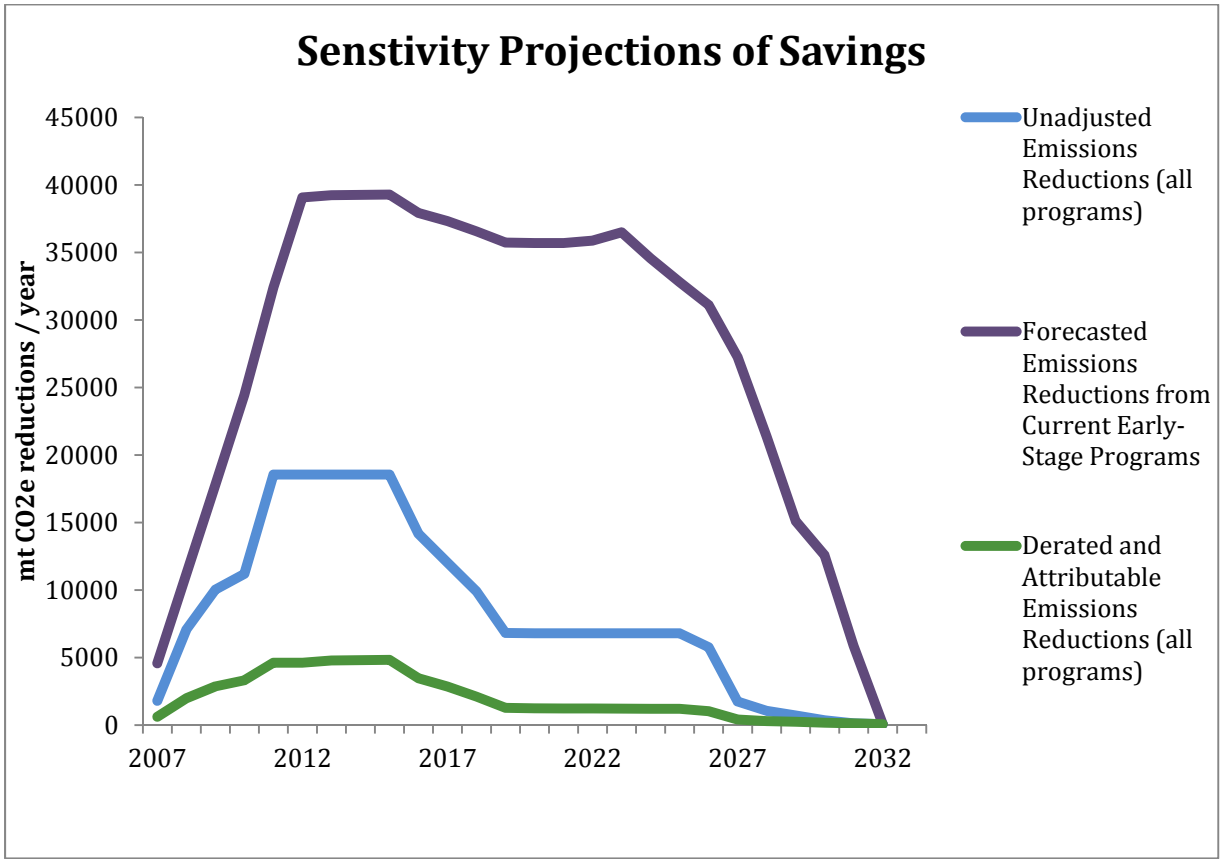
Appendix F: Sensitivity Analysis for Certain Programs

The Sensitivity analysis was conducted for the following programs:

1. Residential EnergySmart
2. SmartRegs
3. Commercial EnergySmart

SmartRegs and Residential and Commercial EnergySmart were examined with five additional years of savings (savings in future years projected to increase to 110%, 120%, 130%, 140%, and 140% of 2011 savings). These projections are conservative in light of the City's goals for project expansion. This resulted in a six-year duration (years in which the program operates) for each of the three programs.

a. The sensitivity also allocated 100% of the savings to Boulder (due to projections of Boulder primarily funding the program in future years).
b. The sensitivity increased the average useful life to 17 years (from 15.5 years) – which was the original estimate based on installed equipment. That estimate was downgraded to estimate the impact of the persistence of savings. With EnergySmart continuing as a comprehensive program – more advanced and durable equipment (beyond lighting) will be installed, thereby increasing the useful life of the program.
c. Costs in future years were estimated based on current costs and expected learning curves (RMI internal estimates included below). Costs of the longer, larger, and fully funded Boulder program were 15 times higher than current program data.



Appendix G: Program Specific Notes

REAP

- City values did not take savings credit for the program, because implementation was not tracked.
- Revised value shows electric and gas savings for 2009 (based on the proportional shares of the kWh and therm savings in the REAP 2009 report).
- Revised value gives credit for 269 homes

Updates

- Set weighted-average measure life to be 10 years since comprised of behavior, lighting, HVAC and envelope improvements.
- Set all derating factors to 1
- Used savings calculations for action program and audits from the 2008 and 2009 REAP reports.
- 2009: 269 action consultations = 629 mtC02e and 560 audits
- 2008: 433 audits in Boulder
- No other savings data available – may be understating.
- Action program included 269 participants (assume these are a subset of the 465 audits). Could apply an overall program implementation factor of 269/465 = 0.58 or 58%. However, not all participants in the action program took action.
- Separate estimate found 56.25% (based on action results from EnergySmart). This factor was selected to account for some action participants not taking action. It is an encouraging sign that both estimates were extremely close. Downgraded to .5 to adjst for non participation from action program participants.
- A cost derating factor was inputted = .8 (based on 10% - using Boulder's overhead calculations) to estimate Xcel's impact on overhead.

Renew Our Schools PTO Fundraiser

- Savings taken in City Program spreadsheet equals 54,327 kWh
- Difficult to make the connection between the data presented on the PTO Spreadsheet and this value.

Updates

- Per the PTO spreadsheet, it appears that the total possible savings for all check list items are 1851 kWh (note possible use of mixed energy units in spreadsheet). Using the reported average household electric use of 7620 kWh, this represents an opportunity for ~ 25% energy use reduction.
- Assumption: Completing the checklist would have an impact of reducing electric and gas use by 3% each. This was not verified. Based on 1151 households participating, this totals 263,119 kWh and 29,005 therms of savings. This is significantly more savings than the 54,327 kWh originally reported.

Small Building Tune-Up Program

- City reported savings per program report, which total 119,700 kWh and 21,800 therms for the 15 pilot program projects

Updates

- Weighted average measure life assumed to be 5 years for tune-up program. Could be as high as 7.
- Savings are based on pilot program results. To evaluate program cost-effectiveness moving forward, the costs should be adjusted. Pilot program costs include one-time costs for program research and design. Per the program report Table 14, page 33, estimated costs for

the full scale program with 72 projects are $200,000. Total full scale savings (based on 10,060 kWh and 1834 therms per project) are 724,320 kWh and 132,048 therms.

ClimateSmart at Work Audit

- City is takings savings credit for audits (verified) resulting in implemented recommendations from the ClimateSmart at work program offered in 2007 – 2009. No savings credit is being taken for the PACE Program offered in 2007 – 2008.
- ClimateSmart at Work Program was reformulated as the Small Building Tune Up Program in 2010.

Updates

- Set weighted average measure life to be 10 years for program based on mix of ECMs listed in program spreadsheet.
- No de-rating factors applied. Savings values already account for difference between identified savings and actual savings based on measures implemented.
- Could change RMI savings spreadsheet so that measures die out after 10 years and get credit for a few more years of the 2008 and 2009 program benefits.
- Modifications could be made for PACE accounting (e.g. apply same % actual based on savings identified) but none were because the PACE contribution is small and program will not continue in this form anyway.

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ORDINANCE NO. 7483

AN EMERGENCY ORDINANCE APPROVING SUBMITTAL TO THE QUALIFIED ELECTORS OF THE CITY OF BOULDER AT THE COORDINATED MUNICIPAL ELECTION TO BE HELD ON TUESDAY, THE SEVENTH DAY OF NOVEMBER, 2006, THE QUESTION OF AUTHORIZING THE CITY COUNCIL TO IMPOSE A CLIMATE ACTION PLAN TAX, EFFECTIVE ONLY FROM APRIL 1, 2007 THROUGH MARCH 31, 2013, AS AN EXCISE TAX COMPUTED UPON THE BASIS OF THE AMOUNT OF ELECTRICITY USED BY RESIDENTIAL, COMMERICAL, AND INDUSTRIAL CUSTOMERS FOR THE PURPOSES OF FUNDING THE CLIMATE ACTION PLAN TO REDUCE AND MITIGATE THE HEALTH AND SAFETY IMPACTS OF GREENHOUSE GAS EMISSIONS AND ADDRESS GLOBAL WARMING; GIVING APPROVAL FOR THE COLLECTION, RETENTION, AND EXPENDITURE OF THE FULL TAX PROCEEDS AND ANY RELATED EARNINGS NOTWITHSTANDING ANY STATE REVENUE OR EXPENDITURE LIMITATION; SETTING FORTH AN EFFECTIVE DATE; SETTING FORTH THE BALLOT TITLE; AND SETTING FORTH RELATED DETAILS.

BE IT ORDAINED BY THE CITY COUNCIL OF THE CITY OF BOULDER, COLORADO:

Section 1. Findings and Determinations.

(a) The city council finds and determines that the electorate should consider authorizing the city council to impose the Climate Action Plan Tax as an excise tax upon persons consuming electricity as residential, commercial or industrial customers. The purpose of this tax is to fund implementation of the Climate Action Plan which is designed to reduce and mitigate the health and safety impacts of greenhouse gas emissions, and achieve local consistency with the Kyoto Protocol.

(b) The tax shall be imposed upon the basis of each customer's consumption of electricity measured in Kilowatt/Hours, and the city council shall set the first year tax at a maximum rate of $0.0022 per kWh for residential customers; $0.0004 per kWh for commercial customers; $0.0002 per kWh for industrial customers; these amounts being based upon the cost of the first

year Climate Action Plan implementation of $860,265, and designed to achieve rates based upon projected program and service expenditures by which 58% will go to the residential sector; 39% to the commercial sector; and 3% to the industrial sector in the first year. Voluntary purchases of utility provided wind power shall be exempt from the tax.

(c) In subsequent years, the city council shall have the authority to increase the rates as needed to fund the Climate Action Plan, as it may be amended, to a maximum rate of $0.0049 per kWh for residential customers; $0.0009 per kWh for commercial customers; $0.0003 per kWh for industrial customers. These maximum tax rates are estimated to support a maximum $1,342,000 program budget.

(d) Tax revenues generated will be used to implement programs to increase energy efficiency, increase renewable energy use, reduce emissions from motor vehicles, and take other steps toward the goal of meeting the Kyoto Protocol.

(e) These taxes shall be collected for the city by the incumbent electric franchisee or the city if a municipal utility is created. The city shall pay reasonable set up and collection charges to the incumbent electric franchisee, subject to an agreement approved by city council. This section and any agreement shall be interpreted consistent with the city's powers under the city of Boulder Charter Sections 111 [Franchises] and 123 [Rate Setting].

(f) The city may by ordinance, identify entities exempt from payment of the Climate Action Plan Tax.

Section 2. At the coordinated municipal election to be held in the various precincts and at the polling places of the City of Boulder, County of Boulder and State of Colorado, on Tuesday, the seventh day of November, 2006, between the hours of 7:00 a.m. and 7:00 p.m., there shall be submitted to the electors of the city of Boulder entitled by law to vote thereon, the question set forth below. The official ballot punch card and the official absentee ballot shall contain the following ballot title, which shall also be the designation and submission clause for the measure:

BALLOT ISSUE NO. 202

CLIMATE ACTION PLAN TAX

SHALL CITY OF BOULDER TAXES BE INCREASED $860,265 ANNUALLY (IN THE FIRST YEAR), AND UP TO $1,342,000 EACH YEAR THEREAFTER FOR THE PERIOD OF APRIL 1, 2007 TO MARCH 31, 2013, BY AUTHORIZING THE CITY COUNCIL TO LEVY AND COLLECT A CLIMATE ACTION PLAN TAX AS AN EXCISE TAX UPON PERSONS CONSUMING ELECTRICITY AS RESIDENTIAL, COMMERCIAL, OR INDUSTRIAL CUSTOMERS, AND PROVIDING AN EXEMPTION FOR VOLUNTARY PURCHASES OF UTILITY PROVIDED WIND POWER. THE TAX SHALL BE ESTABLISHED WITH A FIRST YEAR RATE OF $0.0022 PER KILOWATT HOUR (kWh) FOR RESIDENTIAL CUSTOMERS, $0.0004 PER kWh FOR COMMERCIAL CUSTOMERS, AND $0.0002 PER kWh FOR INDUSTRIAL CUSTOMERS. THE TAX SHALL TAKE EFFECT ON APRIL 1, 2007 AND EXPIRE ON MARCH 31, 2013, AND SHALL BE FOR THE PURPOSE OF FUNDING A CLIMATE ACTION PLAN TO REDUCE GREENHOUSE GAS EMISSIONS. THE MEASURE WOULD ESTABLISH CITY COUNCIL AUTHORITY TO INCREASE THE TAX AFTER THE FIRST YEAR UP TO A MAXIMUM PERMITTED TAX RATE OF $0.0049 PER KWH FOR RESIDENTIAL CUSTOMERS; $0.0009 PER KWH FOR COMMERCIAL CUSTOMERS; AND $0.0003 PER KWH FOR INDUSTRIAL CUSTOMERS.

TAX REVENUES GENERATED WOULD BE USED TO IMPLEMENT PROGRAMS TO INCREASE ENERGY EFFICIENCY, INCREASE RENEWABLE ENERGY USE, REDUCE EMISSIONS FROM MOTOR VEHICLES, AND TAKE OTHER STEPS TOWARD THE GOAL OF MEETING THE KYOTO PROTOCOL.

AND IN CONNECTION WITH THE CLIMATE ACTION PLAN TAX,

SHALL THE FULL PROCEEDS OF SUCH TAXES AT SUCH RATES AND ANY EARNINGS THEREFROM BE COLLECTED AND SPENT WITHOUT LIMITATION OR CONDITION, AND WITHOUT LIMITING THE COLLECTION OR SPENDING OF ANY OTHER REVENUES OR FUNDS BY THE CITY OF BOULDER, UNDER ARTICLE X, SECTION 20 OF THE COLORADO CONSTITUTION OR ANY OTHER LAW?

FOR THE MEASURE _____ AGAINST THE MEASURE _____

Section 3. If a majority of all the votes cast at the election on the measure submitted shall be for the measure, the measure shall be deemed to have passed and shall be effective upon passage, and it shall be lawful for the city council to provide for the amendment of its tax code in accordance with the measure approved.

Section 4. The election shall be conducted under the provisions of the Colorado Constitution, the Charter and ordinances of the city, the Boulder Revised Code, 1981, and this ordinance, and all contrary provisions of the statutes of the State of Colorado are hereby superseded.

Section 5. The city clerk of the city of Boulder shall give public notice of the election on each measure:

(a) By causing a notice to be published in the Boulder Daily Camera, a daily newspaper of general circulation and published in the city, at least ten days before election day; and

(b) By mailing at the least cost to "All Registered Voters" at each address within the city at which a voter is registered no later than thirty days before the election, a notice entitled "NOTICE OF ELECTION TO INCREASE TAXES AND FOR A REVENUE CHANGE." This notice shall include only:

(I) the election date and hours for voting, the ballot title and text of the measure by this ordinance submitted to the voters and the office address and telephone number of the city clerk;

(II) the estimated total of city fiscal year spending for 2006 and the actual total of city fiscal year spending for each of the preceding four years, and the overall percentage and dollar changes;

(III) for 2007, city estimates of the maximum dollar amount of the proposed tax increase and of city spending without the increase; and

(IV) two summaries, no more than five hundred words each, one for and one against the measure, of written comments filed with the city clerk no later than forty-five days before the election. No summary shall mention names of persons or private groups, nor any endorsements of or resolutions against the measure. The city clerk shall maintain on file and accurately summarize all relevant written comments.

Section 6. The notice of the election shall include the ballot title.

Section 7. The officers of the city are authorized to take all action necessary or appropriate to effectuate the provisions of this ordinance.

Section 8. If any section, paragraph, clause, or provision of this ordinance shall for any reason be held to be invalid or unenforceable, such decision shall not affect any of the remaining provisions of this ordinance. The tax established by this measure is intended to be authorized under any lawful means of taxation, including license taxation pursuant to city of Boulder Charter Section 122.

Section 9. This ordinance is hereby declared to be an emergency measure in order for the ballot issue to be presented to the voters at the November 7, 2006 election.

Section 10. This ordinance is necessary to protect the public health, safety and welfare of the residents of the city, and covers matters of local concern.

Section 11. The council deems it appropriate that this ordinance be published by title only and orders that copies of this ordinance be made available in the office of the city clerk for public inspection and acquisition.

INTRODUCED, READ ON FIRST READING, PASSED AND ADOPTED AS AN EMERGENCY MEASURE BY TWO-THIRDS OF THE COUNCILMEMBERS PRESENT, AND ORDERED PUBLISHED BY TITLE ONLY THIS 29th DAY OF AUGUST, 2006.

Mark R Ruggieri
Mayor

Attest:

City Clerk on behalf of the
Director of Finance and Record

K:\CMEN\o-7483-CAP Tax 8 29 06 A.lza.DOC

DRAFT Ballot Issue No. _____

Climate Action Plan Tax Extension

Without raising additional taxes, shall the existing Climate Action Plan Excise tax on persons consuming electricity at the rate of $0.0049 per kilowatt hour (kWh) for residential customers, $0.0009 per kWh for commercial customers, and $0.0003 per KWH for industrials customers with the tax revenues generated used for the purpose of implementing programs to increase energy efficiency, increase renewable energy use, reduce emission from motor vehicles, and take other steps towards reducing greenhouse gas emissions be extended from its current expiration of March 31, 2013 through [add end date here] as a voter-approved revenue change?

FOR THE MEASURE _____ AGAINST THE MEASURE _____

This example is based on the ballot title litigated in the case of *Bruce v. City of Colorado Springs*, 129 P.3d 988, (Colo. 2006)

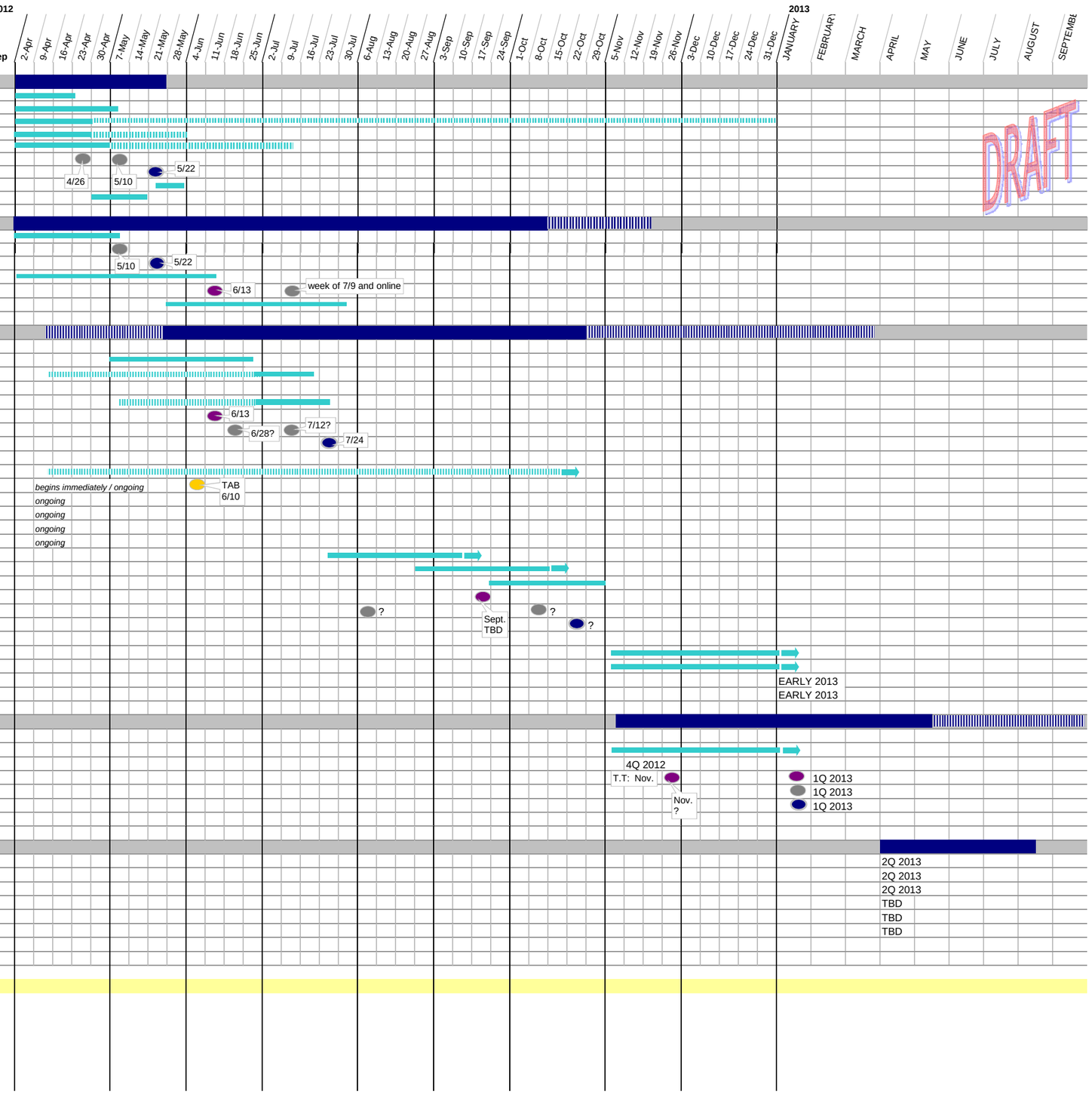
DRAFT

Boulder's CAP 2013 and Beyond - Proposed Work Plan

ATTACHMENT H

Draft - 05/08/12

Phases/Tasks	Product	Primary Resp.	Due date	prep
1 - Conduct Analysis for New Climate Action Framework				
1.1 - Develop CAP 2013 and Beyond work plan draft	draft work plan	LE	*All dates*	
1.2 - Assess how Boulder's doing (CAP 1.0)	RMI report / summary	KC	*to be added,,,*	
1.3 - Research lessons learned and model CAPs (peer cities)	Highlights into draft CAP	KC		
1.4 - Research options for long-term goals and criteria	Peer cities/ long-term goals	KC		
1.5 - Prepare criteria and measures to evaluate DSM programs	From RMI for Council	KC		
EAB (summary of analysis)		KC		
Council SS (summary analysis, options for long-term goal)		KC		
1.6 - Finalize CAP 2013 and Beyond work plan	CAP	LE		
1.7 - Develop stakeholder process	Public input goals/timeline	incl. Comm		
2 - Begin Discussion of Long-term Climate Action Goal				
2.1 - Prepare options for long-term goals, research on other communities	EAB/Council packet	KC		
EAB continues discussion about long-term goal	Summary of EAB discussion	KC		
Council Study Session	Summary of Council SS	KC		
2.2 - Discuss community values & considerations related to long-term goal	Draft for public input	KC		
Committee and Community Outreach	Summary of public input	KC w/ KH		
2.3 - Refine long-term goal and considerations for success	Working goals - for CAP draft	KC		
3 - Prepare Focus Areas, Interim Targets, and Metrics				
PART A: ASSESSMENT AND ALIGNMENT				
3.1 - Assess focus areas/methodology for sector GHG emissions inventory	Strategy Area/Methodology	YG/KC		
3.2 - Identify master plan alignment with focus areas (& potential consolidation and new)	Targets/forecasts existing	KC		
3.3 - Propose potential new or consolidated focus areas and metrics of success	New strategy areas?	KC		
3.4 - Refine master plan integration and coordination approach	Work plan integration	LE		
Committee and Community Outreach	Summary of public input			
EAB check-in	Summary of EAB discussion			
Council Study Session	summary of Council SS			
PART B: COORDINATION - MASTER PLANS, TARGETS, AND METRICS				
3.5 - Coordinate internally regarding master plan update processes	Process/work plan link	LE		
Coordination with TMP (existing goals, measures, forecasts, new goals)	ONGOING	LE		
Coordination with EAP, incl. criteria for future DSM programs	ONGOING	LE		
Coordination with Commercial Energy Efficiency Strategy	ONGOING	LE		
Coordination with Information Resources on future data warehouse	ONGOING	KC/LE		
Coordination with other master plans	ONGOING	LE		
3.6 - Refine metrics (qualitative and quantitative), by focus area	For CAP draft	KC/YG		
3.7 - Develop forecasts for focus areas and identify gaps		KC/YG		
3.8 - Identify preliminary new targets and initiatives (to address Task 3.6, gaps)	For CAP draft	KC/YG		
Committee and Community Outreach	Summary of public input			
EAB check-in	Summary of EAB discussion			
Council Study Session	summary of Council SS			
3.9 - Revisit long-term goal and relationship to focus area targets				
3.10 - Refine interim targets and metrics for focus areas				
3.11 - Refine process for identifying targets and metrics for remaining focus areas				
EAB check-in	Summary of EAB discussion			
Council Study Session	summary of Council SS			
4 - Identify Longer-Term Funding and Implementation Steps				
Note: CAP tax policies are being addressed in 2012 on a parallel track (EAP) and not included here.				
4.1 - Identify longer-term funding needs and sources to support focus areas		Phase 4 - TBD		
4.2 - Identify measurement responsibility and mechanics for tracking & reporting	For CAP draft			
Committee and Community Outreach				
EAB check-in				
Council Study Session				
4.3 - Develop an implementation guide for assessment and reporting	For CAP draft			
5 - Prepare Climate Action Plan Framework for 2013 and Beyond				
5.1 - Revise CAP framework contents outline		Phase 5 - TBD		
5.2 - Assemble CAP framework draft				
5.3 - Review draft				
Community Outreach				
EAB check-in				
Council Study Session				
5.4 - Revise CAP framework				
5.5 - Adoption process				
6 - After CAP framework development				
Measure				
Monitor				
Reassess				
Better integration with BVCP, citywide goals, and internal city operations				
Strong partnerships with private sector to achieve goals				
Periodic updates for CAP				
Full update for CAP, 5 years				



Summary of Research on Long-Term Climate Action Goals

This attachment summarizes research conducted so far by staff on long-term climate action goals that have been adopted by other communities. It includes two parts:

1. A spreadsheet describing the long-term goals and basic structures of approximately 40 climate action plans being implemented by communities around the country; and
2. A list of issues or challenges that are implicated in long-term goal-setting.

This research formed the basis for staff's list of considerations that could be weighed in selecting an appropriate long-term goal as well as the proposed recommendation that Boulder pursue climate neutrality by 2050 or sooner.

Issues and Challenges Implicated in Setting Long-Term Climate Action Goals

In the course of research, staff identified several issues or challenges that are implicated when selecting a new long-term climate action goal:

1. **Climate Science.** Nationally and internationally, many governments are adopting goals based on scientific findings related to climate change. There is a scientific consensus that a global atmospheric concentration of less than 450 parts per million (ppm) of carbon dioxide equivalent (CO_2e) is necessary to avoid dangerous anthropogenic interference with the climate and to limit global temperature increase to less than 2^oC. Increasingly, climate scientists have determined that the concentration may need to be 350 ppm or less. Data suggest that in order to reach these necessary global concentrations, developed countries may need to decrease emissions by 80 to 95% below 1990 levels by 2050. Governments have begun to adopt these targets as long-term goals. The European Union (EU) has committed to reduce its emissions by 20% below 1990 levels by 2020 and proposed to scale up to 30% subject to matching commitments by other industrialized nations. The EU has an ultimate goal of reducing its GHG emissions by 80 to 95% below 1990 levels by 2050. Some local (and national) governments are using this goal as an interim step to achieving long-term carbon or climate neutrality. Seattle, Washington, and Davis, California, have 2050 climate neutrality goals, whereas Norway has a 2030 goal and Costa Rica, a 2021 goal.

2. **Developing a Roadmap in the Face of Uncertainty.** Forecasting the long-term future is simply not possible. The scenarios being developed within the new climate action framework and the Energy Action Plan (EAP) will explore routes towards long-term decarbonization of the energy system, and an overall reduction in community GHG emissions. All current data imply major changes in, for example, carbon prices, technology and networks. A number of scenarios to achieve aggressive reductions in greenhouse gas emissions will be examined. Boulder will need to determine how "aspirational" its new reduction target should be and the roadmap to reach the set targets. It is anticipated that the goals outlined in the new climate action framework will be ambitious. Naturally, given the long-time horizon associated with many of the more popular targets being adopted by other jurisdictions, there is uncertainty associated with

these results. Lessons learned from the CAP so far indicate that social, technological and behavioral changes will also have significant impact on the energy system. That said, Boulder's efforts over the past years have provided important data that point to the types of strategies that are most effective at reducing GHG emissions while enhancing regional economic vitality and social welfare. Our ability to achieve aggressive climate action goals will be determined by careful and measurable targets in the short term.

3. **Setting Interim and Sector-Specific Targets.** The concept of setting an aspirational long-term climate action goal is best thought of as a powerful incentive for vigorous short-term goals. Because of the uncertainty involved in setting and meeting goals decades out, communities generally set interim targets in addition to long-term goals. To reach 80% below 1990 levels by 2050, communities are targeting an absolute reduction in GHG emissions of 20% per decade (2% annually on average). This equates to a common interim target of 20% or greater by 2020. Some communities also target specific emissions sources, or develop other quantifiable metrics, through interim goals related to renewable energy, energy efficiency, or green building. For example, Denmark set a goal to reduce GHG emissions 40% below 1990 levels by 2020, with associated goals of 30% renewable energy consumption and gross energy savings of 4% (relative to 2005). Germany set a goal of doubling "energy productivity" by 2020 in addition to meeting EU goals.[1] Shorter-term targets create challenges by trying to balance putting communities on the path to stretch goals, incorporating technological uncertainty, and front-loading emissions reductions to avoid falling behind.

4. **Baselines and Equity.** Even where communities use a common baseline year, such as 1990, the amount of emissions in each community vary for that year, leading to different baselines. This means that long-term goals based on reducing emissions by a set percent for each community will create varying absolute burdens depending on that community's contributors to GHG emissions (e.g., fuel supply, economy) in 1990. Some local governments (as well as many universities) are turning to carbon neutrality as an end goal, removing the need to focus on a baseline year and shifting the focus to the end goal. Climate neutral generally means zero net GHG emissions: emissions are balanced by offsets like RECs or carbon sequestration.[2]

5. **Carbon Accounting.** Generally accepted carbon accounting methods, such as the GHG Protocol Corporate Standard, develop emissions inventories that calculate the six "Kyoto gases" (CO_2, CH_4, N_2O, SF_6, HFCs, and PFCs) as CO_2e. Carbon inventories measure emissions from the production and consumption of electricity, natural gas, diesel, and gasoline, and may include emissions from water treatment and landfill decomposition. However, communities often experience challenges in determining the scope of emissions. Most measure emissions based on geographic boundaries rather than creating complex emissions "footprints" that include regional transportation, electric line losses, land use change, and life-cycle emissions from the production and transportation of

[1] Energy productivity is defined as the amount of primary energy generated per unit of gross domestic product.
[2] For additional background, please see the City of Seattle Office of Sustainability and Environment report *Getting to Zero: A Pathway to a Carbon Neutral Seattle* (2011), http://www.seattle.gov/environment/documents/CN_Seattle_&appendices.pdf.

goods like food.[3] This means that both "80% by 2050" and "net neutral" emissions goals are only measured against the emissions sources that are included in inventories.

Some of the expedited timelines appear to be based on large purchases of international carbon offsets, such as forest planting. The Vatican, Norway, Costa Rica, and Melbourne, Australia, which are pursuing carbon neutrality, are all looking to carbon offsets to meet 50% or more of their goals. Seattle and Copenhagen prioritize energy efficiency and renewable energy before carbon offsets, but do consider carbon offsets related to renewable energy and avoided land-use changes. Because of the limitations surrounding inventories, they may be useful more as a guidepost for developing policies that address large emissions sources than they are for drawing conclusions about causation from those policies.

[3] In other words, they include limited "scope 3" emissions as defined by the GHG Protocol. Attachment A notes a few exceptions.

ATTACHMENT I: High-Level Review of Selected Local Government Climate Action Plans

Community	Census Population (2010)	Baseline Year	Long-term goal[1]	Short-term goal	Year of CAP	Most recent report	Most recent inventory	Strategy Areas	Inventory Method & Scope[2]	Reason for Relevancy Classification
MOST RELEVANT										
Berkeley, CA	112,580	2000	Reduce 80% by 2050	Reduce 33% by 2020	2009	2011	2010	Sustainable Transportation & Land Use; Building Energy Use; Waste Reduction & Recycling; Community Outreach & Empowerment; Adapting to a Changing Climate. Also includes 30 long-term qualitative goals with 25 performance metrics.	ICLEI methodology. Includes: residential electricity/natural gas, commercial electricity/natural gas, and transportation diesel and gasoline. Excludes: emissions from landfills, life-cycle emissions from the production and transportation of goods, commuting, universities and federal buildings.	2011 CAP Progress Report updates on non-GHG performance metrics associated with non-GHG goals. Expressed interest to include more emissions sources and track progress to reductions as against economic and population growth.
Chicago, IL	2,695,598	1990	Reduce 80% by 2050	Reduce 25% by 2020	2008	2008/09	?	Energy Efficient Buildings; Clean & Renewable Energy; Improved Transportation Options; Reduced Waste & Industrial Pollution; Adaptation	Unsure; appears to be an adaptation of the GHG Protocol.	Their 1-page dashboard for 2010 is really interesting; lists "co-benefits" with strategy areas; good visuals and relatively clear
Davis, CA (D-CAAP)	65,622	1990	Neutral by 2050; reduce 80% by 2040	Reduce 28% by 2020; 15% by 2015; 7% by 2012	2010	2010	2006 or 08	Mobility; Energy; Land Use & Buildings; Consumption & Waste; Food & Agriculture; Community Engagement; Government Operations; Advocacy; Climate Change Preparation (Adaptation)	ICLEI software with review by UC-Davis. Appears to include energy, waste, transportation	Staggered goals, including avg annual reduction, to get to neutrality
Eugene, OR (CEAP)	156,185	1990	Reduce 70% by 2050	Reduce fossil fuel use 50% by 2030	2010	2011	2005	Buildings & Energy; Food & Agriculture; Land Use & Transportation; Consumption & Waste; Health & Social Services; Urban Natural Resources	Appears to use ICLEI software. Activities that directly produce GHGs; no consumer products LC or bio-sequestration	Alternative goals in addition to quantitative GHG reductions
Fort Collins, CO	143,986	2005	Reduce 80% by 2050	Reduce 20% by 2020; 3% by 2012	2008	2010	2010	Uses key community indicators separated into Residential, Commercial Industrial, Total Energy, Transportation, Waste & Recycling	Unsure; an adaptation of the GHG Protocol. Appears to exclude most Scope 3 but details methods	It has a lot of metrics and indicators we can consider; although it organizes more by measure than strategy area
Portland, OR	583,776	1990	Reduce 80% by 2050	Reduce 40% by 2030	2009	2010	2010	Buildings & Energy; Urban Form & Mobility; Consumption & Solid Waste; Urban Forestry & Natural Systems; Food & Agriculture; Community Engagement; Climate Change Preparation; Local Government Operations	Appears to use ICLEI software. Excludes industrial processes, agriculture, bio-sequestration, airplane fuel, LC of products, offsets (although it has a "food" strategy area)	Interesting strategy areas and parsing out of emissions reductions
Sacramento, CA	466,488	2005	Reduce 83% by 2050	Reduce 38% by 2030; 15% by 2020	2011 (draft)	n/a	2005	Sustainable Land Use; Mobility & Connectivity; Energy Efficiency & Renewable Energy; Waste Reduction & Recycling; Water Conservation & Wastewater Reduction; Climate Change Adaptation; Community Involvement & Empowerment	Uses ICLEI software. Geographic boundary; separates out "high GWP" GHGs	Slightly different goal set; includes a lot of projections
Santa Cruz, CA	59,946	1990	Reduce 80% by 2050	Reduce 30% by 2020; carbon neutral development by 2030	2011 (draft)	n/a	2008	Energy Efficiency; Transportation & Land Use Planning; Water Use & Waste Reduction; Locally Generated Renewable Energy; Public Partnerships, Education, & Outreach; Implementation	Uses ICLEI software with transportation modeling from the Monteray Bay Area metropolitan planning organization (AMBAG). Geographic; includes some Scope 3 (waste)	Alternative goals in addition to quantitative GHG reductions; useful strategy areas
Seattle, WA	608,660	2008	Neutral by 2050	Reduce 30% by 2020 & 58% by 2030	2006 (2012 update)	2009	2008	2009: Transportation Choices/Compact Communities, Clean Fuels/Clean Fleets, Clean Energy/Efficient Buildings, Waste Reduction, Adaptation, Community Engagement, Measuring Progress	Appears to use the GHG Protocol. Geographic/within city boundaries.	Neutrality goal

[1] This spreadsheet is a working document. At this time, it only identifies GHG emissions reduction goals, not source-specific goals like renewable energy mix.

[2] Most communities are using variations of the GHG Protocol, developed by WRI & WBCSD, for carbon accounting. ICLEI (Local Governments for Sustainability) used this model to develop specific guidance and software for local governments.

ATTACHMENT I: High-Level Review of Selected Local Government Climate Action Plans

Community	Census Population (2010)	Baseline Year	Long-term goal	Short-term goal	Year of CAP	Most recent report	Most recent inventory	Strategy Areas	Inventory Method & Scope	Reason for Inclusion/Exclusion
SOMEWHAT RELEVANT										
Albany, NY (CAP within Albany 2030 Plan)	97,856	2009	Reduce % by strategy area by 2030	n/a	2011 (draft)	n/a	2009	Buildings (10%); Transportation (VMT 21%); Solid Waste (65% diversion); Wastewater/Water (10%); Urban Forest (not counted); Adaptation; Education & Outreach	GHG Protocol; excludes most Scope 3	Goals are by strategy area rather than overall, with some non-GHG metrics
Albuquerque, NM	545,852	2000	Reduce 80% by 2050	Reduce 25-30% by 2020; 20% by 2012	2009 (draft)	n/a	?	Business, Industry, & Carbon Offset; Carbon Neutral Buildings; Clean, Renewable Energy; Complete, Livable Neighborhoods; Local Food & Agriculture; Recycling & Zero Waste; Social Change; Transportation	Unsure; appears to be based on the GHG Protocol.	Good example of basing newer goals on Kyoto goals (20% below 2012 is like 7% below 1990, but rounded) but still in draft
Aspen, CO	6,658	2004	Reduce 80% by 2050	Reduce 30% by 2020	2007	n/a	2007	Policy, Research, & Education; Buildings: Energy Efficiency; Transportation: Air & Ground; Electricity; Landfill: Waste Reduction & Recycling; Localization: Offsets & Food	Appears to be based on the GHG Protocol; detailed geographic & conceptual boundary; includes tourism-based "footprint" emissions from travel	Aspen is the only community found so far that discloses full inventory spreadsheets
Austin, TX (CPP)	790,390	n/a?	800 MW EE, 35% RE in utility portfolio; city operations neutrality by 2020	All city facilities RE powered	n/a?	2011	2010	City Government Impacts; Community Climate Action	Unsure	May be worth considering because of non-quantitative GHG goals, but not much data and city operations-focused
Boston, MA	617,594	2005?	Reduce 80% by 2050	Reduce 25% by 2020	2011 (update)	2011	2010	Mitigation (Buildings & Energy, Transportation, Solid Waste), Adaptation, Economy, Community Engagement, Implementation	Appears to be based on the GHG Protocol; includes activities within city boundaries and excludes air travel and LC of consumer products	Interesting strategy areas and parsing out of emissions reductions, but short on specifics, like baseline year
Burlington, VT	42,417	2007	Reduce 80% by 2050	Reduce 20% by 2020	2012 (draft)	n/a	2010	Energy Efficiency in Buildings; RE Resources; City Government Transportation; Community Transportation; Waste Reduction & Recycling; Local Farms, Gardens, & Carbon Offsets; Policy & Education	Appears to use ICLEI software; excludes most Scope 3	Interesting strategy areas and parsing out of emissions reductions, but not enough data to answer all questions
Cincinnati, OH (Green Cincinnati)	296,943	2006	Reduce 84% by 2050	Reduce 40% by 2028; 8% by 2012	2008	n/a	2006	Transportation; Energy; Waste; Land Use; Advocacy; Food	Uses ICLEI software; appears to exclude most Scope 3, although it does have a "food" strategy area	No progress reports, but could be worth additional review because the goals are slightly different; also looks at payback periods
Minneapolis, MN	382,578	2006	Reduce 30% by 2025	Reduce 80% by 2050	1993 (2012 update)	n/a	2010	26 "sustainability indicators" including Greenprint category: Climate Change; Renewable Energy; Air Quality; Waste Reduction & Recycling; Bicycling; Transportation Alternatives; Airport Noise; Tree Canopy; Stormwater; Healthy Lakes, Streams, & Rivers; Green Jobs; Local Food	Uses ICLEI guidance; appears to exclude Scope 3 except for some air travel (http://www.minneapolismn.gov/sustainability/indicators/WCMS1P-087163)	1993 w/ Urban CO2 Reduction Project (20% below 1988 by 2005); interesting because tied to Minneapolis 2020 Goals, but no update yet
New York City, NY (PlaNYC)	19,378,102	2003	Reduce 80% by 2050	Reduce 30% by 2030	2011 (PlaNYC)	n/a	2009	Primary: Efficient Buildings, Sustainable Transportation, Clean Energy Supply, Solid Waste Wastewater & Fugitive Emissions; Secondary: Housing & Neighbors, Parks & Public Space, Waterways, Water Supply, Energy	Unsure; appears to be an adaptation of the GHG Protocol.	Insufficient data but could be a good model for the master plan-style framework
Pittsburgh, PA	305,704	2003	Reduce 20% by 2023	n/a	2010 (2012 update)	n/a	2008	General; Energy; Recycling & Waste Management; Transportation; Green Building Practices; Student Engagement & Higher Education	Uses ICLEI software; appears to exclude most Scope 3	Revisit when 2.0 becomes available

ATTACHMENT I: High-Level Review of Selected Local Government Climate Action Plans

Community	Census Population (2010)	Baseline Year	Long-term goal	Short-term goal	Year of CAP	Most recent report	Most recent inventory	Strategy Areas	Inventory Method & Scope	Reason for Inclusion/Exclusion
LEAST RELEVANT										
Chattanooga, TN	167,674	1990	Reduce 80% by 2050	Reduce 7% by 2012; 20% by 2020	2009	n/a	2006	Energy Efficiency; Healthy Communities; Natural Resources; Education & Policies	Uses ICLEI software; appears to exclude most Scope 3	Report is currently task force recommendations; no progress reports; BUT strategy areas may be worth looking at more
Los Angeles, CA (Green LA)	296,943	1990	Reduce 35% by 2030	n/a	2007	n/a?	2004?	Energy, Water, Transportation, Waste, Port of Los Angeles, Airport, Open Space & Greening, Green Economy, Adaptation	Unsure; appears to use the GHG Protocol	Old data + under the 20-2020/80-2050 split, would be reduced 40% by 2030
Madison, WI (CP not CAP)	233,209	?	Reduce 80% by 2050	25% of energy from clean sources by 2025; reduce energy use by 50% by 2030	2011	n/a	?	Carbon & Energy category of Sustainable Madison plan, with goals related to building energy use, transportation, and engagement	Unsure	Goal includes plan to develop a future plan and inventory
Philadelphia, PA (LAP)	1,526,006	1990	Reduce 20%, time uncertain	Reduce 10% by 2010	2007	2010	2006 (2010 forecast)	Buildings; Transportation; Industry & Waste; Greening & Open Space; Policy, Education, & Outreach	Uses ICLEI software; appears to exclude most Scope 3	No post-Kyoto goal; progress on indicators like GHGs reported in "Greenworks Philadelphia" (useful for metrics)
Salt Lake City, UT (Energy & Transportation Sust Plan)	186,440	2005	Reduce 80% by 2050	Reduce 17% by 2020; 2% per year	2011	n/a	2009	Energy Conservation & Renewable Energy; Transportation & Mobility -- itself a strategy within Sustainable Salt Lake Vision	Unsure; includes waste	Interesting because of structure within Sustainable Salt Lake master plan but no progress reports
San Francisco, CA	805,235	1990	?	Reduce 20% by 2012	2004	n/a	2002?	Transportation; Energy Efficiency; Renewable Energy; Solid Waste	Appears to use ICLEI guidance; excludes most Scope 3 but does include intraregional transportation	No post-Kyoto goal, but also has a Sustainability Plan and an Electricity Resource Plan
Santa Barbara, CA	88,410	1990	Reduce 80% by 2050	Reduce 15% by 2020	n/a	n/a	2007	No CAP yet, but does have a "Sustainability Action Plan" for city operations	Uses ICLEI software; includes scope 1 agricultural activities and excludes scope 3 (life-cycle emissions)	CAP is not yet in place; in the process of developing a "climate action strategy"
Tacoma, WA	198,397	1990	Reduce 80% by 2050	Reduce 40% by 2020; 15% by 2012	2008	n/a	2005	City Leading by Example; Moving People and Goods More Efficiently; Enhancing Compact/Livable Neighborhoods; Energy Efficiency in our Buildings, Homes, & Industries; Reuse & Recycle…From Buildings to Food	Appears to use ICLEI software; excludes most Scope 3	Separates out quantifiable & non-quantifiable goals; interesting strategy areas but no recent progress reports
Tucson, AZ	520,116	1990	Reduce 7% by 2020	Reduce 7% by 2012	2011 (rec's)	n/a	2011	Core Phase 1 Strategies; Voluntary Goals for Community Action; Voluntary Improvements to New Construction; Carbon Reducing Land Use & Transportation; City Leadership & Increased Efficiency	Unsure; appears to be an adaptation of the GHG Protocol.	In consultant recommendation stages for plan and inventory; incomplete data

Reviewed but not Classified:	Reason:
Ann Arbor, MI	Has 2015 goal for 8% below 2000 by 2015 + 5% RE, but working on an update in 2012
Boynton Beach, FL	Focused on city operations
Cambridge, MA	2002 plan set goal of 20% below 1990 by 2010 that was not met; no new goals yet
Evanston, IL	No post-Kyoto goal at this time but strategy areas may be worth looking at in the future
Gainesville, FL	Limited detail
Gilroy, CA	Still in development phase; list of strategies but no targets
Homer, AK	Has community inventory with 2006 data, but strategies and actions are for municipal operations only
Keene, NH	Plans are from 2004 and 2007 with no subsequent reports or inventories
Marin County, CA	Goal is 15% below 1990 levels by 2020 for the community and 20% for the city org; no progress reports but ongoing work with the clean energy authority
Menlo Park, CA	Not far enough along in update--2011 assessment report--although does extensively look at cost-benefit analysis
Miami, FL	City org (25% from 2006 levels by 2015) and community (25% by 2020) goals; no progress reports
New Orleans, LA	Has a 2030 goal but no documentation online
Philadelphia, PA	Has not met goal of 10% below 1990 levels by 2010 and post-Kyoto goal is not yet available
Raleigh, NC	Inventory only for city operations
San Diego, CA	Goal is 15% below 1990 by 2010
Sonoma County, CA	Goal is 25% below 1990 levels by 2015; strategy areas are of interest (e.g., Power Up Locally)

Boulder's Peer Cities	Status
Ann Arbor, MI	2015 goal; currently updating
Berkeley, CA	Among "most relevant"
Eugene, OR	Among "most relevant"
Fort Collins, CO	Among "most relevant"
Madison, WI	CAP not yet in place
Provo, UT	Does not appear to have a CAP
Santa Barbara, CA	CAP not yet in place
Santa Cruz, CA	Among "most relevant"
Norman, OK	Does not appear to have a CAP
Tempe, AZ	Sustainable Tempe; no CAP

City of Boulder/Boulder Chamber Commercial Energy Efficiency Strategy Focus Group
Tuesday, April 24, 2012
Boulder Chamber
Meeting Summary

Project Purpose
City Council identified the commercial sector as an important component of Boulder's Climate Action Plan (CAP) efforts. At the Jan. 31, 2012 study session, council members expressed interest in hearing options for incentives and regulatory approaches to address commercial energy efficiency.

1. What is preventing property owners from implementing energy efficiency improvements?
- Cost – it's difficult for property owners to see the cost-benefit and return on investment (ROI)
    - Modeling can be inaccurate; payback isn't always as expected
    - Need monitoring systems for solar PV
- Tenant disruption
    - When tenants are lost and space is being reconfigured, it's a good time to make upgrades
- The process is confusing; it's not clear who to call or what rebates are available
    - It's also resource intensive – takes time & money
- It's difficult to integrate efficiencies into existing complex systems in commercial buildings
    - Creates a risk for operations and is staff intensive
    - Not only capital but operational impacts
- Split incentive – tenants interest for energy efficiency is minimal when cost savings is low for smaller leased properties
    - Most tenants don't own the buildings
    - Property owners need to hear from their tenants that they are willing to:
        - Move into buildings more quickly or pay additional rent if more energy efficient space
        - Or "if you don't upgrade, we will move out"
- Lack of cost-sharing between tenants & owners
    - If tenants were willing to pay more in rent, improvements would be more likely
- W.W. Reynolds – made upgrades due to their personal commitment, economies of scale and contractor relationship
    - Concerned that upgrades don't impact vacancy rates, but hope that the improvements create a competitive advantage (which is hard to quantify)
    - Even with Energy Advisors assistance it still takes attention and staff resources
- Businesses already struggle to stay in Boulder, but many move out solely for cost-based reasons
    - Still a difficult environment – rental rates are not as high as they used to be
    - City should look into what this breaking point is
    - Concern that costs of meeting regulation may transfer to tenants and drive business out of Boulder

    - Concern whether city is approaching this process comprehensively, rather than from just an energy conservation standpoint
- Hopefully it will come back to a competitive advantage
    - Tenants are excited about "greening the building" but owners don't know if it will translate into lower vacancy rates or higher rents
- Potential regulations may penalize those businesses that have already made upgrades
    - City struggles to track those upgrades made outside of EnergySmart or Xcel
        - City should consider how to track & reward upgrades already made
    - Consider what the starting point would be as to not penalize prior investments
- Some benchmarking assumes tenant similarity, but other structures allow for benchmarking against self
- Competitive advantage disappears when the "bar" or expectation is raised and is set higher
- Is there enough of a demand to be in Boulder, in an energy efficiency property?
    - Can upgrades impact vacancy rates?
    - Properties must remain affordable so businesses can still find profit
- Educate tenants to increase the value and importance of utility costs within a tenant's rent, eventually increasing the demand for lower utility bills
    - Can property owners provide more information on utilities to their tenants?
    - The impact of behavior on utility bills is huge; focus on education and behavior change
    - Increase tenant education on total cost of rent
    - Impact of property taxes on total rent
- Determine the role of comfort and usability of buildings
    - Role of energy efficiency and upgrades, and planning for maintenance, among these issues
    - Larger buildings have complex systems and high inefficiencies
    - Lack of monitoring to identify inefficiencies
    - Various tenants uses and energy intensive operations can distort a building's energy use
    - Role of EnergyStar Portfolio Manager
- Make the process easy and provide technical assistance
- Most buildings have a single rooftop unit per rentable space
- For the fewer larger buildings, it costs ~$100K to focus and fix poorly operating HVAC systems – they are probably the most inefficient

2. Would you use incentives to track energy use?
- Yes, as it supports LEED EB (existing building) certification
    - Part of business branding
- It would be very helpful to fully understand efforts and successes of similar ordinances & regulations in other communities before implementing one here
    - Staff addressed this, indicating that research has already been completed
    - NYC implemented a regulation that led to 80 percent compliance in the first deadline
    - A crucial lesson learned included working with utility partners to obtain data & effectively track energy usage

    - What are the lessons learned? Exceptions? Strucutre for three sizes of buildings?
- Is there a way to take into account the uses in the buildings?

Other comments on the options:

- Is an ordinance really the short term target?
    - Can city just increase incentives and "carrots", reporting, and education?
- There would be an uproar if CAP tax rates changed
    - Would penalize early adopters and would decrease willingness to collaborate with city
- Regulation may interrupt natural market and competition
    - Would a benchmarking standard also cause this?
- Voluntary reporting could accomplish a lot
    - Power of information
    - Can also drive competition
    - Would give time to address the technicalities (e.g., what are the standards, what are the comparisons, etc.)
    - Don't mandate reporting though, as "bad actors" won't participate
- SmartRegs hasn't increased the value of existing rental housing stock
- Are there similar efforts occurring in local communities?
    - Ft. Collins? Longmont developing a point system for buildings?

Meeting participants included:

Name	**Affiliation**
Elizabeth Vasatka	City of Boulder
Kara Mertz	City of Boulder
Cassie Milestone	City of Boulder
Kristen Hartel	City of Boulder
Angelique Espinoza	Boulder Chamber
Clif Harald	Boulder Economic Council
Clay Della Cava	LJD Property Management and Development
Aaron Schlagel	The W.W. Reynolds Companies
David Workman	Unico/J. Midyette Properties
Sean Maher	Downtown Boulder Inc.
John Tayer	The Public Affairs Center
Pam Milmoe	Boulder County Public Health, Commercial EnergySmart Administrator
Dan Powers	Western Disposal Inc.
Kyle Callahan	Energeia Consultants LLC
One-On-One Meetings	
Eric Rutherford	Wright Kingdom
Jeff Wingert	The W.W. Reynolds Companies
Aaron Schlagel	The W.W. Reynolds Companies
Lynda Gibbons	Gibbons/White Incorporated
Brett Phillips	Unico/J.Midyette Properties

City of Boulder Large Commercial Property Owner Charrette Outcomes
Thursday, June 9, 2011
Spice of Life
Meeting Outcomes

Meeting Purpose
The City of Boulder's commercial energy efficiency charrette was conducted on June 9th from 7:30 am to 1:30 pm. The charrette, a workshop style engagement process, brought together a broad range of commercial building stakeholders to collaboratively develop creative and practical solutions for large-scale commercial energy efficiency improvements in Boulder's commercial building stock. This multi-disciplinary group was tasked with:

- Identifying additional resources and tools that can assist with short-, mid- and long-term planning for building energy efficiency improvements;
- Identifying key strategic, practical and operational issues; and
- Developing initial project ideas and next steps specifically designed to help larger commercial property owners, managers, and brokers make energy efficiency improvements.

Starting with the examination of common and not so common barriers to commercial energy efficiency, the group then interacted in a series of plenary discussions and breakout group sessions to explore solutions and recommend marketing and implementation strategies for those solutions. As an outcome, the group identified six preliminary solutions to accelerate efficiency improvements for the large commercial stakeholders:

Solution 1 – Optimize EnergySmart for Large Commercial Properties

- Expand the current EnergySmart service offerings to address the specific needs and considerations of Boulder's large commercial property stakeholders.

Solution 2 – "Customer Relationship Management" (CRM) for Buildings

- Identify and/or develop and provide a product, such as a software solution, that enables Building Owners and Managers (BOMs) to integrate many common building/space management functions.

Solution 3 – New Finance Approach

- Develop and provide innovative financing that meets the interests and investment criteria of the key commercial building stakeholder groups (e.g., medium and large BOMs, tenants).

Solution 4 – Energy Efficiency Menu: EZ Energy Resource

- Develop clear and concise energy efficiency information for each commercial building stakeholder group, and for key "windows of opportunity" identified with each group.

Solution 5 – Commercial Real Estate Broker (and Tenant) Education/Engagement Program

- Develop and implement commercial broker education and training, including energy efficiency tools and resources.

Solution 6 – Energy Efficiency Code Variance

- Provide code "flexibility" to energy efficiency projects, (e.g. a Community Benefit Ordinance).

Over the coming months the City of Boulder will continue to engage the commercial sector stakeholders through a series of "working groups" designed to refine the identified solutions and assist in their implementation. Moving forward, the emphasis will be on leveraging the outcome and findings from the charrette to augment existing EnergySmart services and to provide a refined suite of tools and resources created for – and vetted by – Boulder's large commercial stakeholders.

Charrette participants included:

Name	**Affiliation**
David Driskell	City of Boulder
Elizabeth Vasatka	City of Boulder
Liz Hanson	City of Boulder
Vanessa Frambes	City of Boulder
Kelly Crandall	City of Boulder
Clay DellaCava	LJD Development
Cara Carmichael	Rocky Mountain Institute (RMI)
Sam Cohen	Elevations Credit Union
Stephanie Gripne	CU Real Estate Center
Eric Rutherford	Wright Kingdom
Alex Cassidy	The W.W. Reynolds Companies
Aaron Schlagel	The W.W. Reynolds Companies
Angelique Espinoza	Boulder Chamber
Mark Casey	Casey Partners
James Dixon	Tebo Development
Jason Denner	Point380
Dave Payne	Point380
Ty Colman	Point380

ATTACHMENT L

Other Communities 'Commercial Building Energy Efficiency Incentives & Policy Matrix

		Characteristics			Incentives		Voluntary	Regulation			Building Type & Size Threshold			Disclosure	Rating System		Regulatory Measures
	Jurisdiction	Population (2010 census)	Climate Action Plan & Goal	Comm./Ind. Sector Emissions*	City/State/Country	Utility	Benchmark/Energy Rating	Short Name	Enacted	Effective	Gov't	Commercial	Multi-family	Context of Disclosure	Energy Star	Other	Audit/Improvement Requirement
Phase 1: Voluntary Programs	**Chicago**	2,695,598	25% below 1990 levels by 2020; 80% by 2050	23,000+ comm., ind., institutional bldgs.	Efficiency competition, recognition for ratings, grants for EE upgrades	Prescriptive, custom rebates, audits, retro-commissioning	1-3 star rating for MF energy improvements	-	-	-	-	-	-	-	-	-	
	Denver	600,158	25% below 1990 levels by 2020	18.2%	Denver Energy Challenge, free assistance for small business	Prescriptive, custom rebates, audits	Watts to Water: benchmarking, rebates, education, networking	-	-	-	-	-	-	-	-	-	-
	Portland, OR *(under consideration)*	*583,776*	*Reduce 80% of 1990 levels by 2050*	*40%*	*Green Investment Fund, Ecoroof Incentive*	*Prescriptive, custom rebates, energy tracking through Energy Trust of Oregon*	-	*High Performance Green Building Policy*	-	-	-	*20K SF+*	*20K SF+*	*Government*	✓	-	*Mandatory upgrades for bldgs w/ scores <30*
Phase 2: Mandate Energy Rating & Reporting	**Austin**	790,390	20% of 2005 levels by 2020		Municipal Utility	Custom & prescriptive rebates, audits	Energy scorecard & recognition for sustainability efforts	Energy Conservation Audit & Disclosure (ECAD) Ordinance	Nov. 2008	June 2011	✓	10K SF+	Audits	Government, buyers	✓	ACLARA	Audits & mandatory upgrades for multifamily buildings
	China	1.3 billion (2012 estimate)	Reduce carbon intensity per unit of GDP by 2015	71% industrial	Energy subsidies	-	Voluntary ratings for MF buildings	Civil Building Energy Efficiency	2008	2010	New bldgs.	If apply for energy subsidies/green bldg label	If apply for energy subsidies/ green bldg label	Website, government		MOHURD: 1-5 star rating	Top 10,000 energy using enterprises must limit emissions through government contract
	District of Columbia	601,723	20% below 2006 levels by 2012; 30% by 2020; 80% by 2050	51% non-residential	Assessments & financing for retrofits, education, rebates for solar/photovoltaic	Prescriptive, custom rebates, incentives for upgrades	Link to EnergyStar on website	Clean and Affordable Energy Act of 2008	July. 2008	2010 -2014	10K SF+	50K SF+	50K SF+	Website, government	✓	Energy Star Target Finder	-
	European Union	502.5 million (2011)	8% below 1990 level by 2012	12% from fuel oil from households & commercial bldgs	Money for private investment in EE/RE projects	Utilities vary by country	-	Energy Performance of Buildings Directive	2010	2006-2010	✓	New & existing	New & existing	Public bldgs on website, comm./MF bldgs to buyers, lessees	-	Determined by country	-
	Seattle	608,660	Carbon neutrality by 2030	15%**	Municipal Utilities; funding for upgrades through federal Better Buildings program	Prescriptive, custom rebates, audits, subsidized energy service consultants	-	Seattle Building Energy Benchmarking and Reporting	Jan. 2010	2011 - 2013	10k SF+	10K SF+	5+ units	Government, buyers, lessees, lenders, tenants	✓	-	-
Phase 3: Mandate Prescriptive Measures and/or Performance Standards	**Australia**	22,874,686	8% below 1990 levels by 2012; 80 per cent below 2000 levels by 2050	10%	Tax breaks for retrofits, grants to reduce emissions	Renewable energy credits, Green Power Accreditation	-	Building Energy Efficiency Disclosure Act	2010	2010-2011	-	> 2,000 sq. m. for sale or lease	-	Buyers, lessees	-	NABERS Energy star Rating	Tenancy lighting audit & general energy guidance also required
	Berkeley	112,580	80% below 2000 levels by 2050	53% comm.	Rebates, audits, green business certification, technical assistance	Prescriptive, custom, retrofit, & efficiency rebates	Portfolio Manager through Pacific Gas & Electric	Commercial Energy Conservation Ordinance	1994	-	-	When sold, or renovations > $50,000	-	-		-	Audit & buildings must adopt 32 energy saving measures
	California	37,253,956	1990 levels by 2020; 80% below 1990 levels by 2050	25%	Rebates for MF solar upgrades & renewable energy	Prescriptive, custom rebates, energy advisors, incentives for benchmarking	-	**Commercial Building Energy Use Disclosure Program**	Oct. 2007	2012 - 2014	✓	5K SF+	-	Government, buyers, lessees, lenders	✓	-	Mandatory upgrades to be developed
	Massachusetts *(under consideration)*	*6,547,629*	*25% below 1990 levels by 2020*	*60% of electricity consumption*	*Green Loan Program, assistance finding rebates & funding*	*Energy assessment & rebates (MassSave Program); incentives from utility companies*	*Voluntary Energy Star Portfolio Manager*	***Building Energy Asset Labeling Program***	-	-	*10K SF+*	*10K SF+*	*10K SF+*	*TBD*	*TBD*	*Asset & Operational*	*ASHRAE level II audits and modeling*
	New York City	19,378,102	30% reduction by 2030	45% from bldgs affected by ordinance	Regulated energy costs for Lower Manhattan commercial bldgs & cos. moving to specific areas	Prescriptive, custom rebates, audit, subsidies	-	Greener, Greater Buildings Plan	Dec. 2009	2010 - 2013	10K SF+	50K SF+	50K SF+	Website, government	✓	-	ASHRAE level II audits & RCx, public building audits & upgrades
	San Francisco	805,235	20% of 1990 levels by 2012; 80% by 2050	49%	Incentives for upgrades, energy survey	Prescriptive, custom, retrofit, efficiency rebates	-	Existing Commercial Buildings Energy Performance Ord.	Feb. 2011	2011 - 2013	10K SF+	10K SF+	-	Website, government, buyers, lessees, lenders, tenants	✓	-	ASHRAE level I or II audits every 5 years
	Washington State	6,724,540	1990 levels by 2020; 25% below by 2035; 50% below by 2050	61% of electricity consumption	Audit, financing from energy service company; many municipal utilities	Prescriptive, custom rebates & incentives	-	Efficiency First	May 2009	2011 - 2013	10K SF+	10K SF+	-	Buyers, lessees, lenders	✓	-	Audits for public buildings with ratings <50

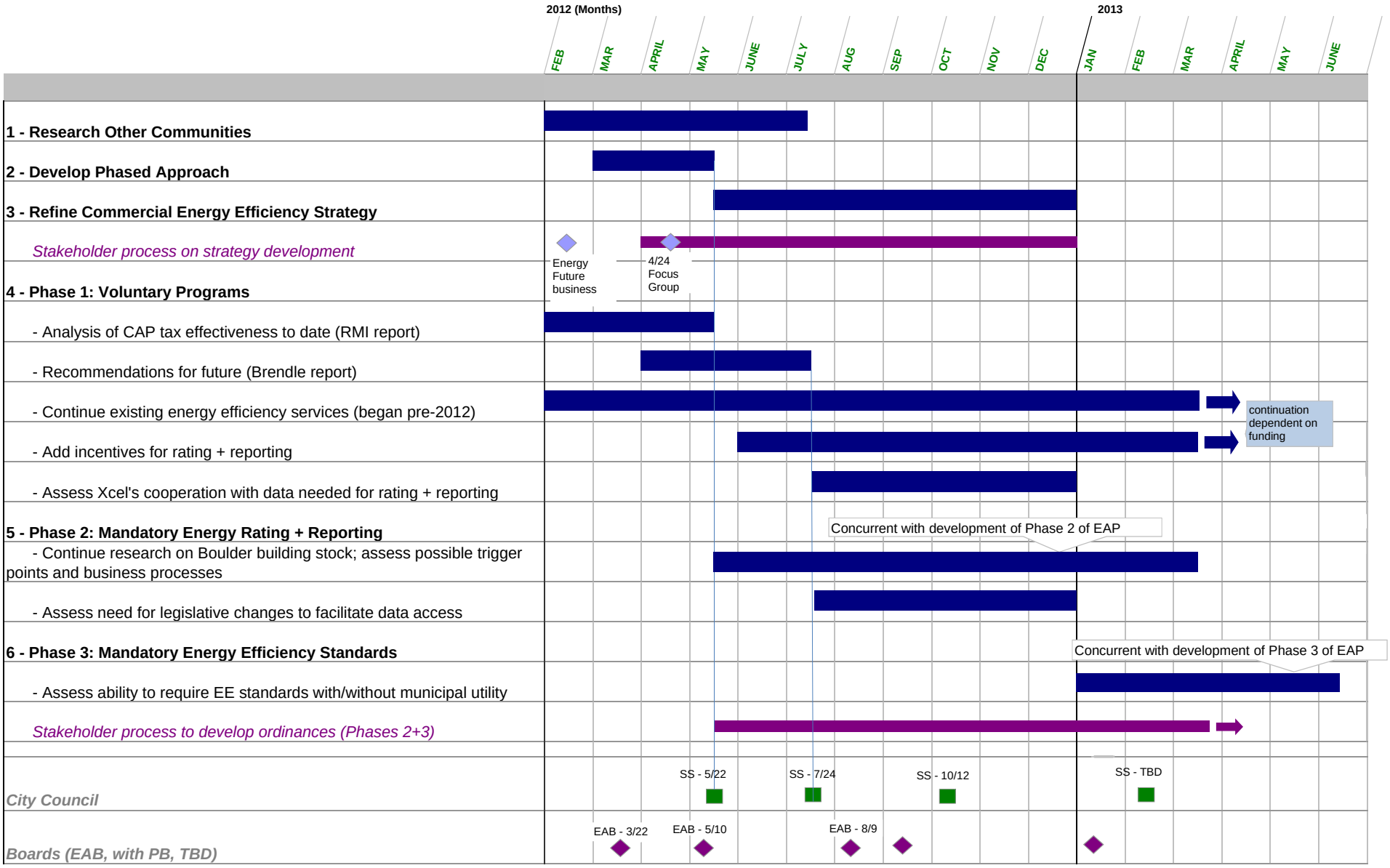
*information varied per cities' metrics

MF: multi-family **EE**: energy efficiency **RE**: renewable energy **MOHURD**: Ministry of Housing & Urban-Rural Development **cos.**: companies **bldgs**: buildings

Original source material provided by IMT

Proposed Commercial Energy Efficiency Strategy

Phases	Evaluation Considerations			
	Cost and Implementation (Informational)	**Creates energy efficiency improvements, reduces energy and GHG emissions**	**Cost-effective**	**Creates better data access, energy management and energy transparency**
Phase 1 – Voluntary Programs; continue to provide incentives that assist businesses & property owners with energy efficiency improvements (e.g. Boulder, Denver, Chicago & Portland).	*Requires funding for programs (2012 - $700K) *Builds on existing programs *Results increase as funding increases since it is voluntary participation *May not realize the full energy efficiency implementation potential	**Pros:** *Continues program successes & continues to build business/customer relationships *Flexible timeline to implement energy efficiency improvements **Cons:** *Does not directly address the split incentive barrier *May take longer to achieve GHG emissions reduction goals	**Pros:** *Continuing existing programs will make them more cost effective over time * Utility rebates are usually not enough to make improvements cost effective, additional city incentives decreases out of pocket expenses for businesses and property owners **Cons:** *Businesses/property owners must have a return on investment	**Pros:** *Continue using the existing database for tracking customers and improvements *Incentives provide a mechanism to authorization receiving a customers' energy use data *Voluntary benchmarking programs are provided by Federal Govt. **Cons:** *Requesting businesses/property owner energy use data through Xcel Energy is resource intensive.
Phase 2 – Mandate Energy Rating (Benchmarking) and Reporting (or Disclosure); requires commercial property owners to rate their whole buildings' energy performance and report to the city and/or public (e.g. Washington D.C., Seattle & Austin).	*In addition to funding for programs, implementation requires funding to develop, enforce, and monitor program. *City buildings will be impacted by requirements *Property owners incur costs to comply *May require state legislative requirements to receive energy use data in a specific format	**Pros:** *Creates a new data set of buildings' performance *Starts to address the split incentive barrier *Creates energy transparency and a market advantage for high performing buildings **Cons:** *Revealing low performing buildings may have unintended consequences	**Pros:** *Using a standardized free on-line benchmarking tool supported by the Federal Govt. (EPA & DOE) will reduce city costs **Cons:** *Property owners incur a cost to comply and the costs may increase tenants' lease rates	**Pros:** *Increases in energy use data will allow for better program design in future *Creates energy transparency & can drive market demand for energy efficient buildings in commercial real estate *Use standardized benchmarking tools allows for more Federal Govt. support **Cons:** *Need Xcels' support to streamline access to whole building energy use data
Phase 3 – Mandate Prescriptive Measures and/or Performance Standards; requires commercial property owners to make specific energy efficiency improvements and/or achieve a performance standard (e.g. Berkeley, New York).	*In addition to funding programs, implementation requires more funding to develop, enforce, and monitor program. *City buildings may be more impacted by requirements *Property owners' cost to comply increases *May require legislative requirements to receive energy use data in a specific format	**Pros:** *Addresses the split incentive barrier **Cons:** *Requiring improvements removes the market advantage for property owners making voluntary improvements	**Pros:** *Creates an even playing field for implementing energy efficiency improvements **Cons:** * Property owners incur an increased cost to comply and the costs may increase tenants' lease rates	**Pros:** *Increases in energy use data will allow for better program design in future *Creates energy transparency * Drives market demand for energy efficient buildings in commercial real estate * Using standardized benchmarking tools allows for more Federal Govt. support **Cons:** *Need Xcels' support to streamline access to whole building energy use data

Commercial Energy Efficiency Strategy

Draft Process Timeline (2012-2013)