Boulder City Council
STUDY SESSION
Study Session is Televised

Tuesday
May 12, 2015

6-6:45 PM
Boulder's Energy Future

6:45-8:15 PM
Commercial and Industrial Energy Efficiency Ordinance

8:15-9 PM
Resilient Boulder

Council Chambers
Municipal Building
1777 Broadway

Submit Comments to City Council
Email: council@bouldercolorado.gov or
Attention: Alisa Lewis, City Clerk
PO Box 791, Boulder, CO 80306
Fax: 303-441-4478

MEMORANDUM

TO: Members of City Council

FROM: Jane S. Bratigam, City Manager
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Maureen Rait, Executive Director of Public Works
Don Ingle, Information Technology Director
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Kendra Tupper, Energy Services Manager
Kara Mertz, Local Environmental Action Manager
Elyse Hottel, Sustainability Data Analyst
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Sarah Huntley, Media Relations/Communications Manager
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DATE: May 12, 2015

SUBJECT: Study Session – Boulder's Energy Future

I. Executive Summary and Background

The Boulder community, in collaboration with the city, has been engaged in significant local climate action activities for over a decade. Last year, Boulder City Council expressed support for evolving the community vision from a Kyoto Protocol goal to a Climate Commitment—moving toward a "fossil fuel free future" that would be measured, at least in part, by an 80 percent reduction in greenhouse gas emissions by 2050 ("80 by 50").[1] With energy being a significant contributor to greenhouse gas emissions, Boulder's Energy Future is a key focus of the Climate Commitment. Council will have a study session in late July on the broader context, framework, and work effort related to the overall Climate Commitment.

As the city moves closer to municipalization, the staff team is identifying opportunities to expand and test new innovative energy services. While currently limited due to legislative and regulatory constraints[2] as well as current work priorities and resource commitments, there are some exciting "utility of the future" opportunities the team is working to explore. In 2015, these include:

[1] As compared to a 2005 baseline, the Kyoto Protocol Goal was 7 percent below 1990 levels of emissions by 2012.
[2] These constraints have been identified across a series of different staff analyses:

1. **Solar Localization Analysis.** Expanding on the city's previous energy localization study by adding a level of granularity in the solar capacity analysis to support targeted outreach by the city and third parties to areas such as affordable housing, expanding the diversity of homes and businesses that have access to rooftop solar.

2. **Blueprint for Energy System Transformation.** As previously described to council, this grant-funded work will bring peer cities to Boulder in July for the first step in developing a shared framework for "energy system transformation," building on Boulder's community visioning sessions for the "utility of the future" last fall. This work has generated strong interest from other cities as well as funders, as it seeks to understand and define how local communities, and local governments, can best advance their interests within a rapidly changing energy environment. It also seeks to create a shared vision of energy transformation in the broadest sense—not just for electricity, but also thermal energy and transportation fuels—as well as the potential interplay between them, and their relationship to other areas of local government control (e.g., land use, building codes). The combined knowledge of the other cities and invited experts will contribute to Boulder's Climate Commitment planning as well as to our work on Boulder's Energy Future.

3. **Nanogrid Pilot.**[3] The city team has submitted a grant application to the Department of Energy to fund a public-private partnership for developing a pilot which combines distributed generation with a nanogrid to enhance reliability and efficiency for key facilities. Boulder Community Hospital, Boulder Housing Partners, and city-owned water treatment facilities are all candidates for this grant study.

4. **"Utility of the Future" District-Scale Pilot.** In early May, the city team was invited by the Carbon Neutral Cities Alliance (CNCA) Innovation Fund to develop a proposal to fund the initial feasibility analysis for developing "utility of the future" demonstration projects. Two other cities are partnering on the proposal—Minneapolis and Seattle—with the intent of conducting analyses to determine the technical, legal, and financial feasibility within a defined district of each city for combining aggressive energy efficiency, distributed generation, high capacity storage, electric vehicles, and other technologies to demonstrate the potential for "energy as a service" business and operational models that achieve stable and competitive rates, deep carbon reductions, and a high level of reliability as well as resilience to unplanned events.

5. **Thermal Decarbonization Strategy Analysis.** The CNCA has also invited Boulder to lead development of a second funding proposal, in collaboration with San Francisco, to analyze the potential strategies for decarbonization of thermal energy (natural gas). This area of emissions

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- Att. D (p.36) to the August 2, 2011 City Council Meeting, "Example strategies under the status quo, a local energy authority, and full municipalization"
- City Council Round Table Discussion: Exploring Alternative Opportunities for Reaching Boulder's Energy Future Goals, December 6, 2012
- Att. E (p.69) to the July 23, 2013 study session memo, "Qualitative Analysis"
- Colorado's Energy Policy & Regulation Relative to Progressive Policy Trends, January 21, 2015

[3] Microgrids are small networks that can "island," or operate separately from, the electric grid. However, the term microgrid may imply multiple customers linked together, which potentially triggers legal or regulatory consequences because of the potential to sell or share electricity. In this project, the term "nanogrid" refers to a behind-the-meter distributed generation and energy storage system that serves a single building or customer.

has not been a key focus to date in Boulder, or in most cities, but needs to be addressed if the goal of "80 by 50" is to be achieved. If successful, the grant funding would be used to develop a framework and methodology for thermal decarbonization analysis at the city scale, using Boulder and San Francisco (and possibly a third international city) as test cases for application of the analysis. Both CNCA proposals are due at the end of May, with final funding approval expected in June.

6. **Local Carbon Offset Fund.** As a first step towards creating a Local Carbon Offset Fund that could provide a "local offsets" option for investing in local clean energy initiatives, the city team is working toward replicating Boulder County's recently launched program that provides an alternative for marijuana growers to contribute to a local carbon offset fund as a means for achieving their green energy requirements. Staff will provide additional details on the proposal in the fall.

All of these efforts are driven by the awareness that achieving deep carbon reductions will require a transformation of our energy systems, ranging from how we use and generate electricity to how we fuel our vehicles and support the businesses that are developing transformational technologies. The city recognizes the need to collaborate with other government organizations, such as the University of Colorado, Boulder County, and federal labs, as well as private companies. This is an exciting time for energy innovation and by working collectively—leveraging the products and services being created in Boulder's entrepreneurial community—we can move toward achieving our climate and energy goals. This will require new business models, new forms of partnership, and new governance models that help define a shared vision and serve to guide collaborative decision-making and action in service of community values and priorities.

In study sessions on April 29, 2014, November 12, 2014, and January 27, 2015, staff presented aspects of an integrated energy work plan that allocates finite staff resources to advance the community's energy and climate goals on several fronts. As the city's integrated energy team continues its work in 2015 and into 2016, significant resources will continue to be devoted to the exploration of municipalization and the creation of a local energy utility and/or new partnership with Xcel Energy that can provide the necessary platform for transformation of Boulder's energy system. Resources will also continue to be devoted to the delivery of EnergySmart services, SmartRegs compliance, and development of a Commercial and Industrial Energy Efficiency Strategy, which are central to improving the energy efficiency of Boulder's existing buildings, and a necessary foundation for any long-term energy strategy.

In addition to these existing efforts and the new initiatives outlined above, staff is presenting a "top 10 list" of state legislative and regulatory changes, as requested by council, that might achieve the community's Energy Future Goals without municipalization. Some of these have been introduced in the form of legislation; however, as of today, no new legal or regulatory policies have been passed which could enable Boulder to achieve greater control over power and service decisions, and position it to achieve its energy and climate goals, absent municipalization.

While the city remains open to continued dialogue with Xcel to create a new partnership, efforts in that area have so far been unsuccessful. In February, City Council gave direction to the city's legal team to file a transfer of assets application with the Colorado Public Utilities Commission (PUC). Preparation of this important set of materials is ongoing, as are key portions of a plan that is designed to ensure a smooth transition if the city begins providing power to homes and businesses in the next couple of years. The

memo also includes an update to the city's transition plan for the operation of a local electric utility. The updated schedule prioritizes the city's application for a transfer of assets to the Colorado Public Utilities Commission and sets a "Day One" date for ownership of the system as late 2017. While the legal process moves forward, the city is in the process of taking steps related to identifying its needs related to power supply, operations and maintenance, and information technology.

II. Questions for Council

Staff has three questions for council:

1. Does council have any questions on the current and proposed 2015 energy work program priorities? Are there any concerns with the proposed approach to advance new initiatives through grant opportunities, in light of current resource commitments, with potential additional resource requirements being considered through the 2016 budget process?

2. Does council have any feedback on the "top 10" list of state legislative and regulatory changes?

3. Does council have questions or feedback regarding next steps in the municipal utility transition plan, specifically as they relate to securing a power supply and providing operations and maintenance services?

III. 2015 Energy Initiatives

A. Targeted Work Plan Expansion in 2015

For 2015, in addition to the existing programs provided later in this memo, staff is adding a limited number of projects that are reasonably certain to deliver near-term benefits to the community; can be developed in a way that require fewer city resources and staff impacts (e.g., public-private partnerships); leverage grant funding to support the necessary analysis to undertake local demonstration projects; and support the community's Energy Future Goals. These work efforts are summarized below and build on ideas suggested by community volunteers.

1. Solar Capacity Analysis Phase 2 – Online Map

As part of the city's goal of increasing local generation, a solar capacity analysis is underway. This analysis is an extension of the Localization Study completed in 2011. The study is intended to provide an in-depth analysis of the potential to install local (distributed) solar in Boulder. This analysis has three main phases:

- **Phase 1**: Assess "suitable" rooftop area using city building footprint data and LiDAR[4] data. In partnership with the National Renewable Energy Laboratory (NREL), this component will provide the city with the total suitable area for rooftop solar based on NREL-tested assumptions for shade, sunlight, and slope.

[4] LiDAR generates three-dimensional data about the earth's surface and so can be used to determine viable rooftop for solar capacity based on roof angle and shading.

- **Phase 2**: Using city building footprint and LiDAR data as inputs, create an online mapping tool for the community which shows solar suitability by address as well as some basic financial information for installing solar (**Fig. 1**). This phase could support an expansion of rooftop solar to a more diverse and frequently underserved population by providing information that allows for targeted outreach and funding by the city.

- **Phase 3**: Analyze the data further to identify either technical or financial constraints not shown in the first part of this study. The results of this analysis will allow the city to set specific targets for solar installations as well as inform policies and incentives to support more solar in Boulder. Eventually this work can integrate with a resource planning process.

Phase 1 has been completed by staff. Staff is seeking to fund Phase 2 out of the Solar Grants "renewable energy fund," as this fund has not been fully allocated in recent years and the mapping tool would allow for direct outreach to affordable housing units that could take advantage of the grant program. The cost to complete Phase 2 is approximately $28,000, with a target date of implementation by the July Climate Commitment study session. Phase 3 is not currently funded but may be considered and prioritized as part of the 2016 budget process.

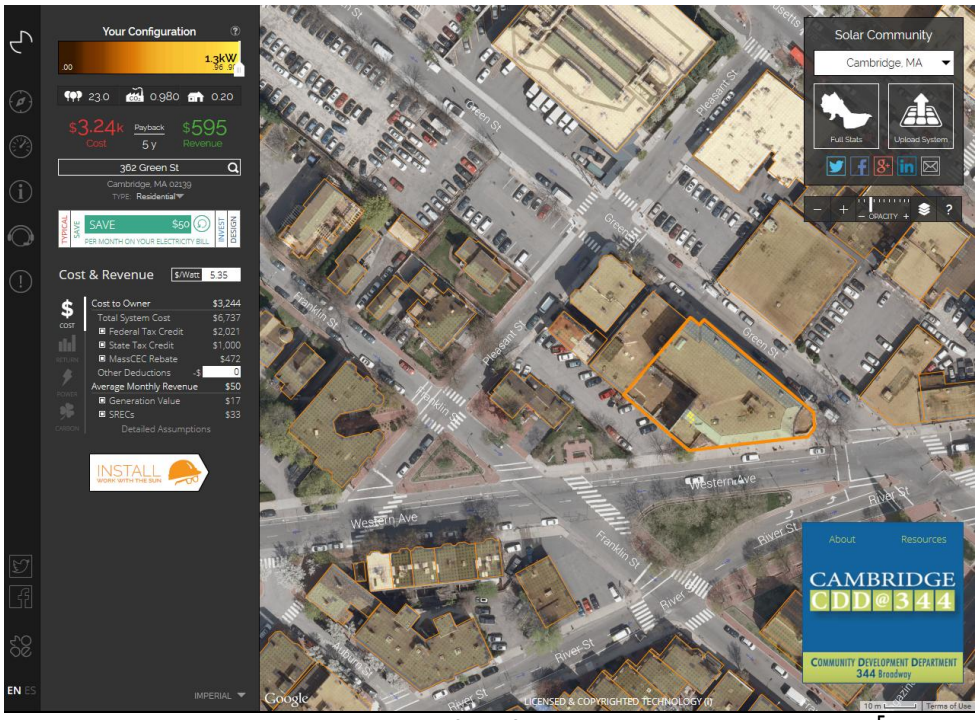


Fig. 1: Sample Mapdwell Interface for Cambridge, Massachusetts[5]

[5] http://www.mapdwell.com/en/cambridge

2. Grant-Funded Energy Future Analyses

Staff has submitted four grant proposals that relate to further developing Boulder's "fossil fuel free future." Each is briefly described below.

a. Energy System Transformation Blueprint. Based in part on feedback from community members and stakeholders who participated in the November 2014 utility of the future visioning workshop, the city applied for, and received, a grant through the Urban Sustainability Directors Network (USDN) to host a "breakthrough convening" with the cities of Boston, Minneapolis, Portland, and San Francisco. The objective of the convening is to develop a shared vision and analytical framework for designing and implementing a full "energy system transformation." The grant work is specifically focused on the roles and opportunities uniquely available to local governments in facilitating policies, investments, programs, and partnerships that can fundamentally transform their community's energy system in a manner consistent with other community values and priorities.

This gathering, scheduled for July 22 and 23 in Boulder, will bring together technical experts and key staff from these leading-edge cities to identify what factors communities should consider to implement fundamental transformation of their energy systems. While much of the convening will be limited to key staff, peers, and invited experts—per the requirements of the grant—there will also be a public panel and discussion. This public portion will act as a bridge for linking the utility of future visioning work and the USDN convening. The evening events will take place at eTown Hall.

b. Department of Energy (DOE) Resilient Energy Delivery Infrastructure Grant for Developing Nanogrid Pilots. A core strategy for enhancing community energy resilience is the development of "islandable" energy infrastructure around critical community services. The floods in 2013 demonstrated how vulnerable some of the city's critical infrastructure is to energy disruption. DOE has recognized the importance of this type of infrastructure development and has issued a call for proposals under a program called Resilient Energy Delivery Infrastructure (REDI), which will fund projects that integrate renewable energy and microgrids in settings that improve energy resilience, particularly in high vulnerability/critical service settings.

The grant application is an example of a partnership where the city will be submitting a grant proposal and facilitating connections between public and private parties to develop and implement it. The city is currently finalizing potential projects with the 63rd Street Reservoir, and exploring additional installations with Boulder Community Hospital and Boulder Housing Partners. All projects would establish micro- or nanogrids to increase energy resilience and reduce operational costs. The Colorado Clean Energy Cluster has agreed to administer the grant, and private sector partners—Schneider Electric, Exponential Energy, and PosEn Energy—have agreed to provide all technical assistance and implementation support. PosEn has also pledged to provide all of the matching funding required. The grant was submitted on May 4, 2015. Initial notifications of award are expected by July.

c. Carbon Neutral Cities Alliance (CNCA) Innovation Fund. Staff submitted three letters of intent (LOIs) seeking a total of $275,000 in grant funding in partnership with other leading cities, through its membership in the CNCA—a global group of 20 cities committed to deep carbon reductions. The projects applied for include:

- A "utility of the future" demonstration project that would combine aggressive energy efficiency measures, distributed renewable energy, storage, microgrid technologies, smart energy management, and electric vehicles in a specified district, either "behind the meter" [6] or in collaboration with the electric utility and other partners;
- An analysis to determine whether it is possible to develop community solar gardens "behind the meter" on city assets; and
- Development of strategies to convert natural gas and fuel oil to decarbonized sources, such as solar thermal and biofuels.

The city was notified in late April that out of over 20 LOIs submitted, seven were being invited to develop full proposals, two of which were LOIs led by Boulder: the "utility of the future" district-scale pilot (approved for $125,000, in collaboration with Minneapolis and Seattle) and the thermal decarbonization strategies analysis ($75,000, in collaboration with San Francisco). During the week of May 11, Boulder team representatives will be participating in the CNCA annual meeting where the proposal ideas will be further developed, and potential other city partners—as well as other potential funding—identified. Final proposals are due at the end of May, with final funding approval expected in June. Copies of the LOIs for the two ideas invited to develop full proposals are provided in **Attachment A**.

3. Local Carbon Offset Fund

Currently, the city allows marijuana dispensaries and grow facilities (about 70 in total) to offset their electricity use through on-site renewables, by a verified subscription in a community solar garden, or by purchasing renewable energy credits (RECs) through programs like Xcel Energy's Windsource. All but one facility located within the city is using the Windsource option.

Recently, Boulder County created a program that replaces the Windsource option with a Boulder County carbon offset fund to provide a local revenue source for energy and sustainability projects. When the city's marijuana licensing staff returns to council in the third quarter of 2015, they will propose the idea of revising the city's ordinance language to replace the current REC option with a similar local offset fund. Initially, those funds could be used to assist with efficiency and renewable energy projects at the grow facilities, but over time, staff proposes that this expand to be a community-wide offset side that others can contribute to, and benefit from. To make this a reality, a fixed-term employee or funds for external consultants would be needed. This will be considered and prioritized as part of the 2016 budget process.

[6] "Behind the meter" projects are being considered because of statutory and regulatory limitations on the amount of electricity that can be generated on-site, and due to limitations on the sale of electricity.

IV. The Future of Energy Services

There are many programs, policies, and initiatives related to energy that could be examined, and possibly implemented, between the current day and the commencement of operation of a local electric utility. Two working groups of community volunteers with deep expertise in providing energy services and conducting energy resource planning have met to develop an extensive list of ideas for future efforts that could be undertaken in Boulder.

The objective of their meetings has been to develop a list of ideas to supplement those developed by staff that would allow the city to demonstrate its ability to deliver high-value energy-related initiatives that align with the community's energy goals, build on existing efforts, and show tangible and meaningful benefits to the community. These initiatives are focused on the short-term; while they will help advance community energy goals, their impact may be limited compared to what can be accomplished with a local electric utility—and should they prove successful, they could be further developed if a utility is formed. The working groups identified relevant initiatives based on whether they would reduce greenhouse gas emissions, promote economic vitality, be visible in the community, serve an important learning objective, promote social and environmental justice, and build energy resilience.

Attachment B describes the full list of ideas the working groups put forward in more detail, but the list includes the concepts in **Table 1**:

Idea Area	Initiative
Regulation & Local Revenue Streams	Adding new requirements to new construction energy codes
	Database of city building stock
	Local Renewable Energy Fund
Financing	Loan pool for PACE projects
	Media campaign for commercial PACE
	Finance Concierge Services
	On-bill financing through water bill
	Payroll deduction for energy efficiency
	Solar Bond/Solar Bank
	Load reduction business model
Local Generation Projects	Demand response from water storage systems
	City "behind the meter" solar garden
	Solar-plus-storage demonstration project
	Community geothermal loops
	Combined heat and power plant
	Zero Energy District
Energy Efficiency and Low-Income Services	Realtor Network
	Education and incentives for behavior change
	Deep community retrofits
	Partnership with Google for solar and efficiency
	Case Management Services for Low-Income Residents

Table 1: List of Energy Services Initiatives Suggested by Community Volunteers

The top ideas that came forward from the most recent working group meeting are:

- Solar Gardens, with or without Xcel: creates more opportunities for solar in the city with the solar garden business model and innovative financing structures to reduce up-front costs. As noted above, this idea is part of the grant proposals that will be submitted by staff.

- Solar plus storage: expands the scope of a current Boulder Energy Challenge project to integrate battery storage into solar installations along with smart inverters, smart appliances, plug-in electric vehicle (PEV) chargers, and energy management systems.

- Local renewable energy fund: provides a revenue stream for local projects that reduce greenhouse gas emissions. As noted above, staff is investigating this idea in the form of a local carbon offset fund.

- Public-private financing program: ideas are in this category—including on-bill financing, loan pools for smaller projects, and payroll deductions for energy efficiency—would create innovative financing models to reduce the barrier of capital costs to energy projects.

Staff will continue to refine this list with the working groups this spring, building on initiatives already underway or in development, and then refine implementation plans and resources needs for the top ideas to include in the 2016 budget process.

A. Current Energy Programs

Table 2 summarizes the city's 2015 energy-related work efforts, organized by the three areas of action necessary to support fundamental system transformation.[7] Many of these programs have performed well above expectations. In particular, the city's SmartRegs program recently surpassed a "stretch goal" by reaching 3,000 compliant rental units in a one-year contract period between February 2014 and March 2015. Please refer to the commercial and industrial ordinance memo council received in conjunction with this study session for a progress update on EnergySmart and SmartRegs.

[7] Additional information about these focus areas will be presented in greater detail when staff gives an update on Climate Commitment strategies at a study session in July.

Action Area	Programs, Policies, and Initiatives
REPLACEMENT Clean Energy Source Change	• Municipalization Exploration Project • Energy System Transformation Blueprint • Solar Grants Program • Solar Rebates Program • City Hydroelectric Programs

REDUCTION
Enhanced Energy Efficiency
	• Municipalization Exploration Project
	
	<u>Better Buildings</u>
	• EnergySmart (Commercial and Residential)
	• SmartRegs
	• Community Power Partnership
	• Partners for a Clean Environment
	• Boulder Energy Challenge
	• University of Colorado Green Teams
	• Commercial & Industrial Energy Ordinance
	• Energy Code Updates (Commercial and Residential)
	• People, Power, Planet (City-Owned Facilities Efficiency)
	
	<u>Clean Mobility</u>
	• Transportation Master Plan Implementation
	  ○ Alternative Mode Development—Bike, Walk
	  ○ Transit Development
	  ○ Travel Demand Management
	• Electric Vehicle Adoption Support
	  ○ Workplace Charging Challenge
	  ○ Employee Electric Vehicle Commute Pilot

REFORM Partnerships and Policy Reform	• Municipalization Exploration Project • Non-Municipalization Public Utilities Commission Filings • Community Carbon Inventory & Reporting • Legislative Testimony • Colorado Climate Network • Colorado Clean Energy Cluster (CCEC) • Urban Sustainability Directors Network (USDN) • Joint City-County Policy Agenda Development • Information Technology Collaborations (Open Data, Broadband) • Various Intergovernmental/Regional Task Forces/Working Groups[8]

Table 2: Existing Energy Programs, Policies, and Initiatives

[8] Staff provided an update on regional, national, and international collaborations in Att. A of the Nov. 18, 2014 Boulder's Energy Future Budget Update.

V. 2016 Innovations and Budget

Staff has continued to evaluate the strategic importance and success of current and potential new energy programs, prioritizing staffing and resources to ensure the success of those efforts that are already underway. Importantly, at this time and under current staffing and funding constraints, it is not possible to be as opportunistic as the city would like regarding energy innovation. Some of the initiatives which are expected to be the most impactful in terms of greenhouse gas reductions (such as updating residential and commercial green building codes, and implementing the new Commercial and Industrial Energy Efficiency Strategy) will require additional resources or the repurposing of existing resources, with resulting impacts to other work efforts.

During the 2016 budget process, and subject to council's approval of energy ordinances, council may receive requests for FTEs related to energy codes and the implementation of the Commercial and Industrial Energy Efficiency Strategy. One or more FTEs may also be sought contingent on competitive grant awards and related analysis results. This would provide the ability to undertake further pilots and initiatives in 2016 and 2017 as strategic priorities are further defined.

VI. Partnerships & Policy Reform

At the January 27, 2015, study session, City Council asked that staff identify a "Top 10" list of legislative and regulatory changes that would help meet the community's energy and climate goals. On April 7, 2015, the 2015 Legislative Agenda (Item 6A) presented an extensive list of proposals that the city would support. **Attachment C** provides a list of priority proposals that could be supported or pursued through legislative or regulatory action. This ranked list is admittedly subjective and represents staff's reasonable estimation as to high-impact areas that could be pursued.

To create the ranking, staff began with the full list of energy and climate proposals from council's 2015 Legislative Agenda. Similar proposals were combined and the list was limited to specific policy "asks." The list was also limited to state actions, as opposed to federal ones (such as renewing the federal Production Tax Credit for wind generation). The proposals were then reviewed to determine whether they met the city's energy localization framework,[9] which has three goal areas: democratize energy decision making, decentralize energy generation and management, and decarbonize the energy supply. They were further categorized by whether they had a high, medium, or low impact on those goals, and whether they could be accomplished in the near term, as opposed to over a longer period.

Ten proposals have been put forward as a starting point for encouraging state-level legislative and regulatory innovation. Ultimately, their objective is to enable actions that the city and community cannot do today, in order to significantly reduce carbon emissions, without forming a local electric utility.

The "top 10" list mentioned describes the types of initiatives that could be supported or pursued through legislative or regulatory action. However, the ability for local jurisdictions to significantly reduce their greenhouse gas emissions and prepare for the associated impacts through policy reform is essential. To parallel our local efforts, city staff, in partnership with Boulder County and the Colorado Climate Network, are in the process of creating an organization, tentatively called the Colorado Climate Future Coalition (Coalition). The coalition would lead efforts to advocate for policy and regulatory

[9] For more information: https://bouldercolorado.gov/energy-future/energy-future-goals-and-objectives.

changes that promote and support local decision making in pursuit of a low carbon energy future including those that would simultaneously promote community resilience, economic vitality, and job creation.

The Rocky Mountain Climate Organization (RMCO) has agreed to administer the Coalition for its members. RMCO, a 501(c)(3) organization, has a rich history of working with Colorado communities to develop climate-related strategies at the local level. One of the strengths of RMCO is the broad cross-section of organizations in the existing network, united to bring about climate understanding and action. RMCO will convene, organize and conduct meetings with the Coalition partners with the overarching goal of creating and advocating for the implementation of a statewide vision for climate policy. RMCO is in the process of reaching out to local governments and other organizations that might wish to participate. Staff will update Council as this exciting new coalition develops.

VII. Municipalization Exploration Project Update

Since 2011, when Boulder voters approved proceeding with municipalization, staff has accomplished several significant milestones related to the utility's creation and operation. In 2013, staff completed an extensive feasibility analysis that demonstrated that a locally owned utility could be formed while meeting the requirements that Boulder voters placed in the City Charter related to rates, reliability, and renewable energy. The analysis was reviewed by an independent third-party evaluator that affirmed its methodology and findings. In August 2013, council voted to move forward with forming a local electric utility, and authorized staff to proceed with condemnation of Xcel's electric assets. In 2014, staff and consultants developed an extensive transition work plan that laid out the significant steps that must be taken in order to operate the utility effectively once the city owns the infrastructure.

For the last year, staff has been carrying out initial tasks from that transition work plan. In recent months, several significant steps have been taken to seek out qualified service providers related to power supply, operations and maintenance, and information technology, as well as to engage a series of community working groups to inform aspects of the transition process. The next several months will prioritize an upcoming filing at the Colorado Public Utilities Commission (PUC), which will institute a sequential process of regulatory filings followed by the condemnation process. This section provides updates on the overall transition work plan and these key work areas.

A. Transition Plan Update

The original transition work plan (Plan) was developed in 2014 in anticipation of moving forward with acquiring portions of the electric system owned by Xcel through a condemnation petition in Boulder District Court. The Plan serves as a working tool for the city that will continue to be updated on a regular basis as regulatory and legal issues are addressed, tasks are refined, and work is completed. It is designed to manage the risks of acquisition while prioritizing the fundamentals of an electric utility: safety and reliability.

The Plan has been updated based on the city's intent to file an application with the PUC to resolve issues related to the transfer of assets from Xcel to the city, consistent with recent Boulder District Court rulings. The task list of the updated Plan has not changed significantly. However, the timing of these tasks has changed based on the current understanding of and approach to regulatory and legal processes. In the original transition schedule, the regulatory filings and condemnation proceedings were

assumed to occur on a parallel path (or simultaneously or on an overlapping timeline); since the courts have determined these filings will be sequential, the timeline had to be modified. The updated schedule overview is presented as **Attachment D**. Based on current budget estimates, existing appropriated funds should be sufficient to support the work plan through 2016.

It is currently anticipated that the PUC application process can reasonably be completed by the second quarter of 2016. The next step in the regulatory/legal process will be to re-file a condemnation petition in Boulder District Court. This is anticipated to occur later in 2016 and to conclude in late 2017.

As a result, the timing of two critical dates, upon which many tasks are predicated, has changed as follows:

- Day One – the date on which the city takes ownership of the electric system and begins customer billing (approximately fourth quarter 2017); and
- Day Two – completion of interconnection construction (approximately fourth quarter 2019).

In the near-term, significant effort will be expended supporting the PUC process. At the same time, staff will continue to implement critical Plan activities, including integrating and leveraging existing city resources and procuring necessary external resources.

B. Power Supply Update

Access to increasingly clean sources of energy has continued to be the underpinning of the municipalization effort. It is critical that the desire to achieve much higher percentages of clean energy resources in Boulder's energy portfolio be balanced with issues such as risk and cost, reliability, and a seamless transition from Xcel. With those objectives in mind, the city has identified a preferred strategy to buy all or part of the community's power from Xcel for some period of time.

The city would gradually depart from Xcel's system on a schedule that coincides with Xcel's need for new generation resources. This departure timeline may be as short as five years. This approach not only provides a seamless transition to the municipal utility, but also allows Boulder to focus its efforts on coming up to speed on running the utility, developing customer energy services and local generation options, and beginning the process of resource planning, to take place in years 3 and 4. During this timeline, Boulder could begin to transition to alternate power suppliers in whole or in part.

To facilitate this arrangement, the city delivered a request for proposals (RFP) to Xcel on April 16, 2015, requesting a proposal that meets the city's core objectives of clean energy, the ability to self-generate some portion of our energy needs, and a gradual departure from Xcel's system at a pace that protects all customers. Should Xcel choose not to respond to the RFP, Boulder will release an RFP for wholesale energy with the intention of identifying PPAs from one or more power providers. A PPA is a legal contract between an electricity generator (provider) and a power purchaser (buyer, typically a utility or large power buyer/trader). Contractual terms may last anywhere between five and 20 years, during which time the city buys electricity from the electricity generator.

Staff will update City Council on any response from Xcel Energy and next steps on power procurement.

C. Operations & Maintenance Update

Reliable operations depend on comprehensive knowledge of electric systems and applicable safety and environmental codes and practices. Rather than build these skill sets internally to be prepared for the beginning of utility operation, the city plans to outsource several functions initially, including:

1. Start-up services;
2. Ongoing construction, operation and maintenance;
3. Implementation of energy and conservation services; and
4. Certain distribution and transmission services.

Depending on the long-term cost effectiveness of this approach, the city may decide later to hire internal staff to implement some or all the required functions. This outsourcing approach has been successfully implemented by large investor-owned utilities, electric cooperatives, and electric municipal utilities. For this reason, the city solicited statements of qualifications (SOQs) from experienced vendors in April. The city received qualification statements for all of the functions listed above that are planned to be outsourced. The SOQs are the first step in a two-step process. The city intends to shortlist qualified firms that will be asked to submit more detailed proposals and negotiate contracts for the various services.

The city will review the information and qualifications based on the capability of vendors to deliver reliable, high quality and customer-focused services that will contribute to a flexible plan for service that supports and allows for the growth of distributed generation and innovative customer programs. Information concerning the capability, availability and interest of vendors in providing the ongoing services will be used to help determine next steps in transitioning to a new electric utility. Cost information will be used to help calculate the cost of service for setting rates and tariffs.

D. IT Systems Analysis

In October 2014, the city released an RFP for Information Technology (IT) consulting services related to the formation of an electric utility. The scope of the RFP was to seek consulting services related to assessing existing city IT systems (e.g., water utility billing and GIS systems); conducting a gap analysis to identify IT systems not currently in place that the city will need to operate the utility on Day 1 (e.g., automated meter reading); and recommending a procurement and implementation roadmap to ensure that appropriate software, infrastructure, and staffing would be in place.

Schneider Electric was selected to provide these services. Kickoff meetings were held in April, with preliminary work products expected in June and final reports in August.

VIII. Energy Future Working Groups Update

Four Energy Future working groups are actively meeting, meaning that approximately 55 volunteers with diverse expertise are participating in the development of a local electric utility. These groups are the Energy Services Working Group, the Resource Acquisition Working Group, the Rates Working Group, and the Reliability & Safety Working Group. While the timeline has been reworked to focus on the PUC filing, staff anticipates that there will be an additional two working groups in the future related to governance and customer experience.

A. Rates Working Group

The **Rates Working Group** met in March, April and May of 2015. The members' bios are located here. This group has three key objectives:

1. Recommend a series of retail electric rates that can be applied by a city electric utility on "Day One;"
2. Collaborate with the working groups on energy services and resource acquisition to develop relevant rates and tariffs associated with energy services (e.g., distributed solar); and
3. Recommend a path to evaluate and redesign the city utility's retail electric rates to more closely align with community goals, including the development of a "utility of the future."

The group has been starting from the assumption that electric rates, at the time the utility begins to provide retail electric service, may look very similar to Xcel's current electric rates, due to a lack of data specific to the Boulder community. Meeting agendas and summaries will be posted on the working group website linked above. Staff will be conducting additional outreach to other segments of the Boulder community as part of a wider discussion on electric rates, which will likely not be considered by council until 2016 or 2017.

B. Reliability & Safety Working Group

The **Reliability & Safety Working Group** met in March and April. The members' bios are located here. This working group is continuing the work of the first Reliability Working Group in 2012 and 2013. The input received from this working group will be used to guide the transition plan and formation of the local electric utility. Key questions and issues that are being discussed and considered include:

- What are the reliability expectations and desires of residential, business and institutional customers? Should special reliability zones be considered for customers with high reliability needs?
- What are best practices for ongoing administration, operation, maintenance, monitoring, control, dispatch, project management, customer service and response procedures to assure reliable and safe electrical service?
- How should distributed generation, demand management, growth and redevelopment be accommodated and managed to assure reliability and safety?
- What quality of service benchmarks should be considered?
- How should existing city policies and procedures be adapted or supplemented to achieve industry best practices?
- What procedures and investments should the city consider to increase the level of reliability and safety?

C. Energy Services Working Group

The **Energy Services Working Group** has been meeting since December 2014 on a monthly basis. The members' bios are located here. The initial scope of the working group focused on developing a plan for energy services to deliver with the start of a municipal utility. Because of the timing associated with the municipalization work plan, this group has shifted its focus to the short-term energy initiatives the city

can deliver in the next two to three years. Staff plans to provide a summary of the group's recommendations later in 2015 and potentially begin implementing the top recommendations in 2016.

D. Resource Acquisition Working Group

The **Resource Acquisition Working Group** has also been meeting since December 2014 on a monthly basis. The members' bios will be located here. The initial scope of the working group focused on assisting staff in evaluating and recommending potential energy options for a local electric utility, including wholesale energy supply and the role of local generation and demand-side management. Because of the timing associated with the municipalization work plan, this group has shifted its focus to the short-term energy initiatives, in conjunction with the Energy Services Working Group, that the city can deliver in the next two to three years. Staff plans to provide a summary of the group's recommendations later in 2015 and potentially begin implementing the top recommendations in 2016.

IX. Next Steps and Conclusions

Next steps include:

1. Come back during the 2016 budget cycle with recommendations to support proposed programs and services.
2. Continue implementing the municipalization transition plan and report back on progress related to the power supply RFP.
3. Continue to utilize the Energy Future working groups as needed to provide recommendations related to the municipalization transition process and to the evaluation of short-term energy services.
4. Provide an update on grant funding and related efforts as part of the Climate Commitment July study session.

X. Attachments

A. Letters of Intent submitted to the Carbon Neutral Cities Alliance Innovation Fund
B. Notes from Joint Working Group Session
C. Legislative and Regulatory "Top 10" List
D. Transition Work Plan Schedule Overview

Carbon Neutral Cities Alliance LOI

I. Title of the project – City-sponsored "Utility of the Future" District Scale Pilots

II. City lead and primary contact information (name, title, department, city, email and telephone)

David Driskell, Executive Director, Community Planning and Sustainability
City of Boulder, 1777 Broadway, Boulder, CO 80306 USA
driskelld@bouldercolorado.gov, 303-441-3425

III. Other CNCA cities and/or "next wave" cities participating in the project (if already identified); and other partners (NGOs, consultants, etc.), if relevant, on the project

Minneapolis, Seattle

IV. Summary of the project

This project would conduct technical, legal and financial analysis to identify and advance opportunities for district-scale implementation of "utility of the future" pilots in the three participating cities. The proposed analyses would focus on actual pilot projects to be implemented in each city that would combine aggressive building efficiency initiatives with development of distributed renewable energy generation/storage, micro-grid and smart grid technologies for energy management, and vehicle electrification to demonstrate the potential for deep carbon reduction in conjunction with a high level of customer input and control, and community economic benefits. Each participating city has identified a candidate district for project development. Each city would develop an approach adapted to the particular social, legal and political context in which they are operating.

V. Grant amount requested (in USD) – an estimate with as much budget detail as possible; identify any additional sources of funding

$150,000. Participants are willing to search for additional funding if CNCA funds cannot support the full resource needs of the project.

VI. Problem statement (why this project is needed), objectives of the project, what success will look like, and how success will be measured

As cities are developing strategies to achieve deep emissions reduction, it is becoming increasingly clear that existing regional utility plans and business models are not designed to support this goal. Local district and distributed energy sources appear to have a high potential to achieve these goals and cities are eager for pilot projects that show how multiple clean energy sources can be integrated to serve both buildings and transportation. This project helps three cities take the first steps to developing implementation plans for district scale energy systems and also contributes to our understanding of the challenges, opportunities, and policy and planning needs that cities must consider implementing such systems

This project will build on the substantial foundation created through the USDN Microgrids project sponsored by Boston including specific analysis conducted onbenefits, site selection, equipment considerations, load balancing, business and financing models, and legal and regulatory issues (utility franchises, rights of way, standby tariffs, etc

This proposed LOI will take that work to the next level and provide resources for the participating cities to do the preliminary due diligence work in identifying specific pilot project opportunities in their cities, linking

microgrid development with existing or potential programs/projects to integrate deep efficiency retrofits, EV infrastructure and/or distributed generation/storage.

VII. Bullet point list of top 1-3 "products" or deliverables that will come from the project

1. Implementation plans for three energy system demonstration projects, including the following:
   - Identification of potential project sites and specific project components.
   - Identification of potential development partners.
   - Analysis approaches that enable the matching of clean energy generation and storage capacities with demand side resource needs.
   - Initial project design feasibility:
     - Regulatory framework, barriers and implementation alternatives
     - Potential customers and electric, thermal and cooling loads
     - Technology and program options
     - High level financial and revenue requirements
     - Ownership and governance alternatives
   - Next steps in business plan development
2. A report of lessons learned about the legal framework, challenges and opportunities of applying multiple clean energy systems to a community that will help participating cities frame larger scale policy agendas and planning efforts around microgrids in the following years. Lessons learned from these pilots will also be used to update the microgrids whitepaper developed in the Boston USDN funded project.

VIII. How the project is "transformational."

Increased local energy generation, aggressive energy efficiency and more intelligent energy management are key components of every city strategy for energy systems transformation. This project will create a set of real world examples of this approach that will both inform the next generation strategic framework developed by the Boston microgrids project, and give other cities real-world roadmaps for implementing similar projects in their own communities. An important innovation explored in this initiative is the active integration of multiple systems and sectors—deep energy efficiency design, on-site renewable energy generation, microgrid integration and transportation/mobility integration.

IX. Expected project impacts, and how the applicant will use, apply and/or scale the results/impacts. Why is this topic important to a) CNCA members, and b) "next wave" cities?

- Integrated district energy pilot projects will be advanced in three cities.
- The process and business designs as well as challenges and lessons learned, will be shared with other CNCA and USDN members.
- Effective implementation partners and resources will be identified that can be accessed by other communities.

X. How much time is required to complete the project

12 months

Carbon Neutral Cities Alliance LOI

I. Title of the project – "Natural Gas, Fuel Oil and related Thermal Energy De-carbonization Strategies"

II. City lead and primary contact information (name, title, department, city, email and telephone)

David Driskell, Executive Director, Community Planning and Sustainability
City of Boulder, 1777 Broadway, Boulder, CO 80306 USA
driskelld@bouldercolorado.gov, 303-441-3425

III. Other CNCA cities and/or "next wave" cities participating in the project (if already identified); and other partners (NGOs, consultants, etc.), if relevant, on the project

San Francisco

IV. Summary of the project

This project would develop a strategic framework for cities to use in converting existing carbon-based thermal fuels to low or no-carbon fuel sources. This framework will include initial analytical tools and strategies for assessing the carbon-based heating and process uses; evaluation of existing and emerging replacement technologies; and preliminary assessment of policy and market-based mechanisms for stimulating the rapid conversion to no-carbon thermal systems.

V. Grant amount requested (in USD) – an estimate with as much budget detail as possible; identify any additional sources of funding

$75,000

VI. Problem statement (why this project is needed), objectives of the project, what success will look like, and how success will be measured

Most heating systems in cities are dependent on fossil fuel sources – primarily natural gas and fuel oil. While efforts to de-carbonize the grid can have an enormous impact on carbon emissions, they do not typically affect these heating sources, unless owners convert to electric heat systems. In some locations, these energy sources can represent 20-30% of total community emissions.

This project will create a strategic framework for cities to apply the energy systems transformation cycle (create the vision; analyze the system; develop a new system design; implement the changes) to heating fuel sources and technologies.

VII. Bullet point list of top 1-3 "products" or deliverables that will come from the project

1. An assessment of clean energy thermal options including:
    a. An overview of thermal fuels and technologies in use in cities and procedures for conducting thermal fuel assessments.

   b. Data on typical market penetration rates of different technologies and fuel sources.
   c. Information on the carbon intensity of thermal fuels.
2. Strategies for analyzing a city's thermal carbon foot print on a technology by technology basis.
3. Strategies for managing the conversion of thermal fuels to de-carbonized sources:
   a. CHP and Tri-generation based on bio-fuels
   b. Heating and cooling electrification
   c. Ground-source heating/cooling systems
   d. District deep water cooling systems
   e. Solar thermal
   f. Passive house standards to eliminate the need for heating and cooling systems
   g. Options for financing thermal conversions
   h. Options for timing the transition and coordinating it with grid de-carbonization

VIII. How the project is "transformational."

Every city has a large thermal carbon footprint and few cities now have a clear pathway to decarbonization of this footprint. This project will jumpstart the CNCA/USDN conversation on thermal decarbonization and identify the next wave of projects that can support city strategies. Many of the candidate conversion technologies also have the potential for providing low-carbon critical cooling load management in the anticipated context of rising temperatures resulting from global warming.

IX. Expected project impacts, and how the applicant will use, apply and/or scale the results/impacts. Why is this topic important to a) CNCA members, and b) "next wave" cities?

Participating cities will use this framework to conduct local thermal decarbonization assessments and develop transition strategies. These pilots will provide informative case studies for other communities interested in conducting similar assessment and planning initiatives.

X. How much time is required to complete the project

12 months

Energy Services/ Resource Acquisition Working Group Meeting

April 16, 2015; 9-11am
1101 Arapahoe 1st Floor

Agenda

1. Introduction of the key meeting objectives and process: **9:00 - 9:15 am**
2. Organize into four break-out groups: **9:15 - 9:20 am**
    - Regulation & local renewable energy fund
    - Financing /Local revenue Streams
    - Local Generation Projects
    - Energy Efficiency and Low Income Energy Services

(IN BREAKOUT GROUPS)

3. Prioritize list of potential projects to top 2 (each group can discuss their methodology for selecting their top two projects). **9:20 - 9:35 am**
4. Evaluate the projects by answering the following three questions: **9:35 - 10:05 am**
    a. *What are the existing technical, legal and financial barriers to implementing the project?*
    b. *What resources are needed to fully evaluate/coordinate the project? e.g. consulting services, legal evaluation, staffing resources*
    c. *What partnership or collaboration opportunities exist related to the project?*
5. Assign group members and prepare for report-out: **10:05 – 10:15 am**

(IN LARGER GROUP)

6. Report out part 1: Quick round to introduce groups top 2 projects: **10:15 – 10:25 am**
7. Report out part 2: "The Pitch" Group members address the questions and work to "sell" the projects to the group. **10:25 – 10:55 am**
8. Wrap-up and next steps **10:55 – 11:00 am**

Criteria for Selecting Short-term Energy Initiatives

Overall Objective:
Demonstrate the city's ability to deliver high value energy-related initiatives that align with the community's energy goals, build on existing efforts, and show tangible and meaningful benefits to the community.

Selection Criteria:

a. Reduces GHG emissions
b. Promotes Economic Vitality
c. Community Visibility/ Wow Factor
d. Serves an Important Learning Objective
e. Promotes Social and Environmental Justice
f. Builds energy resilience

Ideas to Evaluate

1) REGULATION AND LOCAL REVENUE STREAMS

a. Current energy codes for **new buildings**

i. Timeline for Net Zero, how we get there and what we can do in between.

b. Given the cities plans for **existing building** regulation (rental housing and commercial buildings), what else could be required?

i. Solar thermal?

ii. Pre-wire buildings for solar electric and/or electric vehicle charging

c. Create a **building database** characterizing the entire city building stock including building size, building characteristics, major energy systems, and presence of energy efficiency and renewable energy measures. Leverage existing data collected by county assessor and existing tool developed as part of "Two-Men and A Truck" program development by Cadmus Group/First Tracks Consulting. Purchase supplemental data from Market Vue or similar vendor. Collect primary data from targeted sampling using telephone survey, online data collection, and onsite energy assessments. Tool would provide powerful engine for calculating potential energy/carbon savings, develop program targeting strategies, and tracking market penetration.[1]

d. Create a **Local Renewable Energy Fund** to provide a revenue stream for local renewable energy demonstration projects. Revenues could come from:

i. Requirement for marijuana grow facilities to purchase renewable energy credits or offsets for their energy usage

ii. Residents or businesses that wish to contribute to local projects

iii. Boulder Power Pioneers: A Boulder run program for voluntary support of Boulder renewable energy future. Assuming the same price point as Windsource ($2.16/100kWh) and Boulder Windsource participation rate (3%), would generate ~$1m annually. Ideally the program would purchase Colorado RECs from local projects with an option to buy energy in the future if municipalization is successful, however this may prove overly expensive (> the $20/MWh available). So alternately the program could purchase national voluntary RECs at $1/MWh and use the remaining funds (~$950k/year) for other projects that increase Boulder's renewable future.

iv. Green Pricing Program: A future municipal utility would have the ability to create a more robust and cheaper green pricing solution, since it could be fully integrated into utility operations. However, even absent a municipal utility, Boulder should be able to create a product that overcomes the shortcomings of current market offerings, such as Xcel's WindSource and unregulated offerings like Renewable Choice. Features to explore in a city-run offering could include transparency (to inspire customer confidence); a range of renewable options (e.g., solar/wind/other; local/nonlocal choices; partial/full volume); and pricing that leverages city's bond financing rates and water utility/property tax credit structures. Initiative could be self-funded through bond financing and market pricing, so would not require tax or general fund revenues. Or city could subsidize service to lower pricing and increase carbon savings.

2) FINANCING

[1] While this is not specifically regulation it falls into the role of local government and planning functions.

a. **Loan pool for smaller Property Assessed Clean Energy (PACE) projects:** Because transactional costs are fixed in PACE (and other forms of financing) -the small/mediumbusiness sector is often overlooked (they are overlooked for a host of other reasons as well). However one method that City of Boulder to use to get Colorado PACE projects used in the sub $200k project size world would be to provide a loan pool to incentivize these projects. This could be done a few ways:
   i. Pot of funds to cover the transaction costs charged on projects under a certain size (200-250k recommended)
   ii. Pot of funds to cover entire project costs for projects under $200k. This pot of funds, managed by COB, would be the project investors. In the meantime- COB could work with investors to ultimately be an off taker of this fund, once enough projects are done that this becomes interesting to an investors.
   iii. Boulder County may be interested in this as well and has remaining Loan Loss Reserve dollars.

b. **Launch a media and public relations campaign to promote and stimulate demand for commercial PACE**. Create a sense of urgency by offering some kind of rate reduction for a limited time. Decrease the hassle factor for customers by utilizing existing energy service concierge providers such as ClearResult (formerly Populus) to help walk customers through the measures selection process. Run promotions for different market segments (e.g. retail, restaurants, office complexes) in order to bundle projects and potential measures. Partner with a few service providers, and require performance of the promotion portfolio as opposed to on a building by building basis to further reduce costs and increase service provider interest

c. **Finance Concierge Services:** Provides Efficiency Finance Broker/advisor services for trade allies; Manages and acts as conduit to those relationships; Links each deal to customized lender & financing; Increases uptake of EE projects at no additional burden to program managers and contractors; Provides Xcel Energy trade allies with access to multiple financial instruments across multiple lenders and assistance with communication and sales of financed-based project bids.

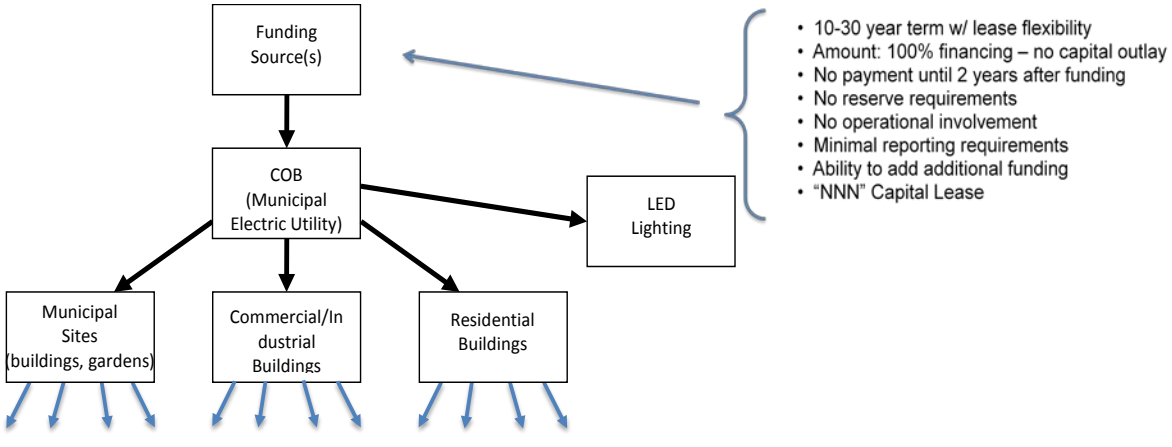
d. **On-bill financing through the water bill:** Provide on-bill financing through Boulder's municipal water utility for water and energy efficiency measures. Promote this enabling financing program through an integrated utility service offering similar to that being designed in the City of Fort Collins. This new utility business model consists of the following critical program elements:
   i. Auto enroll all residential consumers in a bill neutral efficiency package that they can opt out of should they choose
   ii. Create integrated water and energy conservation packages for similar housing stock to reduce installation and procurement costs
   iii. Offer a streamlined customer intake to delivery process to reduce customer confusion and hassle.
   iv. Utilize existing carbon emissions mitigation funds as a source of initial program capital, from there work with local credit unions to sell initial loans to other credit loan partners. See Craft3 and Self-Help Credit Union examples:
   https://www.greentechmedia.com/authors/James+Mandel+and+Martha+Campbell
   http://www.craft3.org/About/newsroom/2014/06/18/energy-efficiency-loan-sale

e. **Payroll Deduction for Energy Efficiency:** Create a program that provides employers with the ability to offer a payroll benefit for their employees to do energy upgrades. An employee could take out a loan for an energy efficiency project and have it repaid through a payroll deduction - just like a 401k or flex

spending account. Could be funded by a revolving loan initiated by energy efficiency projects at the employer's facility. This is a good way for employers to provide additional benefits to their employees, and it is also a good way to reach low/moderate income customers. Could partner with the Clinton Family Foundation that is creating a turnkey package around this concept (HEAL program).

f. **Solar Bond/Solar Bank:** Use bond financing to develop solar bank available to local residents and/or businesses for financing onsite solar PV installations. Create financing structures that allow participants customers to pay per kWh delivered rather than the entire up-front construction costs. Leveraging municipal financing will lower costs for customers, and mimic advantage provided by municipal utility. Tying credit serving into water utility or property tax payments could also reduce credit risk, further lowering prices. Initiative could be self-funded through bond financing and market pricing, so would not require tax or general fund revenues.

g. Load Reduction Business Model: The project is to establish a funding vehicle and business model to foster and support load reduction programs (some of which are already in process) that can be undertaken using the provisional Boulder Municipal Utility shell prior to it being able to operate the local grid. The model consists of 1) a funding source (e.g., investment structures, private equity funds, etc. – see below) that would provide funds to be loaned out by 2) the Utility to 3) residential, commercial/industrial, and municipal electricity users, to upgrade their facilities to reduce load on the local electrical distribution grid. Such load reductions would be accomplished by: (a) **upgrading lighting with LEDs**, and (b**) implementing grid-connected and behind-the-meter solar-plus-storage systems.**



This project would allow the provisional Boulder Municipal Utility to demonstrate both technical capability and profitability without issuing bonds or expending city funds. The loans would be repaid by the end users. The data from this project will enable the city to set policies and incentives to support more solar installations and LED retrofit programs, as well as integrate information into the resource planning process. This project may also free-up revenues needed to support other projects. This initiative will aid in creating a public financing template to communicate program efficacy to other communities.[2]

3) LOCAL GENERATION PROJECTS

[2] This project has lot more details in the proposal submitted. Please see document entitled Load Reduction Business Model.

a. Evaluate the water system for short term value in **Demand Response**, since we have 24 hour treated water storage already. Probably would require a storage tank at Betasso

b. **City Solar Garden** – Behind the meter solar garden in the city. Develop solar garden(s) to offer residents/businesses carbon-free electric service. Like all solar gardens, city could develop options with advantages over onsite solar, including optimized siting, quality maintenance, economies of scale in construction and materials, and offerings to serve renters and multifamily buildings. Like most solar gardens, city could create financing options to allow customers to pay per kWh delivered rather than the entire up-front construction costs. Better than other solar gardens, city could leverage its municipal financing to create competitive pricing. Initiative could be self-funded through bond financing and market pricing, so would not require tax or general fund revenues. Or city could subsidize service to lower pricing and increase carbon savings.

c. **Solar-plus-storage demonstration project** -expanded scope of current Boulder Energy Challenge project: The purpose of the project is to demonstrate and measure the effectiveness of combining some amount of battery storage and smart inverter/charger technology with conventional rooftop solar PV systems in residential and light commercial installations. The project will install and integrate batteries, smart inverters, smart appliances, PEV chargers, and an energy management system in several residential solar PV sites configured to operate in an entirely behind-the-meter mode. It will also construct and calibrate computer models using HOMER™ software to validate and adjust the installations and data collected from them. A separate part of the project will improve monitoring and control of an existing light commercial 19 KW solar-plus-storage installation to demonstrate peak demand limitation and PEV charging with solar.

The project is expected to demonstrate the ability of Solar+Storage and control technologies to 1) reduce and stabilize demand on the grid take full advantage of on-site solar production by storing excess daytime production for use at other times, and 2) provide some level of premises backup power in the event grid failure. An outcome of the project is expected to be a “template” for economical large-scale commercialization of solar+storage within Boulder, and beyond.

The project installations will be able to be re-configured in the future to operate in a grid-feed model, in which case they can also mitigate local grid instability from solar variability, as well as provide the grid with benefits of automatic fast demand response/dispatch, VAR support, frequency stabilization, power factor compensation, premises-based supply/demand balancing, smart appliance demand response, power management and efficiency, the integration of PEV charging with solar PV.

d. **Solar + Storage:** A variation on the project above, through **on-bill financing of the water bill** (which is tied to the property, not the customer), a customer would install a suitably-sized PV array and energy storage. This bypasses the legal and interconnection problems of net energy metering and RECs since all equipment is **behind the meter**. The City would still need to provide permits, as per local regulations. Perhaps a 10-year payback on the equipment would satisfy the balance between a sufficiently-low monthly payment and a longer term amortization schedule. The interest rate could be determined by another process but should be **much lower than commercial banks**, as the property's title is on the line. To satisfy IEEE 1547 requirements, an auto-transfer switch would need to be part of the equipment installed so the distribution line is not energized while the system provides energy to the customer during an outage. That last point could provide incentive for those customers who value

a CAIDI close to 0. If any of this idea comes to fruition, I would advocate for its use on commercial properties that have a **demand charge** to further complement the ability of the system to **reduce both peak load as well as monthly energy usage**.

e. **Community Geothermal:** Community geothermal loop in new multi-family developments and/or existing multi-family communities. The City of Boulder could finance community geothermal projects and then bill each customer every month for the actual heat exchanged. Once the system cost is recovered the City could return the ownership of the loop to the community, or in the case of a municipal utility model the City would retain ownership of the system. Even current City owned pocket parks in established neighborhoods could be utilized if 6 - 10 houses were willing to sign up for the service.

f. **Combined heat and power plant:** Developed at a suitable site with year-round heating needs. If appropriate, extend reach to include district heating and/or cooling plant to serve surrounding properties. One good site might be North Boulder Rec Center with district heating/cooling extending to apartment complexes on south side. Or perhaps serve (or develop) and industrial park in east Boulder. The CHP would provide city with a wholesale , With the extended district heating/cooling, would allow city to provide priced thermal services to end use customers, creating a utility or utility-like entity. To the extent that the generator is oversized for the thermal load, would also provide the city with a wholesale generation unit to sell into Xcel RTO and broader Western Interconnect.

g. Zero Energy District: Create zero energy district including multiple sustainable energy strategies including onsite PV, solar gardens, green pricing, CHP, microgrid, district heating/cooling, deep efficiency retrofits, etc. University Hill would be likely target, leveraging university's CHP and district heating plant, as well as broader community of small businesses, single family homes, and apartments. Project could leverage existing Xcel Energy offerings, but offer supplemental rebates; financing; on-bill payments tied to water bills; additional targeting and outreach; and perhaps include additional support for energy assessments, contractor arrangement services; etc.

4) ENERGY EFFICIENCY AND LOW INCOME ENERGY SERVICES

a. **Realtor Network:** The weeks surrounding the purchase of a new home could be a big opportunity for energy efficiency, however efficiency programs find out about the sale too late to influence decisions (if they find out at all). Two things happen during this time period - sellers replace equipment with the cheapest option available; and buyers scramble to complete upgrades and move in. The real estate agent is likely have knowledge and influence over some of these decisions, so a program would seek to inform, empower, and incentivize them to connect their clients with energy efficiency offerings.

b. **Simple Energy Behavior Change through Education and Incentives:** Partner with Simple Energy. The company uses a range of experiences, leveraging many proven behavioral science concepts – normative comparisons, social norms, rewards, loss aversion and goal setting – to motivate people to take action. As people interact with the program, their unique drivers and interests are learned. The Simple Energy experience continually learns and improves based on each customer's actions, delivering sustained engagement over time. Customers are part of a "points" reward system that incentives participation and engagement. This is a local company but would require a partnership with Xcel Energy in the short-term for data purposes.

c. **Deep Community Retrofits:** Implement retrofits achieving deep savings per building and broad penetration within neighborhood/community. Perhaps retrofit goal would be net zero, but maybe limited to energy efficiency retrofits. Perhaps target only residences (although primary energy needs of most residences are gas and not electric), or only businesses, or find a community (like University Hill or North Boulder) with mixed use. Project could leverage existing Xcel Energy offerings, but offer supplemental rebates; financing; on-bill payments tied to water bills; additional targeting and outreach; and perhaps include additional support for deep-savings assessments, contractor arrangement; etc.

d. **Partner with Google to implement solar and efficiency:** Concerns about the effect of municipalization and growth in the City of Boulder that will force up the cost of living in Boulder on low income families can both be addressed through a program to stabilize energy costs for those families by either a solar installation, energy efficiency improvements or both that is provided by a partnership between the City of Boulder, Google and local solar and energy efficiency companies. Google has partnered with Solar City (http://thinkprogress.org/climate/2015/02/26/3627172/google-solarcity-big-solar-fund/) and has expressed its desire to be a part of the Boulder community. Why not a partnership with Boulder? This would require approaching Google with a proposal, but gives Google the opportunity to continue its mission to help get solar onto rooftops and add in helping mitigate some of the financial burden its expansion in Boulder will have on low income and even middle income families who own their own home with suitable solar locations or energy efficiency or energy efficient appliance needs. Local businesses would also benefit from an increased market for their services. This program would give the City the RECs, the homeowners a stabilized expense for their energy, local businesses additional customers and Google a chance to expand their solar mission and earn some goodwill from the community. Funding would be a combination of upfront capital from Google and the city. A bulk purchase from chosen local suppliers might streamline the process and lower costs for them and hence the installed cost. The homeowner would pay a portion or all of their current energy bill to the city through existing city billing and Google would be reimbursed through these funds. A lien on the property could guarantee loan payment.

e. **Case Management Services for Low Income:** A balanced approach to working with low income customers should include a continuum of services. At one end of the continuum, customer service and programs should address crisis management and the prevention of shut-offs. Customer service is critical to assist with referrals to other public and nonprofit assistance programs. Considered a "case management-lite" approach, this can be achieved through partnership with other agencies including city agencies such as Human Services and BHA. Once a customer is stabilized, long-term affordability can be addressed through weatherization and efficiency. Additionally, long-term sustainability could be approached through exploring solar and efficiency in housing.

THE TOP TEN

Legislative and Regulatory Changes That Would Make Colorado a Leader in Climate Action, Energy Innovation, and Customer Electricity Choice

1

Peer-to-Peer Sharing of Electricity

Customers could pool resources through microgrids and sell or donate excess solar energy to neighbors.

Community Choice Aggregation

2

Communities could source their electricity independently—for example, they could purchase 100% renewable energy from third parties besides their utility.

3

Energy Data Center

A state energy data center or statistics organization could provide information about energy use for research, policy, and market development.

Alternative Energy Efficiency Management

4

Regulated utilities are torn between selling electricity and losing sales to efficiency. A third-party energy efficiency manager does not have that conflict. Similarly, regional energy networks accept utility funds to provide locally tailored efficiency services.

5

Remove the 120% Cap

Currently, solar customers can only net meter up to 120% of their electricity use. Removing this cap would enable larger solar installations on sites with low usage but lots of space, like parking garages.

Performance-Based Ratemaking and Grid Modernization

6

Performance-based ratemaking can reward utilities for being efficient and delivering customer value. It can also encourage upgrades to the electric grid, which make it easier for customers to invest in renewable energy and electric vehicles.

7

State Carbon Tax

Boulder has a local carbon tax, but a state-level tax would help fund renewable energy projects and transmission and distribution system upgrades.

Promote Electric Vehicle Uptake

8

Encourage customers to purchase electric vehicles while making their charging "clean"—through making the state tax credit transferable to enable financing opportunities, and offering time-of-use rates to encourage nighttime charging.

9

Green Electric Resource Planning

Requires utilities to consider carbon and water as factors when they go out to bid for new energy resources. Today this is more of an afterthought than a means to making long-term clean energy decisions that benefit the state.

Time-of-Use Electric Rates

10

Offering electricity rates that could vary depending on the time of day would, among other things, support electric vehicle charging at night.

TRANSITION WORK PLAN SCHEDULE OVERVIEW

4/30/2015

TASK	2015			2016				2017				2018	2019
	QTR2	QTR3	QTR4	QTR1	QTR2	QTR3	QTR4	QTR1	QTR2	QTR3	QTR4		
DEFINITIONS													
DAY 1 - Boulder pays for system and has right to collect revenue													
DAY 2 - Full Separation/integration complete													
LEGAL/REGULATORY													
PUC Application Process													
Condemnation Process													
FERC/NERC/WECC Compliance													
Perform NERC system compliance assessment; confirm proper registration, register with WECC													
Identify and document filing requirements													
Develop Boulder compliance plan													
PLANNING & ENGINEERING													
Systems													
GIS													
SCADA													
Review Xcel SCADA information													
Evaluate SCADA communication protocol													
Implement SCADA system													
Modeling													
Policies/Procedures/Standards													
National Electrical Safety Code (NESC), Occupational Safety and Health Administration (OSHA), Environmental Protection Agency (EPA), "good utility practice," and best practices													
Developer Standards													
Review Xcel Developer Standards													
Develop Boulder Developer Standards													
Interconnection Standards													
Review Xcel Interconnection Standards													
Develop Boulder Interconnection Standards													
Additional Facilities & Services													
Review Xcel Standards for Additional Facilities & Services													
Develop Boulder Standards for Additional Facilities & Services													
Impact Fees and Charges													
Review Xcel Impact Fees and Charges													
Develop Boulder Impact Fees and Charges													
Service Contracts for Large Customers													
Review Xcel Service Contracts for Large Customers													
Develop Boulder Service Contracts for Large Customers													
Substation, Transmission, Distribution Design Manuals													
Review Xcel Substation, Transmission, Distribution Design Manuals													
Develop Boulder Substation, Transmission, Distribution Design Manuals													
Substation, Transmission, Distribution Materials and Construction Standards													
Review Xcel Substation, Transmission, Distribution Materials and Construction Standards													
Develop Boulder Substation, Transmission, Distribution Materials and Construction Standards													
Substation, Transmission, Distribution System Planning Guidelines													
Review Xcel Substation, Transmission, Distribution System Planning Guidelines													
Develop Boulder Substation, Transmission, Distribution System Planning Guidelines													
Meter Maintenance & Testing Standards													
Review Xcel Meter Maintenance & Testing Standards													
Develop Boulder Meter Maintenance & Testing Standards													
Council approval of Engineering Policies (as needed)													
Planning & Engineering Studies													
System Map													
Review Xcel's System Map for Boulder system													

TRANSITION WORK PLAN SCHEDULE OVERVIEW

4/30/2015

TASK	2015			2016				2017				2018	2019
	QTR2	QTR3	QTR4	QTR1	QTR2	QTR3	QTR4	QTR1	QTR2	QTR3	QTR4		
Issue RFP, Determine Contractor, Develop System Map and Inventory													
System Model													
Review Xcel's System Model for Boulder system													
Issue RFP, Determine Contractor, Develop System Model													
Protective Device Coordination													
Review Xcel's Device Protection schemes for Boulder system													
Issue RFP, Determine Contractor, Perform Coordination Study													
Arc Flash Analysis													
Review Xcel's Arc Flash study/incident energy levels for Boulder system													
Issue RFP, Determine Contractor, Perform Arc Flash Study													
Long Range Plan													
Review Xcel's Long Range Plan for Boulder System													
Issue RFP, Determine Contractor, Develop Long Range Plan													
CONSTRUCTION, OPERATIONS AND MAINTENANCE													
Evaluate construction & operations services to outsource													
RFQ for on-going services													
Issue RFPs for on-going services													
Negotiate contracts for on-going services													
Meter Reading													
Expand water meter reading operations or sub-contract; implement													
Locate and lease support facility space													
Office Space/Printing/Mail Room/Meeting Room (Construction)													
Indoor Warehouse													
Outdoor Warehouse/ Laydown Yard													
Transformer & Equipment Shop													
Vehicle & Equipment Shelters/Storage													
Meter Shop													
Substation Shop													
Vehicle Service & Maintenance													
Dispatch Center													
SCADA Operations Center													
Emergency Operations Center													
Systems													
Outage Management System													
Evaluate Outage Management Options													
Evaluate and Implement Outage Management or coordinate with Xcel													
Meter Data Management													
Review Xcel meter reading technical requirements and communication protocols OR contract with Xcel for meter reading													
Implement Meter Data Collection/Management System OR develop meter data transfer and system testing plan with Xcel													
Inventory													
Warehouse Stock													
Obtain list of unique or critical equipment specific to Boulder territory													
Determine warehouse inventory levels and purchasing requirements to meet scheduled and emergency work													
Stock Warehouse													
Meters													
Determine required metering inventory levels and purchasing requirements to replace meters as part of ongoing maintenance													
Stock meter shop													
Needs assessment for future meter replacement program (input into LRP); compatibility, functionality, etc.)													
Equipment/Tools													
Contract Crew Equipment													
Service Crew Equipment													

TRANSITION WORK PLAN SCHEDULE OVERVIEW

4/30/2015

TASK	2015			2016				2017				2018	2019
	QTR2	QTR3	QTR4	QTR1	QTR2	QTR3	QTR4	QTR1	QTR2	QTR3	QTR4		
Meter Tech Equipment													
Vehicles													
Rolling Stock													
Personal Protective Equipment													
Policies/Procedures/Standards (Construction & Operations)													
System Operations Procedures													
Review Xcel system operations standards													
Develop Boulder system operations procedures													
System Inspection, Maintenance, and Testing Procedures													
Review Xcel system inspection, maintenance, and testing standards and reports for 5 historical years													
Develop Boulder system inspection, maintenance, and testing procedures													
Vegetation Management Plan													
Review Xcel information on vegetation management requirements including clearing cycles and status of Boulder circuits.													
Evaluate existing City practices, determine expansion of City practices or develop separate plan, finalize Vegetation Management Plan													
Outage Response & Emergency Operating Plan													
Obtain SAIDI and SAIFI for Boulder circuits for the most recent 5 historical years													
Evaluate synergies with other City operations and finalize Outage Response & Emergency Operating Plan													
Council Approval of Construction & Operations Policies (as needed)													
Secure building and facility space of on-going services													
Vendor mobilization for on-going services													
POWER SUPPLY													
Policies/Procedures/Standards													
Risk Management Protocols													
REC & Carbon tracking protocols (with sustainability office)													
Resource Planning													
Integrated Resource Planning													
Determine IRP process including: participants, required data, frequency, approval process, need for consultants, etc													
Potential IRP Working Groups													
Colorado Renewable Energy Resource (RES) Compliance Plan													
Develop and implement RES compliance plan based on state requirements													
Load Forecast													
Review 10 years of historical monthly retail load data, by customer class, from Xcel; adjust to delivery points													
Review 10 years of historical DSM & EE energy/capacity displacement from Xcel programs													
Review 10 years of historical generation from third-party owned generation (DG)													
Develop estimate of future generation/displacement from existing and anticipated city owned or third-party DSM/EE/DG for 10 year planning cycle													
Develop current and 10-year summer/winter energy and demand load profile by delivery point													
Evaluate Rocky Mountain Reserve Group participation													
Power Supply													
Power Supply Preliminary Evaluation (RFP Pre-Work)													
Power Supply Working Group													
Issue RFP for Power Supply and Transmission Service consultant													
Evaluate Boulder Distributed Generation Potential													
Perform local solar potential capacity analysis													
Create web based solar mapping platform utilizing Lidar or equivalent tool													
Perform Local generation potential capacity analysis (other generation resources, e.g. CHP, biomass, geothermal, etc)													

TRANSITION WORK PLAN SCHEDULE OVERVIEW

4/30/2015

TASK	2015			2016				2017				2018	2019
	QTR2	QTR3	QTR4	QTR1	QTR2	QTR3	QTR4	QTR1	QTR2	QTR3	QTR4		
Establish Short and Long Term Power Supply RFP objectives that meet technical requirements for delivery, cost, environmental priorities and Utility of Future vision													
Contract for Power Supply													
Secure Power Supply and Transmission Service													
Issue RFP to Xcel Energy													
Evaluate Xcel Energy Proposal													
Issue RFP to thrid party providers													
Receive responses and evaluate proposals for power supply													
Negotiate contract for power supply													
Council approval of Power Supply contract (as needed)													
Implementation of power supply and transmission prior to Day 1													
Transmission Service and Agreements													
Determine appropriate transmission service													
Provide OATT Application													
Coordinate/negotiate agreements for transmission service													
Execute OATT agreements for transmission service													
CUSTOMER SERVICE													
Determine call center implementation approach													
Issue RFP for call center representative and outsource (if required)													
Billing/Collections Staff													
Expand current City operations for electric billing/collections													
Output Services Inc. (OSI) - printing and mailing bills and notices													
e-Complish/Chase Paymentech - process phone and online credit payments													
JP Morgan Chase - process check payments													
Vanco Services - electronic payments													
Systems													
Customer Information (CIS/Billing)													
Internal evaluation for CIS system requirements													
Contract with Advanced Utility to configure software for electric billing													
CIS system - Software programming implementation													
Clean Data													
Import Customer Account Information and CIS "live" testing with Call Center													
Review Customer Account Information													
Policies/Procedures/Standards													
Customer Service Policies													
Request Xcel's existing customer account policies and charges, deposits, credit checks, disconnection/reconnection, late payments, bill disputes, etc.													
Develop Customer Service policies													
Council approval of Customer Service Policies (as needed)													
Key Accounts													
Establish criteria for Key Accounts													
Identify and Tag Key Accounts													
Develop Key Account Service Plan													
Customer Account Transition													
Communications and Customer Experience Working Group													
Develop/revise customer interface platforms and contact information (phone, email, website)													
Launch Customer Transition Communication													
ENERGY SERVICES													
Develop options for new 2015 Energy Services													
Develop plan and funding options for 2016 Energy Services													
Launch new 2016 Energy Services													
Existing (Xcel) Customer Programs- Billing Transition													

TRANSITION WORK PLAN SCHEDULE OVERVIEW

4/30/2015

TASK	2015			2016				2017				2018	2019
	QTR2	QTR3	QTR4	QTR1	QTR2	QTR3	QTR4	QTR1	QTR2	QTR3	QTR4		
Obtain list of current and anticipated City customers participating in existing Xcel sponsored programs.													
Determine legacy Xcel customers that require program support and ongoing bill credits/compensation (if necessary).													
Incorporate billing methodology to continue credits/compensation to legacy Xcel program participants if necessary.													
Energy Services Development - Day 1													
Energy Services working group (energy efficiency and solar)													
Determine Energy Services objectives and preliminary design													
Develop Energy Services budget for 10-year planning cycle													
Identify customer energy services needs													
Perform gap analysis from existing services													
Develop plan to institute energy services as of Day 1 and beyond													
Develop Energy Services													
Engage legal, marketing, customer service, operations, metering, billing, etc.													
Develop Rate Structures or Riders for input into rate development													
Establish Measurement and Verification Guidelines and Methodology													
Public process/Council approval (as needed)													
Finalize Energy Services													
Market and Launch Day 1 Energy Services													
FINANCE & ACCOUNTING													
Resource (Capital) Planning and Financial Management System													
Modify/expand Tyler Munis Financial system for electric operation													
Accounting													
Modify/expand Tyler Munis Accounting system for electric operation													
FERC Accounting													
GASB Accounting													
Purchasing													
Asset Management													
Insurance													
Personnel Related Insurance - evaluate current self-insurance coverage and adjust as needed													
Equipment Related Insurance - evaluate current self-insurance coverage and adjust as needed													
Budget													
10-20 year Budget (preliminary/pro forma)													
10-20 year Budget (final for bond issuance)													
Refresh Budget (using final retail rates) for Charter Metrics													
Rates													
Retail Rate Working Group													
Issue RFP and choose contractor for Rate Analysis													
Develop Boulder Rates													
Identify Rate Components and preliminary rate structure													
Cost of Service Study													
Develop Rates (final for bond issuance)													
Public process/Council approval of rates (as needed)													
Finalize Rates													
FINANCING													
BRIDGE LOAN													
Election													
Solicitation													
Council Process (as needed)													
Bridge Loan Prep													
Bridge Loan Duration													
BONDING													
Bond Prep													
Issue RFP for Bond Underwriter													

TRANSITION WORK PLAN SCHEDULE OVERVIEW

4/30/2015

TASK	2015			2016				2017				2018	2019
	QTR2	QTR3	QTR4	QTR1	QTR2	QTR3	QTR4	QTR1	QTR2	QTR3	QTR4		
Development of official statement													
Rating agency presentations													
Investor presentations/Drafting of disclosure documents													
Issue Bonds													
SUPPORT SERVICES													
Fleet Service Management System													
Administrative Policies													
Human Resources													
HR Staffing Assessment													
Review/revise existing Personnel Policies following HR Staffing Assessment													
Information Technology													
Facilities													
Fleet													
Communications													
Interim Communications and Outreach													
Communication and Customer Experience Working Group													
Branding, Marketing & Communications Plan													
Evaluate need for branding and logo; develop preliminary budget													
Branding design; preliminary marketing/communication plan													
Public Process/Council approval of branding and logo (as needed)													
Finalize branding and communication plan and budget; identify audience, format, content, and timing													
Launch branding and communication plan													
Accident Investigation Procedures													
Incorporate electric operations requirements into current procedures													
Establish/Adopt Safety Policies & Training Programs for electric operations													
INTER-DEPARTMENT ASSESSMENTS													
GOVERNANCE													
Governance Working Group													
Create Utility Advisory Board													
INTERCONNECTION													

Study Session
MEMORANDUM

TO: Members of City Council

FROM: Jane S. Brautigam, City Manager
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
Heather Bailey, Executive Director of Energy Strategy & Electric Utility Development
Tom Carr, City Attorney
Sarah Huntley, Media Relations/Communication Manager
Elizabeth Hanson, Economic Vitality Coordinator
Kendra Tupper, Energy Services Manager/Lead Strategist
Elizabeth Vasatka, Business Sustainability Coordinator

DATE: May 12, 2015

SUBJECT: Study Session – Proposed Commercial and Industrial (C&I) Energy Efficiency Ordinance

I. Purpose

The purpose of the study session is to discuss and obtain City Council's feedback on recommendations and options for a proposed Commercial and Industrial (C&I) Energy Efficiency Ordinance. City Council identified development of a Commercial and Industrial Energy Efficiency Ordinance as a high priority for the 2014-2015 work plan at its January 2014 retreat. Based on the feedback from council at the May 12 study session, staff plans to return in the third quarter of 2015 with a draft ordinance.

Please refer to **Attachment A** for more details, and analysis of all options considered for the proposed ordinance. Attachment A also provides a brief background on the city's past and current voluntary programs that have led to the development of this proposed ordinance. **Attachment D** provides a more detailed progress report on the city's primary existing demand side management programs: EnergySmart and SmartRegs.

II. Questions for Council

1. Does council have feedback on the proposed requirements, buildings that would be affected and timeline for compliance?
2. Does council have any feedback on the options for public disclosure of building specific energy use?
3. Does council have any feedback on the options for efficiency requirements?

III. Background

Over the past eight months, the city has conducted a broad stakeholder engagement process that has informed the development of options and recommendations for a potential ordinance. This included five meetings with a working group of affected stakeholders (building owners, property managers, service providers, commercial brokers, etc.), as well as broader outreach to

the business community through local business organizations and a widely attended webinar. Staff has also conducted research and interviews with other cities that have adopted ordinances, a nonprofit that has taken the lead on providing best practices for such ordinances (Institute for Market Transformation (IMT)), and federal agencies that are supporting such efforts (Department of Energy (DOE) and the Environmental Protection Agency (EPA)).

III. Summary of Options and Recommendations

The city analyzed several options for the ordinance and discussed these as part of the stakeholder engagement process (please see **Attachment A** for a description of all options considered). Feedback from the stakeholder engagement process, as well as research into best practices in similar city ordinances, informed the recommendations shown in Table 1.

Table 1: Summary of Proposed Recommendations

What should be required?	Commercial and industrial* building owners (of a certain building size) would be required to rate and report the energy use of their buildings, and to take certain energy efficiency actions.
What buildings would be affected?	• Private sector C&I buildings larger than 20,000 square feet (sf) • Newly built** private sector C&I buildings larger than 10,000 sf, and • City owned buildings larger than 5,000 sf. Multi-family units (MFUs) would be excluded to avoid multiple requirements on rental housing owners (e.g. in addition to SmartRegs requirements). *A size threshold of 20,000 sf would cover the majority of private sector C&I floor area (~75%) while minimizing the number of buildings impacted and associated administrative costs. Further, other cities that have tried to cover buildings smaller than 20,000 sf have not been successful, due to challenges in identifying and contacting the many building owners.*
What is the timeline for compliance?	In 2016, only large C&I buildings (> 50,000 sf), newly constructed C&I buildings (>10,000 sf), and city- owned buildings (> 5,000 sf) would have to comply. Over time, compliance by smaller existing private sector buildings (> 20,000 sf) would be phased in by 2020. Efficiency requirements could be phased in as soon as 2019 or as late as 2030, depending on the option chosen. *Significant work is needed to develop systems and business processes prior to the first compliance date. Staff anticipates that this could be completed in time for a May 1, 2016 compliance deadline if the program can be administered in house. If the program administration needs to be contracted out, the city could choose to delay the entire compliance timeline by year.*
* Commercial and Industrial buildings are defined as any structures encompassing any non-residential use or occupancy according to the County's tax assessor records. ** Any buildings permitted since the last energy code update went into effect on January 31, 2014. This will allow the city to understand how the new energy code is actually performing.	

In addition to the recommendations which were supported by all stakeholders, there are two key components where there was **not** clear agreement from the stakeholders: options related to public disclosure and options related to required energy efficiency. Staff requests council's feedback on the following options, which are discussed in more detail in **Attachment A**.

Table 2: Summary of Key Options

Disclosure: What metrics would be disclosed to the public?	Building owners would be required to report total energy use and other energy performance metrics to the city and to their tenants. <u>Options for Public Disclosure:</u> • Option 3A: Building Specific Public Disclosure ***(Recommended)*** • Option 3B: Limited Public Disclosure *Option 3A would encourage competition and drive market transformation by having full transparency around commercial building energy use.*
Efficiency Requirements	• Option 4A: Various Prescriptive Requirements ***(NOT Recommended)*** • Option 4B: Energy Assessment with No Required Action ***(NOT Recommended)*** • Option 4C: Energy Assessments with Limited Required Action (only lighting and retrocommissioning) • Option 4D: Energy Assessments with Required Action (custom to each building, based on what is deemed cost effective) • Option 4E*: Whole Building Performance Standards (e.g., maximum EUI or minimum ENERGY STAR score) ** While Option 4E is very attractive in terms of guaranteed energy reductions, the city does not yet understand how the building stock is performing. If council would like to pursue this option, staff recommends a compliance period from 2024 to 2030 to provide enough time to analyze the data and set reasonable targets.*

IV. Issues

Beyond the policy issues, there are significant staffing and budget implications to adopting an ordinance and developing this new program. To implement the proposed ordinance, it is anticipated that at least one Full Time Employee (FTE) will be needed, or alternatively, the program management and administration would need to be contracted out. In either scenario, there would be additional impacts to existing work plans. Staff is recommending that the Climate Action Plan (CAP) tax funds be used to fund this program, as long as the tax is active. If the city chooses to contract out the program administration, CAP tax funds alone would not be sufficient to cover the costs, unless another program was eliminated entirely.

The city anticipates that ongoing program costs will be between $280,000 and $440,000 a year, depending on whether the program is administered in house or contracted out (a more costly option) – this includes:

- Salary and benefits for an FTE **OR** consulting fees to administer the program
- New incentives and rebates
- Consultant fees: data analysis /quality control, annual benchmarking reports, etc
- Training and support for building owners
- Development and dissemination of templates and how to guides for each of the requirements

In order to fund this program through CAP Tax funds, the city would have to reallocate existing resources and potentially request new resources through the 2016 budget process. This reallocation and budgeting will happen as part of a larger effort that considers all of the city's energy related programs.

V. Next Steps

Based on the feedback from council, staff will return in the third quarter of 2015 with a draft ordinance and more details on implementation and budget implications. If an ordinance is adopted, staff anticipates the following timeline for implementation (subject to change based on the implementation schedule approved by council).

- June to August 2015: An ordinance will be drafted and presented to council for consideration, along with a discussion of budget and resource implications
- October 2015: Publish the list of covered buildings for 2016
- September 2015 to April 2016: Outreach and training efforts
- October 2015 to April 2016: Develop systems and tools for implementing the ordinance
- May 2016 – First compliance date for rating and reporting

V. List of Attachments

Attachment A: Analysis of Options for Proposed Commercial and Industrial (C&I) Energy Efficiency Ordinance

Attachment B: Feedback from Working Group Meetings

Attachment C: Feedback from Environmental Advisory Board (EAB)

Attachment D: Update on Existing Programs

Attachment E: Building Data

Attachment F: Details on Cost Analysis

Attachment A

Analysis of Options for Proposed Commercial and Industrial (C&I) Energy Efficiency Ordinance:

Rating and Reporting and Energy Efficiency Requirements for Building Owners

TABLE OF CONTENTS

WHAT IS RATING and REPORTING (R&R)?

- **"Rating"** (also known as benchmarking) is the process of measuring and comparing energy performance metrics (such as the normalized energy use of a building) to other similar buildings
- **"Reporting"** is providing the energy use and associated metrics and ratings to the parties required by the proposed ordinance (e.g. the city and tenants of the building).

WHAT TOOLS ARE USED?

R&R is done using the U.S. Environmental Protection Agency's FREE online tool, ENERGY STAR Portfolio Manager (ESPM). ESPM provides a building performance rating system, similar to miles per gallon (MPG) but using energy use intensity Instead.

WHAT IS ENERGY USE INTENSITY (EUI)?

Energy Use Intensity (EUI) is the total annual energy used per square foot of gross floor area. It is expressed in units of kBtus (thousand British thermal units) per square foot per year (kBtu/sf-yr).

I. Overview and Timeline

City staff is providing recommendations and options to City Council for a proposed Commercial and Industrial (C&I) Energy Efficiency Ordinance that could go into effect as soon as 2016. This ordinance would require C&I building owners to rate and report the energy use of their buildings, and would also require certain energy efficiency actions. The preliminary proposal outlined in this report for council feedback, is that initially the ordinance would only affect large (>50,000 sf) existing buildings and newly constructed buildings (>10,000 sf), with smaller existing buildings (> 20,000 sf) phased in over time. The timeline for development of the ordinance is summarized below.

Table 1: Timeline for Proposed Ordinance Development

	Key Efforts	Description
October 2014 – March 2015	Stakeholder Engagement	• Phase 1: Convene a working group of affected stakeholders (building owners, property managers, etc) to help develop options for the ordinance • Phase 2: Broader outreach to the business and commercial building community to solicit feedback
December 2014 – May 2015	Develop options and recommendations	Develop recommendations and options for: • Timing/Phasing of ordinance • Disclosure of energy metrics • Administration, Incentives and Support • Exemptions • Efficiency requirements
June – August 2015	Develop ordinance and present to City Council	Based on feedback from council, staff will: • research and develop more detailed specifications for recommended options, • communicate back to stakeholders (i.e. Environmental Advisory Board (EAB) and affected building owners), and • draft and present the ordinance to City Council for consideration.
August 2015 – April 2016	Communication/ Education Efforts Develop systems and tools for implementing the ordinance Solicit resources to manage and administer program	The city will communicate the goals and logistics of the requirements to affected building owners and will develop the following: • A reference website for the ordinance • Implementation guides • Educational and training opportunities • Incentives for early adopters • Systems and processes for administration and enforcement
May 2016	First compliance date	Targeted compliance deadline for the first buildings subject to compliance

OBJECTIVES:

- ✓ **Improve** the quality of Boulder's commercial building stock
- ✓ **Increase** awareness of efficiency opportunities and realize cost effective energy savings
- ✓ **Help** buildings owners understand and manage their buildings' energy use
- ✓ **Educate** tenants and real estate professionals about building energy performance metrics
- ✓ **Collect** benchmarking data to inform future programs and services
- ✓ **Market** buildings as efficient and high performing

WHAT WOULD BE REQUIRED OF OWNERS?

Under the proposed ordinance, building owners would be required to annually rate and report their buildings. This requires:

1. Collecting whole building energy use data,
2. Entering or importing required data into ENERGY STAR Portfolio Manager (ESPM), and
3. Sharing ESPM data with the City of Boulder

Additional actions will be required if energy efficiency is also included.

II. Public Engagement Process

Over the past eight months, staff has conducted a broad stakeholder engagement process that has informed the development of options and recommendations for a potential ordinance. This process consisted of two phases:

Phase 1 – Working Group (October 2014 to January 2015): Over four months, staff convened and facilitated a working group of affected stakeholder (building owners, property managers, service providers, commercial brokers, etc) to help develop options for a commercial energy ordinance. This was an important process to identify aspects of the requirements that cause the most concern for the business community. Please refer to the project's website for all presentations and meeting notes from this working group. Additionally, key feedback is incorporated throughout this memo, and a summary of feedback and recommendations is included in **Attachment B**.

Phase 2 – Broader Outreach to the Business Community (January to March 2015): Following the working group completion, staff presented to a number of business groups in the community including,

- Downtown Boulder Inc. - Feb. 4, 2015
- Boulder Tomorrow - Feb. 25, 2015
- The Boulder Group of the International Facility Management Association (IFMA) in Denver - April 2, 2015
- Boulder Chamber Community Affairs Council – April 9, 2015
- Commercial Brokers of Boulder - April 13, 2015

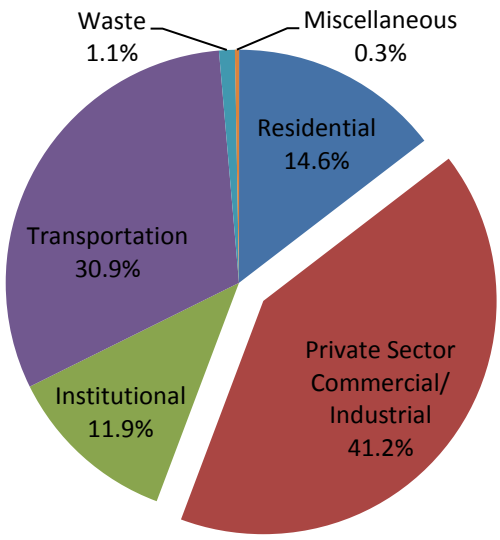
On March 4, 2015, staff discussed these options and recommendations with the Environmental Advisory Board (please see **Attachment C** for a summary of feedback). The city also hosted a one-hour webinar on March 18, 2015, for all affected building owners; this webinar was attended by approximately 55 participants and a recording was posted on the project website for future viewers.

Through this engagement, there has been significant cooperation and dialogue with many owners, property managers, and service providers. However, members of the business community have expressed concerns regarding data privacy and the amount of city regulations. In addition to having the most stringent energy codes in the country for new commercial buildings, the city is in the process of adopting a Zero Waste Ordinance, and considering a commercial linkage fee for affordable housing– all which affect businesses and the commercial buildings community.

III. Background Information

The city's recently completed 2012 greenhouse gas (GHG) inventory shows that private sector commercial and industrial buildings are responsible for 41 percent of Boulder's total emissions. Please note that federal and state owned labs are currently included in the private sector C&I values because the specific energy use for those facilities is not available. City staff is attempting to gather that information from each lab so that they can be included in the total for Institutional Buildings.

Figure 1: 2012 GHG Inventory



While institutional, or public sector, C&I buildings are responsible for 12 percent of emissions, a municipal ordinance would only cover private sector and city owned buildings. Other partnership efforts are targeting institutional buildings, such as the University of Colorado, County owned buildings, and federal and state owned labs and buildings. An analysis of this new GHG Inventory and summary info graphic will be presented to council in June or July of 2015 (either in an Information Packet or Study Session).

Because commercial and industrial building energy use is such a large contribution to the city's GHG emissions, City Council has prioritized efficiency efforts in this sector. In addition to the many voluntary programs that have been in place for a number of years, council provided direction in 2012 for a three-phase strategy to make Boulder's existing commercial buildings more energy efficient and to reduce GHG emissions.

Three Phase Strategy for C&I Buildings

Phase 1 - Expand Voluntary Programs	Phase 2 - Mandatory C&I Rating & Reporting	Phase 3 - Mandatory C&I Energy Efficiency
Continue incentive-based programs to drive energy efficiency improvements in existing buildings.	*Require property owners to rate their buildings' energy performance and report the rating.*	*Phase in the most effective requirements that will improve the buildings' energy performance.*

A C&I Ordinance would move the strategy beyond voluntary programs, into Phases 2 and 3, requiring actions that would benchmark and reduce energy use while improving the quality of Boulder's commercial building stock. This follows the model of what has been done in Boulder's residential sector, with successful voluntary programs (EnergySmart) leading up to energy efficiency regulation on the licensed rental housing stock (SmartRegs).

III.a Brief History of Boulder's Energy Efficiency and Rating & Reporting (R&R) Journey

Since 2007, the city has offered services and support to help residents and businesses in Boulder reduce their GHG emissions:

- 1994 to present - PACE (Partners for a Clean Environment) program: A one-stop shop for businesses and building owners to get free technical assistance, resources and financial incentives to implement sustainability best practices (energy, waste, water and employee transportation options)
- 2008 to 2012- 10 for Change: Voluntary business challenge and networking opportunities to implement energy saving measures and sustainability best practices, with over 100 members
- 2009 to 2010: Designed, piloted and partnered with Boulder County's award of the American Recovery and Reinvestment Act, Better Buildings Grant to implement EnergySmart county-wide
- 2010: Adopted SmartRegs, the city's energy efficiency requirements for licensed rental housing
- 2010 to present: Boulder started researching, evaluating, educating and providing services to rate commercial buildings' performance.

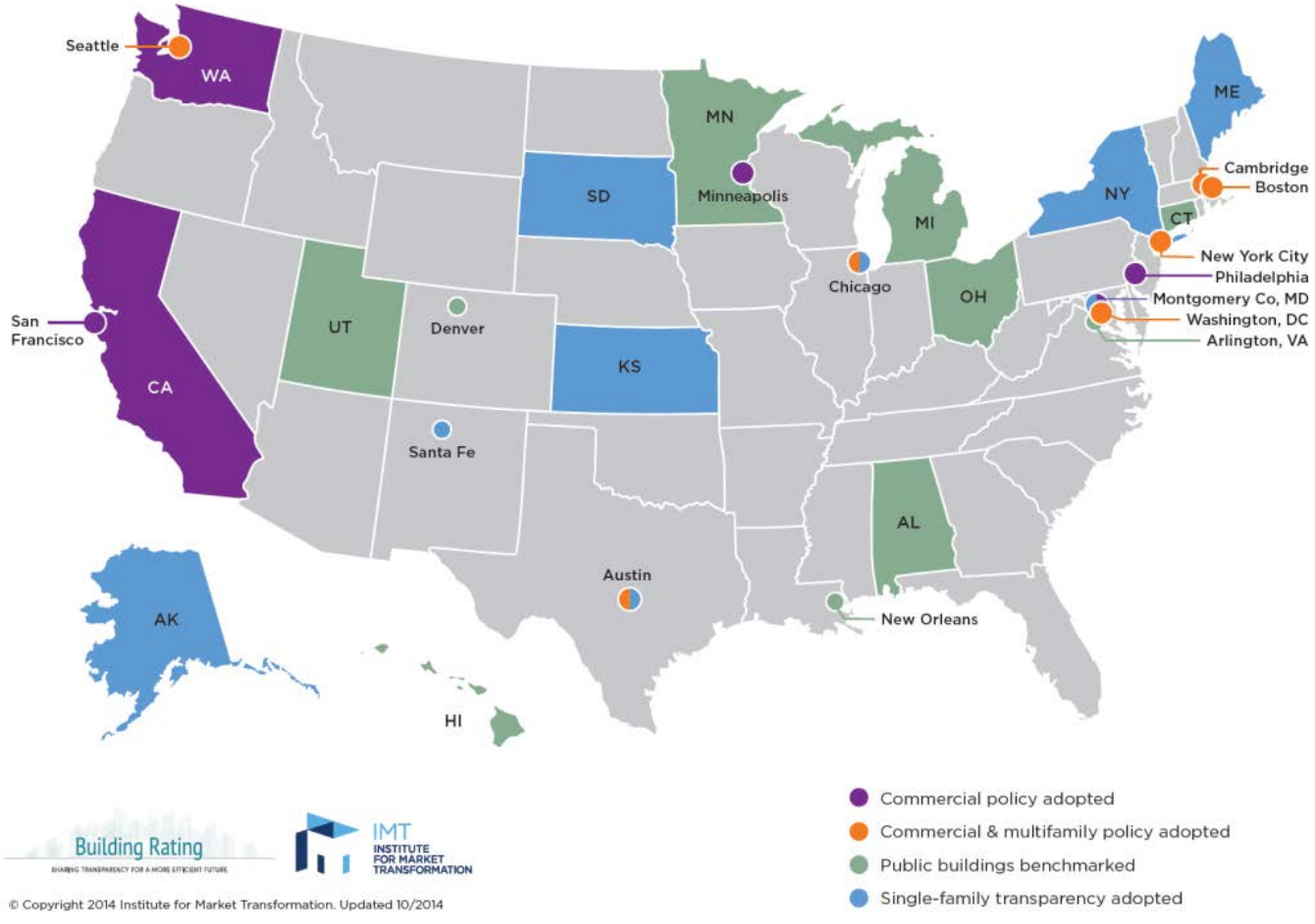
- 2011: Launched EnergySmart, a suite of energy efficiency services to create awareness and to provide technical assistance (advisor service) and incentives to implement cost-effective energy efficiency improvements
    - More than 3,200 businesses and building owners served countywide
- 2012 to 2013: Boulder implemented and evaluated a Commercial Building Energy Rating & Reporting Pilot Program
- 2014: Adopted the most stringent commercial energy code in the country – 30 percent better than the 2012 International Energy Conversation Code (IECC)
- 2014 to 2015: Development of proposed C&I Energy Efficiency Ordinance

Please refer to **Attachment D** for a more complete update on the success of EnergySmart and SmartRegs.

III.b National Context

To date, many other cities and counties across the U.S. have adopted rating and reporting requirements. Since the last update of this map, three other cities have passed benchmarking policies: Berkeley, CA, Atlanta, GA, and Portland, OR.

Figure 2: Map of U.S. Rating and Reporting Policies[1]



The table below summarizes the key components of other similar ordinances that have been passed in the United States (note: Atlanta's ordinance was passed in late April 2015 and not all of the details are currently available). The common motivation among these cities is a commitment to greenhouse gas reductions. Of the thirteen cities, all but two (Austin and Seattle) require public disclosure of building specific energy information. Six cities currently require periodic energy assessments, with New York also requiring the additional energy efficiency actions of retrocommissioning (RCx), lighting upgrades, and tenant sub-metering.

[1] Institute for Market Transformation, updated Oct 2014. http://www.imt.org/resources/detail/map-u.s.-building-benchmarking-policies.

Table 2: Summary of Commercial Building Requirements in the U.S.

City	Date Enacted	Gov't/ Comm	Multi Family	Excludes Industrial?	Public Disclosure?[1]	Energy Efficiency?
Atlanta, GA	2015	25K SF+	?	?	yes	Assessments
Austin, TX	2008	10K SF+	Audits	yes	no	Assessments
Berkeley, CA	2015	All/5K SF+	4+ units	no	yes	Assessments
Boston, MA	2013	All/35K SF+	35+ units	no	yes	Assessments
Cambridge, MA	2014	25K SF+	50+ units	no	yes	---
Chicago, IL	2013	50K SF+	50K SF+	no	yes	---
District of Columbia	2008	10K/ 50K SF+	50K SF+	no	yes	---
Minneapolis. MN	2013	25K/ 50K SF+	---	yes	yes	---
New York, NY	2009	10K/ 50K SF+	50K SF+	no	yes	Assessments, RCx, Lighting, Sub-metering
Philadelphia, PA	2012	50K SF+	---	yes	yes	---
Portland, OR	2015	20K SF+	---	yes	yes	---
San Francisco, CA	2011	10K SF+	---	no	yes[2,3]	Assessments or RCx
Seattle, WA	2012	10K SF+	5+ units	yes	no	---

[1] This refers to whether public disclosure of **building specific** energy use is required. In all cases, summary data is publically shared with the public.
[2] Discloses summary of compliance, but not building energy use (they will in the future when they have solved data quality issues)
[3] CA's statewide initiative, AB 1103, requires buildings to disclose energy performance at point of transaction

In national news, it was announced on April 21, 2015, by the American Council for an Energy –Efficient Economy (ACEEE), that the United States House of Representatives, followed by Congress, passed S 535, an energy efficiency bill that has a provision in it to promote commercial building energy use benchmarking and disclosure. This bill requires all federal agencies to benchmark and publically disclose their energy use. The bill also commits to conducting a study on state and local benchmarking policies and procedures, best practices, and shared databases.

III.c What are the benefits of Rating and Reporting (R&R)?

Knowing your building's energy performance rating is the first step towards understanding the energy use and improving a building's energy efficiency, while reducing energy waste. With an energy rating or benchmark, you can compare your building's performance against similar buildings, and against your own historical performance, to see how much you could be saving on energy costs. Rating and reporting helps to:

- MONITOR consumption trends and anomalies over time
- COMPARE building performance to peers and similar buildings
- IDENTIFY energy systems needing attention and opportunities for savings
- TRACK actual savings from improvement projects
- EDUCATE shareholders on utility costs and environmental impact

When coupled with monitoring and efficiency improvements, rating and reporting (R&R) supports the following outcomes:

Reduced Energy Costs Utilities are typically the largest non-fixed expenditure of a business. R&R provides a basic but valuable way for owners to understand energy use and identify cost-effective opportunities to cut energy waste and costs. Studies have estimated that R&R leads to an average annual energy savings of about 2 percent.[2]	**Improved Value of Building Stock** A recent study[3] shows that green buildings command a market premium and provide numerous other benefits including: • On average, a 5 percent increase in building value • Lower vacancy and higher rental rates • Increased worker productivity
Achievement of Local Policy Goals Based on savings projections from other cities, Boulder could reduce overall GHG emissions by about 10 percent by identifying and implementing improvements in the lowest performing commercial buildings. R&R will allow the city to track its energy reduction goals/target incentive dollars by market sector.	**Better Programs and Services** Benchmarking data illuminates trends that guide energy efficiency program development and outreach efforts (helps target market segments with max potential, or identify key areas of research needed). Data from R&R can be used as a low-cost method to supplement traditional evaluation, measurement, and verification methods.
Increased Market Transparency Market transparency of building energy data will drive energy efficiency in buildings. Further, R&R provides potential tenants and buyers with information to help them evaluate those costs and recognizes buildings for efficiency improvements.	**Job Creation** R&R policies drive increased demand for energy efficiency and management services, creating more jobs in the energy services and construction trades.

III.d Interrelationship with Energy Codes

Boulder's current commercial energy code requires that all new buildings exceed the 2012 International Energy Conservation Code (IECC) by at least 30 percent.[4] This is the most stringent commercial energy code in the country – Boulder's code is approximately 18 percent more stringent than California's Title 24 2013 (T24) energy code.[5] Even with this accomplishment, in order to reach net zero by 2031, the city's adopted commercial and industrial energy codes will need to evolve significantly in the next 10-plus years. With this in mind, city staff is evaluating the potential evolution toward outcome-based energy codes that would utilize the database of energy benchmarking data.

Outcome-based energy codes go a step beyond prescriptive or performance-based codes by verifying actual energy performance in buildings. Compliance is contingent upon demonstrating that a building's energy use, once the building is occupied, meets or exceeds a specific performance target. The city will likely consider transitioning to outcome-based energy codes, at some point along the path to net zero by 2031.[6]

The rating and reporting program could provide a dataset to inform the targets that need to be set for outcome-based codes, and also provide a method for tracking achievement of the targets in the future. Below is a proposed sequencing of how this could potentially evolve over the next several years.

[2] In 2012, the U.S. Environmental Protection Agency (EPA) analyzed the energy performance of more than 35,000 buildings that received ENERGY STAR performance scores for 2008 through 2011 and found that these buildings attained average annual energy savings of 2.4percent (7 percent over a three-year period).
http://www.energystar.gov/ia/business/downloads/datatrends/DataTrends_Savings_20121002.pdf?8d81-8322

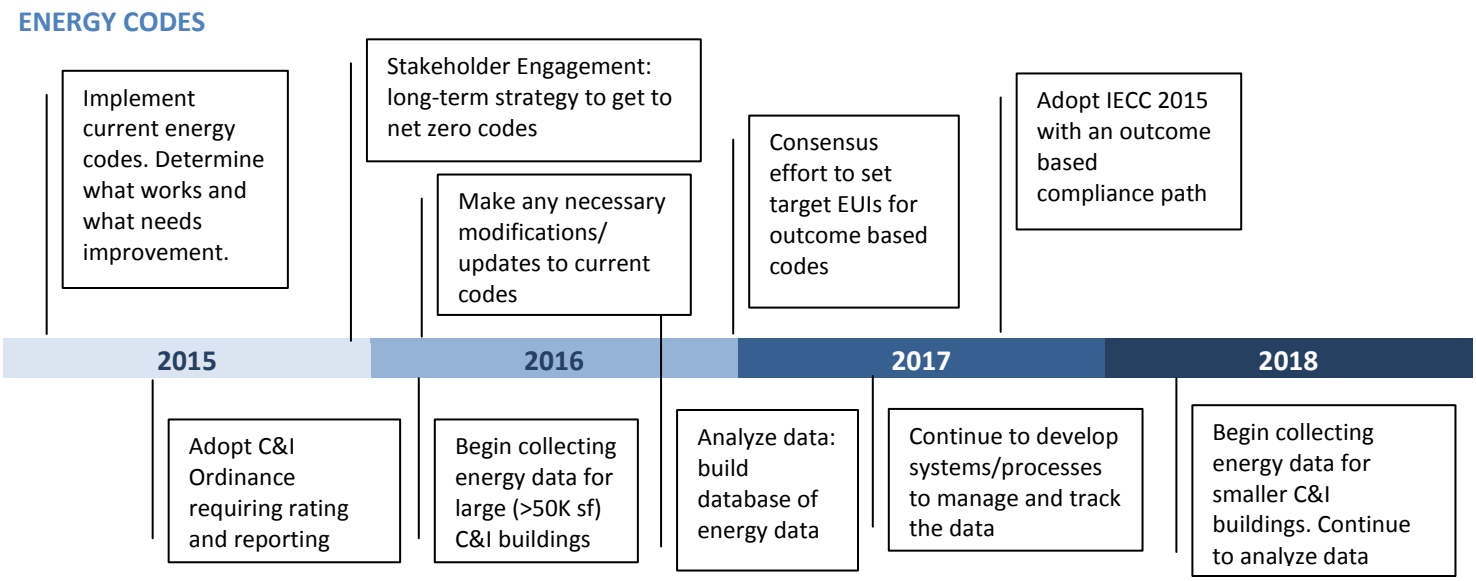
[3] http://www.cbre.com/EN/AboutUs/MediaCentre/2009/Pages/110209.aspx

[4] This requirement can either be met prescriptively, or through the Performance Rating Method (PRM) of ASHRAE 90.1-2010. Under the PRM pathway, one must demonstrate through whole building energy modeling that the proposed building will have annual utility costs at least 30 percent lower than the reference code building.

[5] Title 24 2013 (CA's current energy code) is approximately 12 percent more stringent than IECC 2012.

[6] Currently, Seattle is the only city in the country that offers an outcome-based compliance path.

Potential Timeline for Commercial & Industrial Energy Codes and Rating and Reporting



III.e Interrelationship with Other City Code Requirements

There are two existing city ordinances that also impact energy use in the C&I Sector:

1. Outdoor Lighting Code/Dark Skies Ordinance: Requires all exterior lighting to comply with specified maximum light levels and other requirements to prevent night sky light pollution.
    a. If a new C&I Ordinance requires mandatory lighting efficiency measures, the city will specify that any fixtures must also comply with the existing outdoor lighting code. The current dark skies requirements do not address the efficiency of the exterior lighting, only the maximum light levels and shielding required to prevent night sky pollution.
    b. If a new C&I Ordinance requires periodic energy assessments, the city could require that this assessment determine whether all exterior lighting is compliant with existing code requirements.

2. Requirements Related to the Operation of Medical and Recreational Marijuana Businesses: In 2013, the city added a requirement for all dispensaries and grow facilities in the city of Boulder to offset 100 percent of their electricity consumption. This requirement can be met in one of four ways: (1) the purchase of renewable energy in the form of Windsource, (2) a verified subscription in a Community Solar Garden, (3) renewable energy generated onsite, or (4) an equivalent that is subject to approval by the city. These requirements also cap the maximum size of such facilities at 15,000 sf. Based on recommended size thresholds for the potential C&I ordinance, these facilities would not be covered.

    Currently, all but one of the approximately 70 applicable facilities are choosing the Windsource option to satisfy the offset requirement. Because the Climate Action Plan (CAP) tax excludes any electricity consumption that is being offset by Windsource, all of the revenue from these offsets is leaving Boulder's local economy without being used to fund the city's sustainability programs or to directly reduce energy use at these facilities. While staff feels that it would be confusing and redundant to cover marijuana facilities under this potential C&I ordinance, energy staff is working with marijuana licensing staff to consider options for revising the existing requirements. Such options *could* include:

    a. Requiring the reporting of annual energy use (right now, that information is not being collected). This could be collected through the proposed rating and reporting system; and/or
    b. Replacing the Windsource offset option with a local offset fund that could be used to support energy efficiency and clean energy in the city of Boulder (similar to what Boulder County is doing with its marijuana offset requirements).

IV. Analysis of Options

This section discusses the options available, and proposed recommendations, for each of the key components of the ordinance.

- **Impacted Buildings and Phasing Strategy (section IV.a)**: Which buildings would be covered by the ordinance and what is the proposed compliance timeline?
- **Reporting and Disclosure (section IV.b):** What metrics would be reported to the city, and what information would be disclosed to the public?
- **Efficiency Requirements (section IV.c):** What would the energy efficiency requirements entail?
- **Exemptions (section IV.d):** What exemptions would be available for the proposed requirements?

HOW ARE COMMERCIAL AND INDUSTRIAL BUILDINGS DEFINED?

Commercial buildings are defined as any structures encompassing any non-residential use or occupancy according to the County's tax assessor records.

An industrial building is:

- any building which has a primary use of assemblage, processing, and/or manufacturing products from raw materials or fabricated parts, **OR**
- any building that has the majority of its energy usage come from process loads.

IV.a Impacted Buildings and Phasing Strategy

Staff is proposing that commercial and industrial building owners (of a certain size) would be required to rate and report the energy use of their buildings, and to take certain energy efficiency actions.

Building Types

This proposed ordinance would cover commercial and industrial buildings, but exclude residential units within multi-family buildings. Federal-, state- and county-owned buildings are not required to comply with a city ordinance, so this would not cover large institutional facilities such as the University of Colorado Boulder, or the federal labs. While some cities exclude industrial buildings, staff does not recommend this as those are the most energy-intensive buildings in Boulder.

Multi-family units (MFUs) would be excluded to avoid placing multiple requirements on rental housing owners.[7] SmartRegs, the city's rental housing energy efficiency requirement, is more than halfway through the eight-year implementation phase, with approximately one third of the city's licensed rental housing units certified as compliant. The city will soon be exploring a future strategy for SmartRegs, which would phase in after the deadline for all rental housing units to be in compliance with the efficiency requirements (Dec. 31, 2018). This next phase of SmartRegs could include rating and reporting requirements, but that will be part of a larger strategy process.

Thresholds for Building Size and Energy Use

City owned commercial and industrial buildings would be covered by this ordinance if gross square footage exceeds 5,000 square feet (sf). Newly built C&I buildings would be covered if gross square footage exceeds 10,000 sf, so that the city can verify if these buildings are actually performing close to what the energy models predicted in the permit documents.[8] Private sector C&I buildings would be covered by this ordinance if the building's gross square footage exceeds the size threshold (see options in Table 3).

[7] If a large multi-family building contains more than 50,000 sf (or whatever the current size threshold is) of common, non-residential space, a building owner must comply with the ordinance for those portions of the building.

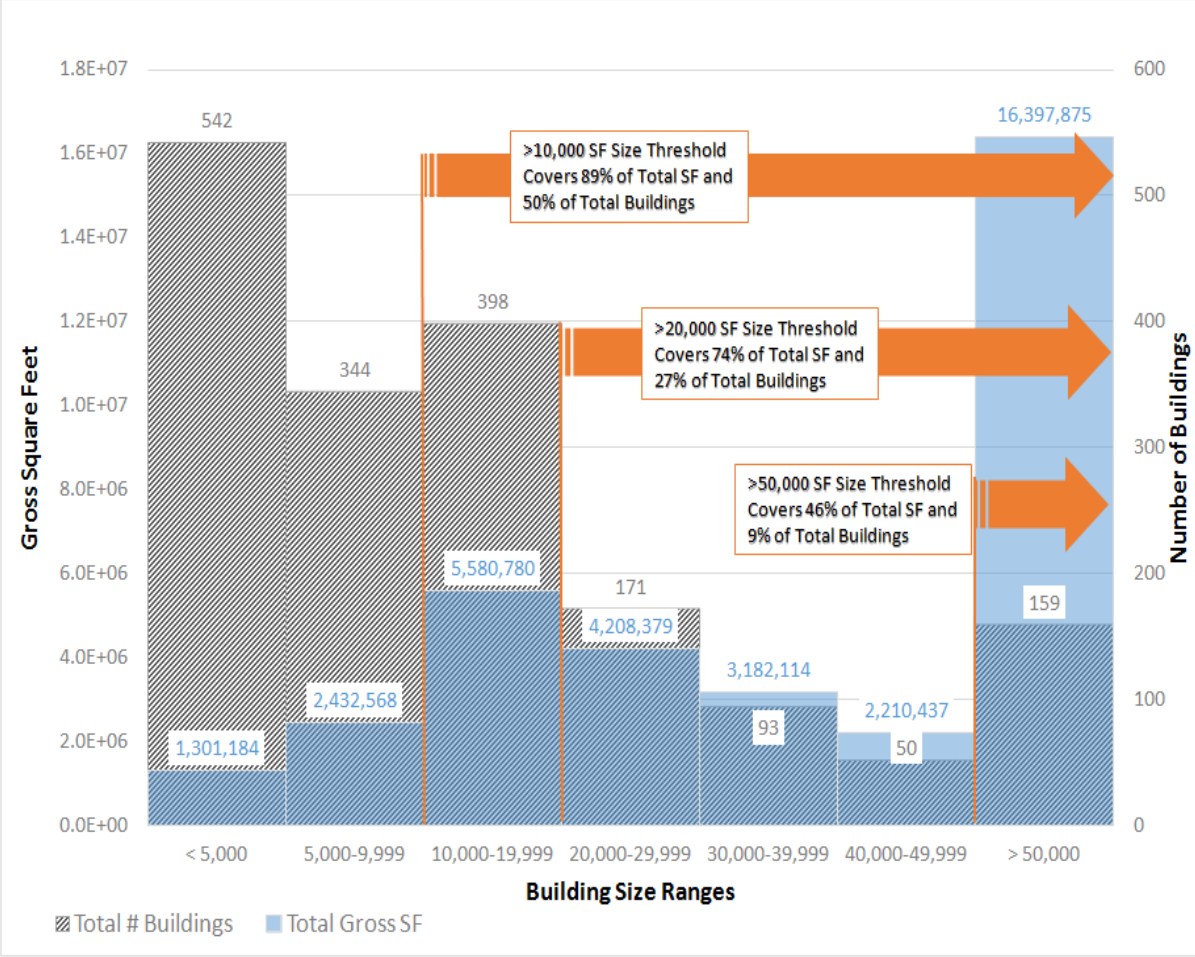
[8] Any building constructed since Jan 31, 2014 is considered "new." This was the date when the city starting enforcing the new commercial energy code (from IECC 2006 to 30 percent better than IECC 2012).

Table 3: Options for Building Size Thresholds for Private Sector Buildings

	Pros	Cons
Option 1A: Larger than 20,000 sf **(Recommended)**	✓ Simpler, lower cost administration and enforcement (see Figure 3) ✓ Preferred option for building owners	– GHG Reductions: Does not address 26 percent of the C&I floor area that could be covered by the ordinance
Option 1B: Larger than 10,000 sf	✓ GHG Reductions: Covers a larger portion of the building stock to maximize GHG reductions	– Administration: It has proved difficult and costly in other cities to include buildings < 20,000 sf – Covers ~400 additional buildings, but only 15% more floor area

Including buildings as small as 10,000 square feet would only cover an additional 15 percent floor area, but would require the city to administer the program for approximately 400 more buildings (see Figure 3). Please refer to **Attachment E** for a tabular breakdown of the commercial building square footage in Boulder.

Figure 3: Total Square Footage (sf) and Number of Buildings Impacted



With regard to phasing, the stakeholder working group strongly recommended that the city start with a smaller number of buildings and fine tune systems and procedures before phasing in additional buildings. Staff is confident that this approach strikes a balance between impacting a large amount of floor area, and having a small enough number of buildings so that the program is manageable. For instance, starting with buildings larger than 50,000 sf will impact 46 percent of the square footage, but only 9 percent of the buildings (about 150 buildings). The following table presents two options for the start of the phased compliance timeline – either 2016 or 2017.

Table 4: Options for Compliance Timeline

	Pros	Cons
Option 2A: 2016 Start Require the largest buildings to comply with R&R in 2016, and phase in smaller building by 2020. Start phasing in efficiency requirements in 2019 or later. **(Recommended)**	✓ Provides the city with data on its largest buildings as soon as possible, to inform future energy codes ✓ Allows time for the city to get systems/ processes working and for the private sector to plan for and absorbs costs	– Delays the capture of GHG reductions for smaller buildings – Requires a new employee (or an external program administrator) before 2016
Option 2B: 2017 Start Require the largest buildings to comply with R&R in 2017, and phase in smaller building by 2020. Start phasing in efficiency requirements in 2020 or later. *This option is required if the program administration is contracted out (versus managed in house).*	✓ More prep time for the city before the first compliance date ✓ Allows more time for the private sector to plan for and absorbs costs	– Delays the capture of GHG reductions for **all** buildings – Does not capitalize on the current momentum and awareness the city has built around this topic

Under the recommend compliance timeline, only large C&I buildings (> 50,000 sf), newly constructed C&I buildings (>10,000 sf), and city- owned buildings (> 5,000 sf) would have to comply in 2016. Over time, smaller existing private sector buildings (> 20,000 sf) and efficiency requirements would be phased in. Table 5 summarizes the recommended phasing strategy.

Table 5: Recommended Phasing Strategy for C&I Ordinance

City Owned Buildings	Private Sector Commercial and Industrial Buildings (Bldgs)		
>5,000 sf	**Existing Bldgs > 50,000 sf** **New Bldgs* >10,000 sf**	**> 30,000 sf**	**> 20,000 sf**
2016: Required rating and reporting (R&R) to the city begins. 2019 or later:** Efficiency requirements take effect	2016: Required R&R to the city begins. 2019 or later:** Efficiency requirements take effect	2016-2017: No requirements 2018: Required R&R to the city begins 2021 or later:** Efficiency requirements take effect	2016-2019: No requirements 2020: Required R&R to the city begins. 2023 or later:** Efficiency requirements take effect

** Any building constructed since Jan 31, 2014 is considered "new." This was the date when the city starting enforcing the new commercial energy code (from IECC 2006 to 30 percent better than IECC 2012). Staff would like to verify if these buildings are actually performing close to what the energy models predicted in the permit documents.*

*** Depending on the option chosen for efficiency, the requirements could take effect for the largest buildings as soon as 2019, or as late as 2030.*

IV.b Reporting and Disclosure

Reporting to the City

Staff is proposing that the following metrics would be provided to the city in order to comply with the rating and reporting requirement. All of this information will be collected when the owner completes the required inputs in ENERGY STAR Portfolio Manager (ESPM).

WHAT IS DISCLOSURE? HOW DOES IT DIFFER FROM REPORTING?

Disclosure is the process of disseminating the reported energy use information to the public. Disclosure is something that the city would do with the information "reported" by the building owners.

- Building information (address, floor area, building type, year built, building owner and contact information, etc)
- ESPM rating[9] (this rating accounts for weather, hours of operation, occupant density, number of computers, and other factors that impact energy use per floor area)
- Normalized[10] and Non-normalized Site and Source Energy Use Intensity (EUI): units (kBtu/sf-yr)
- Estimated Greenhouse Gas Emissions (GHGs): units (Metric tons CO2e/yr)
- Total annual electricity use (kWh/yr)
- Total annual natural gas use (therms/yr)
- Any relevant certifications (i.e. ENERGY STAR Certified, LEED certified)
- On-site renewable energy production

Additionally, owners will have the opportunity to voluntarily provide the following information:

- What percentage of the energy for this building comes from Windsource?
- Is this building designated as a historic building?
- Is this building process load dominated?

For buildings that are dominated by process loads (i.e. buildings used for manufacturing or industrial processing), the city would encourage building owners to develop, track and report metrics of their choosing that makes the most sense for their business process. Under this path, the agreed upon metric would be disclosed publically (if applicable) instead of Site and Source EUI (Energy Use Intensity), which are not appropriate metrics for process-dominated facilities.

Reporting to Tenants

The ordinance would require all building owners to provide their tenants with the Statement of Energy Performance from ESPM and any required energy assessment reports. These documents would be provided to tenants according to the same reporting schedule for reporting such information to the city.

Reporting to Potential Buyers and Lessees

Some cities have a requirement to report energy use information to potential buyers. This can be a requirement to report this information when advertising for lease or sale, at the point or transaction, or upon request. Staff does not recommend including this requirement for the City of Boulder because it would be extremely difficult to track and enforce. Further, reporting energy use at the point of transaction and upon request already occurs as a regular market practice in Boulder.

Disclosure to the Public

After the building owners have fulfilled their requirement to report energy use and metrics to the city and their tenants, the city would then disclose a portion of this information to the public. This information could either be disclosed in aggregate form, or by specific building address. The community working group that collaborated with city staff to develop requirement recommendations spent significant time discussing the issue of public disclosure of energy data and metrics tied to specific building addresses.

[9] This rating is normalized for weather and also adjusted to reflect occupant density, operating hours, and other factors that greater influence energy use, such as the number of computers or servers in a space.

[10] "Normalized" is the energy the building would have used under average weather conditions in the building's geographic location. Since weather in a given year can be hotter or colder than average, weather-normalized energy is used to account for yearly variations.

Table 6 is a summary of the viewpoints of working group members.

Table 6: Working Group Viewpoints - Public Disclosure of Building Specific Energy Use

Viewpoint of Building Owners and Property Managers	*Viewpoint of Service Providers and County/City Staff*
Primary Concern: Energy data alone may drive potential tenants or buyers away without further research. **Secondary Concern**: Service providers may use data to generate leads and solicit building owners. **Recommendation**: Do not give the public access to building specific energy metrics– report only aggregate information (group buildings by type and size range).	**Primary Concern**: If individual building data isn't disclosed to the public, then there is a lack of data transparency in the marketplace to drive transformation. **Recommendation**: After a two-year grace period, publically disclose all information reported to the city (except for owner name and contact info).

With this in mind, staff is presenting two options for public disclosure.

Table 7: Options for Public Disclosure

	Pros	Cons
Option 3A: Building Specific Public Disclosure (Recommended) *After a two-year grace period, publically disclose all information reported to the city (except for owner name and contact info)*[11]. • During the grace period, only publically disclose aggregate information. • Indicate which buildings are historic or process load dominated. • Per the owner's request, do not disclose energy use and ratings if a building is undergoing an efficiency retrofit. • Exemption for disclosing building specific energy use if that information is reasonably considered proprietary business information.[12]	✓ Drives market transformation and competition by providing potential tenants, investors, and lenders with comparative metrics ✓ GHG reductions: Will likely motivate more efficiency investments ✓ Two-year grace period allows owners time to improve their rating before public disclosure	– Many building owners and property managers do not support this – Owners may be contacted by service providers looking for "wasteful" buildings – Historic buildings that are difficult to retrofit will likely appear inefficient
Option 3B: Limited Public Disclosure *Do not publically disclose the entire dataset with building addresses – report only compliance status and aggregate information (averages by building type and size).* • The public can only access data for a specific building by entering the property address and filling out a query form.[13]	✓ Preferred option for building owners and property managers ✓ Owners will still be able to compare their building metrics to their peers	– Does not encourage market transformation and competition – GHG reductions: Will likely result in less efficiency – Building specific data can still be requested under the Colorado Open Records Act (CORA)

Because building specific public disclosure is a key issue for the business community, staff is requesting council's input on the proposed options above. The advantage of Option 3B is that this path would encourage competition and drive market transformation by having full transparency around commercial building energy use. In communities that utilize Option 3B, the data is typically summarized in spreadsheet form and presented as follows. Many communities also have map-based visualizations tools that allow you click on individual sites to view energy metrics (see the City of Philadelphia's web-based visualization tool).

[11] People wanting access to a specific buildings' dataset must fill out a form, which is then available to owners.

[12] For example, a building that, if targeted, could shut down critical business operations.

[13] Building owners are notified when information for their building is accessed.

Table 8: Sample Public Disclosure Information (Philadelphia, PA)

Building Information		Building Performance					
Address	Property Floor Area (Buildings and Parking) (ft²)	Electricity Use (kBtu)	Natural Gas Use (kBtu)	ENERGY STAR Score	Site EUI (kBtu/ft²)	Source EUI (kBtu/ft²)	Total GHG Emissions (MtCO2e)
1924 W Olney Ave.	757,521	61,617,356	6,394,249	99	849.5	2,469.2	7,995
9801 Frankford Avenue	62,000	162,661,197	8,811,112	93	757.4	2,210.1	21,832
3400 N. Broad Street	155,228	18,290,057	22,115,596	16	323.3	644.0	3,503
3440 N. Broad Street	129,260	17,966,207	40,195	46	323.2	514.7	6,436
3500 N Broad Street	485,000	16,699,836	71,788,580	Not Available	320.6	463.1	5,925
1121 W. MONTGOMERY AVENUE	421,938	29,807,048	2,159	34	319.8	617.5	7,299
3307 N. Broad St.	169,976	15,246,713	7,864,771	25	308.6	749.6	2,348

The vast majority (about 85 percent) of cities that require rating and reporting also require public disclosure of building specific energy use and associated metrics. This requirement stems from the opinion that full public disclosure is key to driving true market transformation. While staff fully supports this opinion, it should also be noted that there is no compelling, or statistically significant, evidence to support the widespread belief that public disclosure of building specific energy use results in more energy savings – to date, only a few cities have published savings estimates for these programs, and all of those cities require full public disclosure. Additionally, Boulder's business community has expressed concerns regarding data privacy and the overall amount of city regulations. This may be an area worthy of additional consideration in light of these concerns and this feedback.

IV.c Efficiency Requirements

KEY DEFINITIONS

Retrocommissioning (RCx) - a process that improves a building's operations and maintenance (O&M) procedures to enhance overall building performance. Retrocommissioning is designed to improve the efficiency of existing building operations by "tuning up" and calibrating existing functional systems to run as efficiently as possible through low- or no-cost improvements.

Building Tune-Up - a scaled down version of retrocommissioning that is more appropriate for smaller buildings with less complex systems.

Staff has explored many options for efficiency requirements, and presents the following for City Council consideration. Staff does not recommend Options 4A or 4B because they do not capture significant GHG emission reductions. Option 4C requires efficiency actions that are proven to be cost effective and will result in higher performing buildings and less energy waste. While there are many other efficiency measures that would be cost effective, retrocommissioning, building tune-ups, and lighting upgrades apply to all building types. While Option 4D is designed to capture all cost effective energy efficiency, this would be very difficult to standardize and administer. Finally, Option 4E is very attractive as a longer term option, once the city fully understands how the building stock is performing and could set reasonable targets. If council would like to pursue this option, staff recommends a compliance period from 2024 to 2030 to provide enough time to analyze the data and set reasonable targets.

Table 9 and Table 10 summarize the pros and cons of each option. Staff does not recommend Options 4A or 4B because they do not capture significant GHG emission reductions. Option 4C requires efficiency actions that are proven to be cost effective and will result in higher performing buildings and less energy waste. While there are many other efficiency measures that would be cost effective, retrocommissioning, building tune-ups, and lighting upgrades apply to all building types. While Option 4D is designed to capture all cost effective energy efficiency, this would be very difficult to standardize and administer. Finally, Option 4E is very attractive as a longer term option, once the city fully understands how the building stock is performing and could set reasonable targets. If council would like to pursue this option, staff recommends a compliance period from 2024 to 2030 to provide enough time to analyze the data and set reasonable targets.

Table 9: Options for Efficiency Requirements

	Pros	Cons
Option 4A: Various Prescriptive Requirements (NOT Recommended) *Requiring specific individual efficiency measures such as the phasing out of old inefficient lighting, RCx, or required minimum performance standards for Heating Ventilation and Air Conditioning (HVAC) systems, office equipment, appliances, cooking equipment, etc.).*	✓ This approach would tailor specific requirements to different building sizes and types	– Limited to existing technologies, but future efficiency gains will come from emerging technologies – Prescriptive measures are quickly out of date with building science and new codes. This approach requires constant revision and updating – Extremely difficult to enforce
Option 4B: Energy Assessments with No Required Action (NOT Recommended) *Energy assessments[14] by a qualified professional are required every five years. Buildings that implement efficiency measures and realized at least 25 percent total energy savings from the prior assessment will be on a 10-year cycle.*	✓ Places the least regulation and requirements on the business community ✓ Easiest option for city administration and enforcement	– Does not require any cost effective efficiency measures – Results in the least GHG emissions savings and potentially the highest costs to building owners
Option 4C: Energy Assessments with Limited Required Action *Every 10 years:* • *Energy assessments* • *RCx for buildings larger than 50,000 sf* • *Building Tune-Ups for smaller buildings* • *Required lighting upgrades* *The building owner would have two years from the energy assessment to implement required measures.*	✓ These measures typically payback in under 3 years ✓ Relatively simple to administer and enforce ✓ Highly impactful efficiency measures will be implemented across the building stock	– Owners object to required RCx because of the upfront cost – There is no requirement to implement other cost effective measures that might be identified in the energy assessment
Option 4D: Energy Assessments with Required Cost Effective Action *Energy assessments by a qualified professional are required every 10 years. Any measure identified as having a positive net present value within three years must be implemented. The building owner would have two years to implement those measures, or to justify why they cannot.*	✓ Only requires action that is applicable and cost effective to each individual building ✓ Will result in greater GHG emissions reductions	– Owners and property managers do not support this – It will be difficult and time consuming for the city to standardize and quality control the analysis performed by various service providers
Option 4E: Whole Building Performance Standards (NOT Recommended until 2030) *A certain level of whole building performance would be required, such as: a required minimum ENERGY STAR score, a maximum EUI by building type, or a certain level of whole building energy savings per year.*	✓ Guarantees a significant reduction in energy use and GHG emissions ✓ Aligns best with future outcome based energy codes ✓ Would necessitate a lengthy phase-in time, giving the city and private sector time ample time to plan	– The city does not yet understand how the building stock is performing and costs associated with such targets[15] – Delays GHG savings: Would not require compliance until 2030 – Owners and property managers do not support this – Could result in unreasonable, costly, and unachievable demands on building owners

[14] Equivalent to a Level 2 energy audit, as defined by the American Society for Heating, Refrigeration and Air-Conditioning Engineering (ASHRAE). This audit includes an energy end use breakdown for the building, and detailed cost and savings analysis for efficiency measures.
[15] Multiple years worth of data from the Rating and Reporting requirements will allow the city to understand this in the future.

Table 10: Options for Efficiency Requirements (Graphical Display)

	Maximizes GHG Reductions	Minimizes Cost Impact to Building Owners	Minimizes Complexity for Requirements	Is Desirable to Building Owners	Minimizes Cost/ Administrative Impact to City
Option 4A					
Option 4B					
Option 4C					
Option 4D					
Option 4E		Unknown			
KEY					
 = Fully achieves goal				 = Fails to achieve goal	

With any option, it would be important to provide additional incentives and support to commercial building owners.

If the city pursued Option 4C, only lighting upgrades and retrocommissioning would be required. Significant work would need to occur in order to specify the details of these requirements and how building owners could comply.

Lighting Upgrades

If lighting upgrades are required as part of this proposed ordinance, more research is needed to determine necessary qualifications for service providers, the minimum scope of work required, and specific required actions. The requirements for lighting upgrades would likely be either:

- **Lamp Efficiency-Based**: Any old, inefficient lighting technologies (i.e. incandescent or T12 lamps) must be replaced with EnergySmart eligible replacement lighting (i.e. fluorescent or LED) technologies.
- **Code-Based or Power Density Approach (Recommended)**: All interior and exterior lighting must comply with certain prescriptive requirements of the City of Boulder energy code requirements. All non-residential spaces should comply with the power density limits (watts per square foot) from the current version of the International Energy Conservation Code.

The code-based requirement would be much more stringent, and would need to allow for exemptions for prescriptive requirements that are cost or constructability prohibitive, such as lighting control requirements. The code-based requirement would also require a building permit for the upgrades. Still, staff recommends this approach because it allows for flexibility in the lighting design and better achieves the ultimate goal of overall building efficiency.

Requiring efficiency at the lamp or fixture level doesn't preclude over-lighting, and may dictate upgrades that don't make financial sense or allow businesses to create a desired ambiance. The power density approach allows businesses to focus their attention on the upgrades that make the most sense to them.

Retrocommissioning and Building Tune-Ups

If Retrocommissioning (RCx) and Building Tune-Ups are required as part of this proposed ordinance, more research is needed to determine necessary qualifications for service providers, the minimum scope of work required, and required actions to address issues uncovered in the RCx process. Further, the city would need to determine if automated and continuous monitoring and RCx systems would satisfy the requirements.

Retrocommissioning consists of two main steps: (1) Diagnosis (a study) and (2) Implementation. Examples of typical retrocommissioning measures include:

- Calibration/tune-up of Energy Management System points
- Adjustment of outside air and return dampers
- Resetting the chilled water and hot water supply temperatures
- Optimizing start/stop of air handlers and makeup air units (early shutdown in the evening, late start in the morning)
- Resetting of a chiller's condenser water temperature
- Eliminating simultaneous heating and cooling

A Building Tune-Up is a scaled down version of retrocommissioning that is more appropriate for smaller buildings**.**

IV.d Exemptions

For the Rating and Reporting and efficiency requirements, staff recommends the following exemptions:

Rating and Reporting Exemptions	Efficiency Exemptions
• Buildings with less than one year of use data • Unconditioned and unlit buildings • Proven financial hardship • Others upon request and review	• Current ENERGY STAR Certification • Current LEED EBOM Certification • For the first compliance deadline: Buildings that have had an energy assessment in the past five years and implemented measures that resulted in at least a 10 percent energy reduction • Proven financial hardship • Others upon request and review

If the option for Building Specific Public Disclosure is chosen, there would be an exemption for disclosing building specific energy use if that information is reasonably considered proprietary business information. An example of this would be a critical facility performing tasks related to security, or a building that, if targeted, could shut down critical business operations.

V. Implementation Considerations

As proposed, the ordinance would create new requirements and a new ongoing program in the city, resulting in a commensurate need for staffing resources to develop, implement and enforce the ordinance and program. In addition to developing the program and its requirements and administering those, the city would need to manage any new incentives that are outside EnergySmart, and set up future systems for outcome-based energy code enforcement (should the city move in that direction).

V.a Budget Implications

To implement the proposed ordinance, it is anticipated that at least one Full Time Employee (FTE) will be needed, or alternatively, the program management and administration would need to be contracted out. In either scenario, there would be additional impacts to existing work plans. Staff is recommending that the Climate Action Plan (CAP) tax funds be used to fund this program, as long as the tax is active. If the city chooses to contract out the program administration, CAP tax funds alone would not be sufficient to cover the costs, unless another program was eliminated entirely.

The city anticipates that ongoing program costs will be between $280,000 and $440,000 a year, depending on whether the program is administered in house or contracted out (a more costly option) – this includes:

- Salary and benefits for an FTE **OR** consulting fees to administer the program
- New incentives and rebates
- Consultant fees: data analysis and quality control, development of annual benchmarking reports
- Training and support for building owners
- Development and dissemination of templates and how to guides for each of the requirements

In order to fund this program through CAP Tax funds, the city would have to reallocate existing resources and potentially request new resources through the 2016 budget process. This reallocation and budgeting will happen as part of a larger effort that considers all of the city's energy related programs.

When the CAP tax expires, the city will need to determine how this program will be funded and administered. Likely possibilities include the new municipal electric utility (if formed) or the city's Building Construction department, *if* the rating and reporting database becomes a crucial component of enforcing future outcome based energy codes.

Options for Cost Recovery

Many cities charge a filing fee to comply with their benchmarking and energy audit requirements. This is not recommended for the first two years, as our businesses already contribute to the CAP tax, which will fund this program through 2017. When the CAP tax expires (Dec. 31, 2017), the staff recommends that a modest filing fee (something around $50 to $150 per building) be instituted.

V.b Fines for Non-Compliance

The city explored a number of enforcement strategies to ensure high compliance rates. Best practices from other cities show that a combination of outreach and education, written and verbal reminders, coupled with monetary fines are the most successful. With these strategies, Seattle was able to achieve a 93 percent compliance rate in its first year. The city will continue to invest in outreach and education efforts for the building community (see Section V.d). In addition, staff is exploring what fines would be appropriate under the Boulder Revised Code and the current Administrative Action Penalties. In other cities, fines range from $50 to $500 per day.

V.c Impact to Tenants

While these requirements would be imposed upon building owners, tenants will be impacted in many ways – depending on which options are chosen for public disclosure and energy efficiency requirements. Further research is needed into how to structure the requirements to address both tenants and owners.

- **Rating & Reporting**: Tenants would be required by the potential ordinance to give building owners access to their energy bills.
- **Energy Assessments**
  - Access to spaces: The assessments will be conducted within tenant spaces and require coordination.
  - Costs: Owners may pass through the costs of the energy assessment to the tenants, but if they don't implement any upgrades, the tenants' energy bills won't go down.
  - Coordination: Owners will be required to provide tenants with a copy of the energy assessment report and be encouraged to coordinate energy upgrades through green leasing.
- **Required Efficiency:** Some of the cost-effective efficiency measures may fall under the tenant's jurisdiction (i.e. retail lighting or process loads). The requirements either need to be restricted to base building systems, or need to specify that tenants must cooperate.

V.d Training and Support

Following the passage of the ordinance, the city would design and implement education and training programs to assist building owners with ordinance compliance. It will be important that the city provide support and resources, such as: a website, call center, green lease templates, in-person and online training of the ENERGY STAR Portfolio Manager Tool, and general assistance and support with understanding the rating and reporting and energy assessment information. The city will also coordinate with EnergySmart advisors and call center operators to ensure that they are able to answer questions related to the ordinance as well.

Support for Process-Load Dominated Buildings (Industrial and Manufacturing)

As part of the rating and reporting requirement, for buildings that are dominated by process loads (i.e. manufacturing buildings), the city would encourage owners to develop, track and report an additional metric of their choosing that makes the most sense for their business process. Under this path, this agreed upon metric would be disclosed publically (if applicable) instead of Site and Source EUI, which are not appropriate metrics for process-dominated facilities.

The Colorado Industrial Energy Challenge (CIEC) is a voluntary program managed by the Southwest Energy Efficiency Project (SWEEP) and funded by the U.S. Department of Energy's (DOE) Advanced Manufacturing Office (AMO). The CIEC program challenges manufacturing companies to develop and set a five-year energy efficiency goal, provides networking and training opportunities, and offers public recognition from the Governor's office. The program is open to industrial facilities in Colorado with more than $200,000 in annual energy costs. As part of this proposed ordinance, staff recommends that the City of Boulder provide $10,000 per year to CIEC to offer these services to Boulder-based manufacturing companies that are below the annual energy cost threshold. These funds would allow CIEC to provide support services to ten Boulder based manufacturing companies each year.

V.e Incentives

Staff is proposing new financial incentives for early adopters for any efficiency requirements approved by City Council. Existing resources would be reallocated within the CAP tax fund to cover this, and to expand the city's Commercial EnergySmart rebate funds for custom rebates for efficiency measures that arise from required energy assessments and are not covered under the current list of prescriptive rebates.

Table 11: Proposed Rebates and Incentives

	Incentive	Annual Budget (2016 and 2017)
Early Adopter Incentive: Subsidizes the cost of the required periodic energy assessments	10% of cost (up to $10,000 per building)	$125,000/year (funded by reallocation of CAP Tax dollars)
EnergySmart Rebates for custom efficiency measures	$ per metric ton of CO_2e saved[16]	$230,000/year (funded by reallocating Commercial EnergySmart Funds)

VI. Costs and Benefits

As with any new program, it's important to consider the anticipated costs and benefits to both the city and the community. There is a large variability in the anticipated costs to commercial building owners, depending upon which options for efficiency requirements are chosen, and also the size, complexity, and age and performance of building systems. Staff has gathered data from other cities with similar ordinances, as well as the Institute for Market Transformation, to develop these estimates in Table 12. Despite the variability in costs, the analysis shows that simply rating and reporting can result in a two percent savings in annual energy costs with a less than one year simple payback.

[16] Estimates of metric tons of CO_2e saved will come from the energy assessment reports. Additional research is required to determine the correct rebate per metric ton of carbon saved.

When annualized, the additional costs for periodic energy assessments and retrocommissioning would be less than one percent of a building's annual total operating expense.

Table 12: Summary of Costs and Savings

Requirements	Cost to City	Cost to Building Owner	Savings to Building Owner	Simple Payback
General Program Administration and Support	$155,000-315,000/year*	Annually: $500-$2,400 per building if using a consultant OR 4-8 hours of in-house staff time ** free benchmarking assistance is available through Energy Smart advisors*	~2% savings each year in annual energy costs	< 1 year
Energy Assessments (every 10 years)	$125,000/year (incentives) + additional staff time	$0.12-0.25/sf** *~0.2% of a building's annual operating expenses*	$0.02-0.04 per sf per year (if efficiency is implemented)	Varies
Lighting Upgrades (every 10 years)	~$152,000/year (EnergySmart rebates and advisor support)	$0.10-0.20 per sf	$0.03-0.05 per sf per year	3-4 years
Retrocommissioning or Building Tune-Up (every 10 years)	Additional staff time	Every 10 years: $0.13-0.45/sf***	$0.20-0.40 per sf per year	0.5 – 2.5 years

* Costs include either a new full time staffer (~$80,000 per year) or a contracted consultant (~$240,000 per year) to administer the program. Additional costs are for training and support and data analysis and quality control. First-year costs for 2016 will likely be on the high end to develop initial materials and then decrease in future years.

** The city will also provide a 10 percent rebate for early adopters to help offset these costs.

***Xcel Energy offers rebates for retrocommissioning and building tune-ups for as much as 75 percent of the costs of the study, and up to 60 percent of the costs of the implementation.

Please see **Attachment F** for complete details and citations on this cost analysis.

Net Economic Benefit to the City of Boulder

Based on data from other cities' benchmarking data, the city can estimate the net economic benefit of improving energy performance across the commercial building stock. Based on average data from the city of Seattle, Boulder's local economy could save the following in annual energy costs.[17] While capital expenditures are required to realize this savings that money would be flowing back into the local economy versus being paid out to the utility.

$8.5 million
saved each year if all buildings with high energy use improved to become average energy users

$14 million
saved each year if all buildings with high energy use improved to become low energy users

[17] Based on quartile averages for energy use intensity

Case Study – Sample Office Building in Boulder

Assuming a 75,000 square foot office building with annual energy costs of $150,000/yr and Option 4C assumed for required efficiency, the analysis shows that these requirements would pay for themselves in just over two years.

Total Costs: $4,175/year (annualized costs after rebates)
Total Capital Outlay: $41,750 (over 10 years)
Payback: 2.1 years
 	
• Rating and Reporting: 8 hours/year in staff time @$100/hr = $800/year
• Energy assessment: $1350/year
  o $0.2/sf = $15,000 every 10 years = $1500/year
  o City rebate = $1500 every 10 years = $150/yr
• Required Efficiency: $1985/year
  o Retrocommissioning = $1,125/year
  ▪ $0.3/sf = $22,500 every 10 years
  ▪ Xcel rebate = assume 50%
  o Lighting = $900/year
  ▪ $0.15/sf = $11,250 every 10 years
  ▪ City and Xcel rebates = assume 20%
	Savings: $20,050/year
	
	• Rating and Reporting = $1,050/year (average over 10 years)
	• Lighting: $3,000/year ($0.3 per sf per year)
	• Retrocommissioning = $16,000/year (assumes $0.3/sf with degradation over time)

VI.a Projected Energy and Greenhouse Gas (GHG) Emissions Savings

Staff also considered potential energy savings and GHG reductions from this proposed ordinance. Depending on the options chosen, an ordinance could save about thirty percent in GHG emissions (when fully implemented) for covered buildings. The proposed ordinance could save between 33,000 and 163,000 metric tons of carbon dioxide equivalent emissions ($MTCO_2e$) per year. To put that in perspective, the city estimates that its voluntary Commercial EnergySmart program saves about 13,000 $MTCO_2e$ per year. Energy codes for new commercial buildings are estimated to have similar savings. Thus, even on the lowest end of the estimate, the proposed ordinance would produce almost three times the emissions savings of current commercial programs.

Table 13: Potential GHG Reductions (compared to 2005 baseline)

	Estimated Annual GHG Savings ($MTCO_2e$/yr)	Emissions Savings for Covered Buildings
Rating & Reporting	~33,000 – 38,000	~6-8%
Efficiency (varies with options)	30,000* – 125,000**	~6-25%
Total	33,000 – 163,000	6-33%

* Based on Option 4B: Energy Assessment with No Required Action

** Based on Option 4D: While Building Performance Standards – please note that these savings would be realized about 10 years later as this option necessitates a longer compliance period.

Since this ordinance would not impact public sector buildings (other than city owned) or multi-family, the overall emissions for the city would of course be lower, but still very significant.

Impact to the City's Total Greenhouse Gas Emissions

- *2005 GHG Emissions = 1.8 million metric tons CO_2 ($MTCO_2$)*
- *Reductions needed to achieve 80 percent by 2050 Target = 1.44 million $MTCO_2$/year*
- *2012 GHG Emissions for buildings covered by proposed ordinance = 500,000 $MTCO_2$/year*

In terms of the city's total annual GHG emissions, this proposed ordinance could result in a 2 to 9 percent total savings.

Attachment B: Feedback from Working Group Meetings

The C&I working group discussed a number of considerations that the city should take into account when developing the actual design and enforcement of the ordinance. Working group members were in agreement regarding these considerations, which should be acted on:

- ***Exemptions*:** Consider exemption request for hardship if it is insurmountably costly to gather whole building data (e.g. in the case of multiple master meters, and no change to data privacy rules)
- ***Metrics Reported*:** Include a glossary of terms with the spreadsheet or website that displays this data
- ***How to Guide**:* Include information on options to overcome multiple meter challenge, including the option with Xcel's My Account Portal
- ***Website:*** Set up a query form to allow access to building specific data – have the data go to a valid email address. Store data of who has requested this and share this with interested building owners.
- ***Covered Building List*:** Give owners the opportunity to provide hyperlinks for their buildings, a secondary use type, or add contact info for property managers on the covered building list, which would be posted at least 4 months in advance of ordinance compliance deadline.
- ***Ordinance Language*:** Require a constant sharing of data with the city – do not allow data to be "unshared" after compliance date.
- ***Tenants:*** Include language in the ordinance that requires tenants to provide data within 30 days that owners need to rate and report.

Other Notes/Concerns:

- Think about how to address owner-occupied versus tenant-occupied buildings
- Include parking structures and parking lots in the city-owned building requirements (as a pilot)
- Provide guidance on mixed use buildings. E.g. data center, office space, manufacturing, etc. in single building can create a data collection and analysis headache.
- Provide special metric allowances for manufacturing/process load dominated buildings
- Commit to quality control of the data reported
- Do not reduce current incentives because of mandatory requirements
- Think about the following before compliance: What are the metrics and benchmarks this effort will manifest? How do we know if we're succeeding? What are the metrics of success?
- Messaging should be around savings and increased value for property owners. Talk about pay backs and rebates rather than audits and requirements.
- Include new incentives for early adopter.
- The working group would like to see the following:
    - Clearly articulate what is required of a building owner and what are the benefits
    - Provide adequate training and support for using ENERGY STAR Portfolio Manager
    - Identify appropriate exemptions or special requirements
    - Develop a full communication plan around this effort

Attachment C: Feedback from Environmental Advisory Board (EAB)

In general, EAB supported the proposed C&I Ordinance. A summary of the meeting is shown below:

- The board unanimously supported staff's recommended (Option 3A) building specific public disclosure requirements with potential exemptions for industrial/proprietary information.
- The majority of the board supported staff's recommended (Option 4E) efficiency requirements calling for energy assessments with limited required action.
- **M. Lommele** suggested that building owners who are implementing more energy efficiency strategies than are required should receive incentives for doing so and that there be financial consequences for owners not meeting requirements. She liked the idea of half of the fines paid going into a fund that would be dedicated to helping increase efficiencies and get owners into compliance.
- **M. Abbott** (via written email) supported the most stringent form of energy efficiency requirements (option 5) that would require energy assessments and actions.
- **T. Hillman** noted that with rebates available through Xcel and EnergySmart, the city shouldn't need to provide much, if any, additional rebate funding.
- **B. Queen** suggested calculating and advertising the total estimated public and private costs along with the estimated energy and energy cost savings and the amount of rebates that will be available to encourage people to take advantage of these opportunities to save.

Attachment D: Update on Existing Programs

Since 2010, the city and Boulder County have been collaborating on the EnergySmart, one-stop-shop energy efficiency programs for homeowners, property owners and businesses. The EnergySmart advisor model of delivering energy efficiency services was created in Boulder and is now integrated in energy efficiency programs all over the country. This is a great example of Boulder exporting energy innovation.

With EnergySmarts' full launch in 2011, the accumulative accomplishments that have been achieved are listed below.

Commercial EnergySmart provides advisor service, equipment rebates, contractor bid evaluations and project management assistance to businesses, building owners and property management companies. The success achieved thus far in the business community is:

- Over 3,500 businesses served county-wide
- Over 2,200 businesses served in Boulder (63 percent)
- Over 1,400 Boulder businesses advised with 769 those making upgrades.
- 862 upgrades made
- Saving more than 10.5 million kWh of electricity and over 12,500 Therms, saving nearly $940,000 in energy costs and avoiding nearly 8,500 mtCO2 annually.

Residential EnergySmart provides advisor services on energy efficiency and solar opportunities to homeowners and property owners. The service connects customers with an advisor that assists with scheduling a full utility level audit, provides guidance on efficiency and renewable energy opportunities, contractor bids, rebate availability and project completion. The program success achieved thus far is:

- Over 12,500 residential units served county-wide
- Over 7,300 residential participants served in Boulder (58 percent)
- Nearly 3,100 units making upgrades
- Over 6,600 upgrades made
- Saving nearly 2.6 million Kwh of electricity and over 700,000 Therms, saving over $760,000 in energy costs and avoiding over 5,800 mtCO2 annually

In March 2015, through a comprehensive selection process, Boulder County awarded CLEAResult (formerly Populus LLC) the annual contract for residential EnergySmart administration. As EnergySmart services and offering continually evolve, the county is offering a limited number of performance based rebates to encourage and support deeper retrofits and energy savings. Additionally, CLEAResult has brought in a solar advisor to assist EnergySmart customers with solar photovoltaic (PV) evaluations and installations on their homes.

Since there is an EnergySmart pathway to SmartRegs compliance, city staff was involved in the review, evaluation and selection process for the residential EnergySmart administrator and will again negotiate its own contract with CLEAResult for SmartRegs compliance assistance. A new contract will be in affect from June 1 through Dec. 31, 2015.

SmartRegs, the energy efficiency requirement for approximately 20,000 licensed rental units is more than halfway through the eight-year compliance timeline. The deadline for all licensed rental units to reach SmartRegs compliance is Dec. 31, 2018. The city has been working collaboratively with its partners, Boulder County which manages the residential EnergySmart contract and CLEAResult, with whom the city contracts for additional EnergySmart services for property owner assistance with SmartRegs compliance. The number of rental units reaching compliance over the last four years has increased as the city works to better integrate SmartRegs into the Rental Housing License Housing (RHL) program.

As of January 2015, property owners who are receiving a new or are renewing an expired rental license that isn't SmartRegs compliant, will receive a reduced term license until the unit shows compliance. All rental licenses will expire on Dec. 31, 2018, if units are not compliant with the energy efficiency requirement. This procedure has increased SmartRegs compliance, and the trend indicates that the compliance numbers will continue to grow. The city is also working on many additional fronts with its contractor to bring all the rental units into compliance before the deadline. The table below shows the compliance numbers over the last four years.

Table 1: SmartRegs Compliance Data

Year	Number of compliant units	Running total	% increase from previous year	% of total rental licensed units
2011	917	971	4%	5%
2012	1,697	2,614	8%	13%
2013	1,319	3,933	6%	19%
2014	2,339	6,272	11%	30%
Q1 2015	817	7,089	N/A	35%
*Approximately 20,000 Rental Licensed units				

Additionally, the city achieved it's stretch goal of bringing 3,000 units into compliance between February 2014 and March 2015.

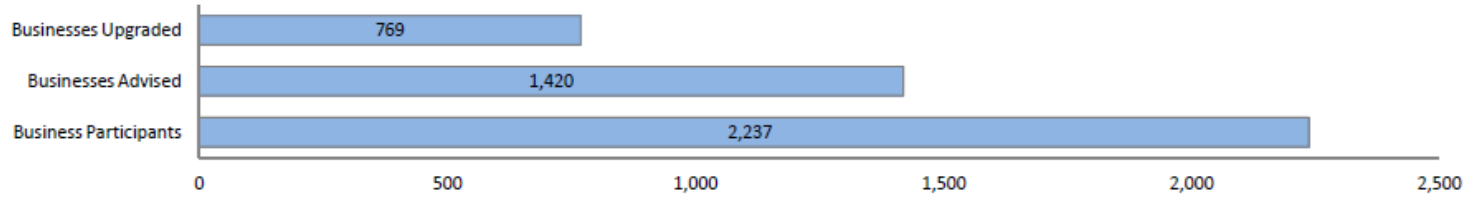
The following pages provide program-to-date progress reports through Q1 2015 for Commercial EnergySmart, Residential EnergySmart and SmartRegs.

City of Boulder COMMERCIAL EnergySmart Program-to-Date Progress Report

This page summarizes progress to date since October 2011 in the commercial EnergySmart services. EnergySmart was conceived and developed through a joint effort of Boulder County Commissioners' Office of Sustainability, Boulder County Public Health, City of Boulder and City of Longmont. For more information, visit www.EnergySmartYES.com.

BUSINESS PARTICIPATION ACHIEVEMENTS

PARTICIPATION IN ENERGYSMART BY BUSINESSES OR PROPERTY OWNERS[1]



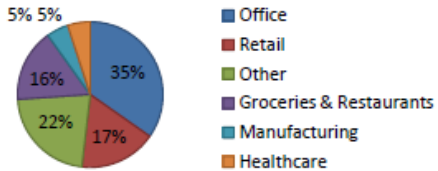
IMPACT

WORK COMPLETED		FUNDING BREAKDOWN	DEEMED ANNUAL SAVINGS FROM UPGRADES			
Number of Upgrades	Total Rebates Paid*	Federal	kWh	Therms	Cost Savings	$mtCO_2$
862	$2,006,327	$632,709	10,583,064	12,647	$939,676	8,487
Total Project Investment	Private Investment	City				
$9,486,155	$7,479,828	$762,611				
Total Investment:Rebates[2]	Program Simple Payback (yrs)[3]	County	Energy and emissions savings to date from commercial EnergySmart are equivalent to taking 1,787 cars off the road!			
4.7 to 1	2.1	$86,206				

HIGHLIGHTS

- PACE Re-launch outreach is in full swing with calls and personal emails out to nearly 200 businesses, and with nearly 100 new PACE Partners signed up.
- Final edits are underway to the new PACE (Countywide) video, which was a great success.
- Advisors met with nearly 70 Twenty-Ninth Street businesses and identified energy efficiency opportunities at 80% of businesses, yielding annual savings of more than $80,000. Advisors proposed several Zero Waste opportunities, and installed pre-rinse spray valves at 10 restaurants, reducing nearly 180,000 gallons of water annually.
- The new Pre-Rinse Spray Valve Campaign is a huge success – 30 have been installed already.

USES OF BUILDINGS ENROLLED IN ENERGYSMART



ADVISING TO ACTION

Businesses that make upgrades after receiving EnergySmart advising services[4]:

45%

Last updated March 31, 2015

(1) Definitions:

Businesses Upgraded: *Businesses that have implemented an energy efficiency project such as a lighting retrofit, and received an EnergySmart Rebate.*

Businesses Advised: *Businesses that have received an Assessment or 4 or more Advising Services on a project, or 1 Advising Service on a completed project.*

Advising Services Include: Opportunity Analysis; Audit Report Review; Behavior Change Recommendations; Technical Assistance; Referral to Partner Programs; Costs and Benefits Assessment; Barrier Assessment; Financial Incentive Support; Contractor/Bid Support; Loan Financing Options; Compliance Assistance; Support Projects Through Implementation; Multiple Project Advising; Utility Bill Analysis; ENERGY STAR Portfolio Manager; and Certification.

Business Participants: *Businesses that have completed a project or received four or more Advising Services. These are unique businesses out of an estimated 6,500 commercially-housed businesses in Boulder County.*

(2) For every $1 spent in rebates, over $4.7 were invested in the community towards these efficiency projects.

(3) The total Rebate amount invested in the program to date will be equalled by the resulting Energy Cost Savings in 2 years.

(4) Percent of all businesses completing Advising [1] that have so far gone on to complete at least one of those projects. Updated annually.

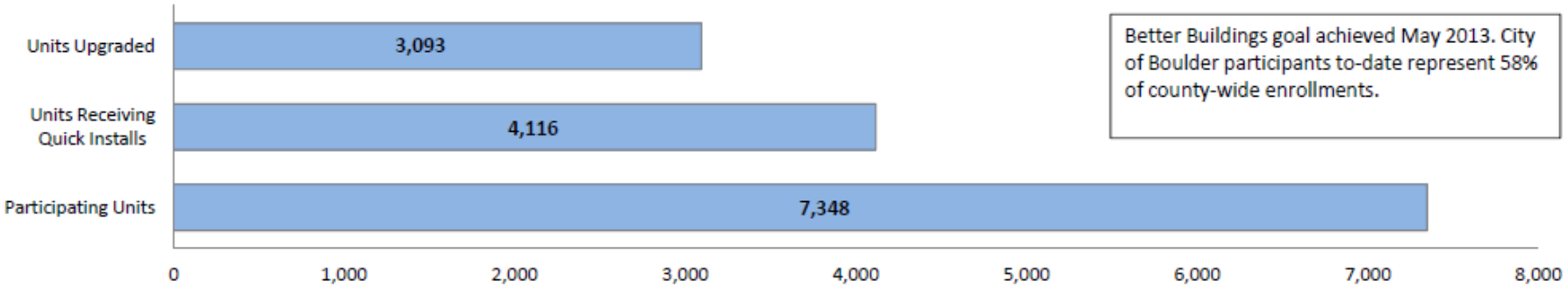
Dashboard design credit: City of Boulder, Boulder County

City of Boulder **RESIDENTIAL** EnergySmart Program-to-Date Progress Report

This page summarizes progress to date since October 2010 in achieving the goals of the EnergySmart services toward the Department of Energy Better Building Grant awarded to Boulder County. The Better Building Residential EnergySmart goal was to have 10,000 homes participate in the program by May 2013. EnergySmart was conceived and developed through a joint effort of Boulder County Commissioners' Office of Sustainability, Boulder County Public Health, City of Boulder and City of Longmont. For more information, visit www.EnergySmartYES.com.

PROGRAM PROGRESS

RESIDENTIAL UNITS PARTICIPATING IN ENERGYSMART



IMPACT

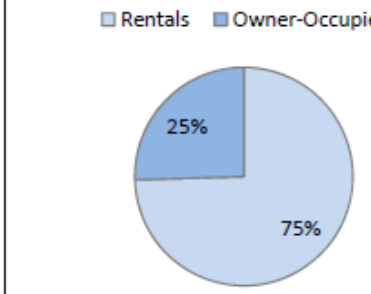
WORK COMPLETED	LEVEL OF INVESTMENT	DEEMED ANNUAL SAVINGS*			
Number of Quick Installs	Private Investment	kWh	Therms	Costs	$mtCO_2$
34,787	$10,362,111	2,592,257	706,623	$760,928	5,833
Number of Upgrades	Total Rebates Paid				
6,616	$1,456,574				

Electricity savings to date from residential EnergySmart are equivalent to taking 1,243 cars off of the road!

HIGHLIGHTS

- 47% of participants in EnergySmart across Boulder County cited energy cost savings as their primary reason to participate. 43% cited Smart Regs as their primary reason to participate.
- Air sealing and attic/ceiling insulation are still the top two upgrades overall, and 3 solar PV projects were completed during Q1 2015 in Boulder. At least 5 whole home retrofits projects (3 or more upgrades) were fully completed in Q1 in Boulder.
- Each dollar spent on residential energy efficiency rebates from the EnergySmart partners leverages about $7.11 in private investment.
- County-wide 12,635 total residences are enrolled.
- From January 2015 - March 2015 there were 68 City of Boulder owner-occupied properties enrolled

ENROLLMENT



ADVISING TO ACTION

COB Owner-occupied units that make upgrades after receiving EnergySmart advising:	75%
COB Rental units that make upgrades after receiving EnergySmart advising:	31%

* Includes deemed savings from upgrades and quick installs.

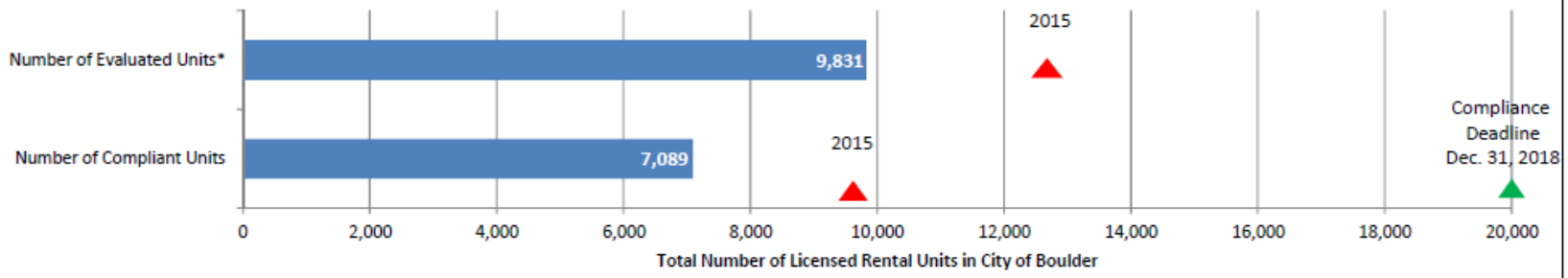
Last updated March 31, 2015

SmartRegs Program-to-Date Progress Report

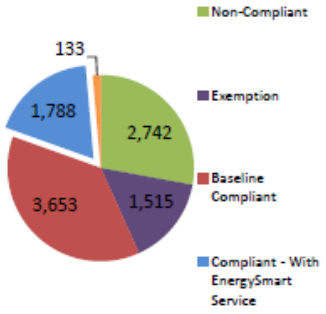
This page summarizes progress to date since January 2011 in achieving the City of Boulder's energy efficiency goals through the SmartRegs ordinance. The progress reported here is based on data from the EnergySmart service along with data from SmartRegs inspection reports.

PROGRAM PROGRESS

RESIDENTIAL LICENSED RENTAL UNITS PARTICIPATING IN SMARTREGS



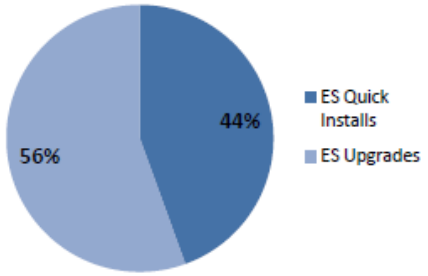
UNITS INSPECTED OR EXEMPT



PROGRAM DETAILS

- Attic/ceiling insulation, air-sealing, and furnace replacements are the top three upgrades overall.
- Each dollar spent on residential energy efficiency rebates from the EnergySmart partners has leveraged $5.74 in private investment.

COMPLIANCE THROUGH ENERGYSMART



ENERGYSMART ADVISING TO ACTION

SmartRegs inspected units enrolled in EnergySmart	53%
SmartRegs compliance achieved through EnergySmart:	25%
Upgrades	*14.0%*
Quick Installs	*11.2%*

ENERGYSMART MARKET & COMMUNITY IMPACT

WORK COMPLETED	LEVEL OF INVESTMENT	DEEMED ANNUAL SAVINGS**			
Number of ES Quick Installs[1]	Private Investment	kWh	Therms	Costs	$mtCO_2$
23,676	$4,053,377	1,280,038	327,576	$360,583	2,770
Number of ES Upgrades	Total Rebates Paid				
2,792	$708,348	Electricity savings to date from SmartRegs improvements are equivalent to taking 614 cars off the road!			

* An 'Evaluated Unit' has either been inspected, sampled, or reviewed/approved for an exemption

Last updated March 31, 2015

** Includes deemed savings from upgrades and quick installs.

[1] Homes may receive multiple quick installs and/or make multiple upgrades.

EnergySmart helps homes and businesses in Boulder become more comfortable and energy efficient. EnergySmart was conceived and developed through a joint effort of Boulder County Commissioners' Office of Sustainability, Boulder County Public Health, City of Boulder and City of Longmont.

Attachment E: Building Data

Table 2: City of Boulder Commercial and Industrial Buildings

Type	Square Feet (sf)	# of Buildings
Private Sector (including multi-family)	~40,000,000	1,856
City of Boulder	~2,800,000	221
Other Public Sector[1]	~10,000,000	117
Total	***~52,800,000***	***2,049***

Table 3: Private Sector Commercial and Industrial Buildings (excludes multi-family)

Size Category (sf)	Total sf	Number of Buildings	Proportion of Buildings at Size Cutoffs (e.g. >5,000 sf is 97% of sf)	
< 5,000	1,111,737	393	100%	
5,000-9,999	2,268,112	318	97% of sf,	74% of bldgs
10,000-19,999	5,276,787	375	90% of sf,	54% of bldgs
20,000-29,999	4,088,380	166	73% of sf,	29% of bldgs
30,000-39,999	2,986,804	87	61% of sf,	18% of bldgs
40,000-49,999	2,210,437	50	52% of sf,	13% of bldgs
50,000 and above	14,529,366	147	45% of sf,	10% of bldgs
TOTAL	**32,471,623**	**1,536**		

Table 4: City of Boulder Owned Commercial Buildings

Size Category (sf)	Total sf	Number of Buildings	Proportion of Buildings at Size Cutoffs (e.g. >5,000 sf is 93%)	
<5,000	189,447	149		
5,000-9,999	164,456	26	93% of sf,	33% of bldgs
10,000-19,999	303,993	23	88% of sf,	21% of bldgs
20,000-29,999	119,999	5	77% of sf,	10% of bldgs
30,000-39,999	195,310	6	73% of sf,	8% of bldgs
40,000-49,999	0	0	66% of sf,	5% of bldgs
50,000 and above	1,868,509	12	66% of sf,	5% of bldgs
TOTAL	**2,841,714**	**221**		

[1] Would not be affected by this ordinance

Attachment F: Details on Cost Analysis

Rating and Reporting

This proposed ordinance would require that energy rating and reporting be done through the U.S. EPA's ENERGY STAR Portfolio Manager Tool. This online tool is free to access and intended to streamline the energy tracking process. Cities with similar ordinances that require annual benchmarking of large, private sector buildings, have reported costs ranging from $500 to $2,400 per building if a consultant was engaged, or four to eight hours of staff time benchmarking was completed in-house. Requiring this will not necessarily contribute to any financial burden to building owners and will unlock critical performance information that can spur efficiency improvements that lead to cost savings.

Building owners are more likely to invest in cost-effective energy efficiency when they are aware of energy performance and use that data to inform infrastructure investments**.** In 2012, the U.S. EPA analyzed the energy performance of more than 35,000 buildings that were benchmarked through ENERGY STAR from 2008 through 2011 and found that these buildings attained average annual energy savings of 2.4 percent (seven percent over a three-year period). [2]

Energy Assessments

Energy assessments have an associated price tag but are intended to result in more potential savings than they cost to implement. A 2011 Pacific Northwest National Laboratory (PNNL) study led by the Department of Energy shows the cost of conducting energy audits varies from $0.12 to $0.50 per square foot, depending on the size and complexity of the building, with smaller buildings typically costing more on a per square footage basis.[3] Industry practice suggests that the cost of an energy assessment should not exceed 10 percent of the annual utility bill.

Based on the average cost of utilities in local buildings and input from industry experts, staff is assuming the average cost to conduct an energy assessment in large commercial buildings in Boulder is approximately $0.12 to $0.25 per square foot. If energy assessments were to be required on a 10-year cycle, the annualized impacts of audits would be $0.02 per square foot per year. In order to put this cost into perspective, the city considered how it relates to a commercial building's typical annual operating expenses (please note, the values reported are based on information from Building Owners and Managers Association's (BOMA) 2013 Experience Exchange Report for Denver; the sample size for Boulder was too small). According to BOMA's 2013 Experience Exchange Report, the average operating expenses for commercial buildings over 50,000 square feet in Denver is $9.99/sf including fixed expenses such as property taxes, insurance, and fees. Given this average, **the annualized cost of energy assessments in Boulder is expected to be just 0.2 percent of a building's total operating expense.**

The potential savings from operational improvements and energy efficiency investments dwarf the outlay for the audit itself. Since energy costs for commercial buildings in the area average $2.00/sf annually[4], energy assessments and retrofits, which typically save 10 to 20 percent in energy costs, have the potential to save building owners $0.20 - $0.40/sf per year. **These annual savings are 10 to 20 times greater than the annualized cost of the audit**.

[2] http://www.energystar.gov/ia/business/downloads/datatrends/DataTrends_Savings_20121002.pdf?8d81-8322
[3] Department of Energy. *A Guide to Energy Audits*. (2011). Prepared by Pacific Northwest National Laboratory and Portland Energy Conservation, Inc. www.pnnl.gov/main/publications/external/technical_reports/pnnl-20956.pdf.
[4] Based on reported Electricity, Gas, and Steam costs from BOMA's 2013 Experience Exchange Report

Retrocommissioning and Building Tune-Ups

A study of 106 retrocommissioning projects showed that the costs range from $0.13-45/sf.[5] Similarly, a PNNL study shows retrocommissioning of existing buildings costs $0.30 per square foot on average.[6] If Boulder's buildings performed retrocommissioning every 10 years, the annualized cost of retrocommissioning would be $0.03 per square foot, or 0.3 percent of an average large building's total annual operating expense. Retrocommissioning has been shown to reduce building energy consumption 16 percent on average, which would save Boulder's buildings $0.32 per sf annually on their energy bills. **The energy cost savings from retrocommissioning will generally pay back the initial capital cost in 6 months to 2.5 years.**

These estimates does not quantify or account for the many non-energy benefits such as reduced O&M costs, increased occupant productivity and improved indoor environmental quality.

[5] Southwest Energy Efficiency Project (SWEEP)/ Western Cooling Efficiency Center (WCEC) Webinar Series. *Commissioning and Retro-commissioning*. Presented by Richard A. Farkas. Nov 2014.

[6] Department of Energy. *A Guide to Building Commissioning*. . (2011). Prepared by Pacific Northwest National Laboratory and Portland Energy Conservation, Inc. http://www.pnnl.gov/main/publications/external/technical_reports/PNNL-21003.pdf

Study Session
MEMORANDUM

To: Members of City Council

From: Jane S. Brautigam, City Manager
David Driskell, Executive Director of Community Planning & Sustainability (CP&S)
Susan Richstone, Deputy Director of CP&S
Greg Guibert, Chief Resilience Officer

Date: May 12, 2015

Subject: Resilient Boulder - Phase I summary and Phase II preliminary focus areas

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Study Session Purpose

Provide an update to City Council on findings from Resilient Boulder Phase I engagements and receive Council feedback on potential Focus Areas for Phase II.

Questions for City Council

1. **Does City Council have any questions about the Phase I process to date?**
2. **Does City Council have any feedback on the initial scoping of potential Phase II focus areas?**

Executive Summary

100 Resilient Cities (100RC) is a global network pioneered by the Rockefeller Foundation to help cities around the world become more resilient to the physical, social, and economic challenges that are a growing part of the 21st century. Boulder joined the network as part of its first wave in 2013 and through its participation, is committed to demonstrating leadership in resilience as well as take advantage of the resources and opportunities it presents.

100RC supports the adoption and incorporation of a view of resilience that includes not just the shocks – floods, wildfires, violence, and other acute events – but also the stresses that weaken the fabric of a city on a day to day or cyclical basis, such as economic hardship or social inequality. By addressing both the shocks and the stresses in a holistic manner, a city becomes more able to respond to adverse events, and is better able to deliver basic functions in both good times and bad, to all populations.

The 100RC program supports resilience building activities at the city level along four pathways:

- Financial support for the creation of a new position in the government who will lead the effort, the Chief Resilience Officer (CRO)
- Technical and logistical support for the development of a resilience strategy that will serve as the city's roadmap to resilience activities and priorities

- Access to tools and specialized partnerships to help developed a sophisticated understanding the city's risks, assets, weaknesses, and opportunities and how they interlink in unanticipated ways
- Inclusion into a network of 99 other cities from which best practices, innovation, and peer-to-peer learning can advance the practice of resilience globally.

The objective of the City Resilience Strategy is to provide a roadmap for building resilience in the city. The strategy should trigger action, investment, and support within city government and from outside groups. Rather than a static road map, the resilience strategy should be a living document to be continuously fine-tuned as priorities are addressed and initiatives get implemented.

The strategy development process is divided into two phases: Phase I establishes the foundation for the resilience strategy. Phase II encompasses strategy build-out. Boulder is now at the end of Phase I, during which the city has conducted a series of workshops, diagnostics, and analyses in order to identify areas for focused activity in Phase II.

This memo summarizes the Phase I activities and results and identifies the potential focus areas for council review and feedback.

Resilience Work Plan and Schedule

100RC has outlined a general approach and methodology for developing resilience strategies that the city has used to customize a process according to community goals and capacity and in coordination with other city projects. Generally, the phases of work are as follows:

1. **Phase I (through May 2015): Preliminary Resilience Assessment.** The Preliminary Resilience Assessment (PRA) is a synthesis of the outputs and findings of Phase I. Additional work to be completed in Phase I includes identifying gaps, opportunities and challenges and identifying preliminary focus areas for work in Phase II.
2. **Phase II (through late 2015): Strategy Development.** The second phase will focus on creating the resilience strategy for the identified focus areas.
3. **Phase III (in 2016)** will be dedicated to early implementation activities and ensuring financial sustainability of resilience beyond the initial 100RC investment.

Summary of Phase I - Preliminary Resilience Assessment

The Preliminary Resilience Assessment (PRA) is a synthesis of the outputs and findings of Phase I and is used to develop the analytical foundation for selecting Focus Areas. The PRA builds on specific Phase I activities, which included a shocks and stresses workshop with 100RC staff in April 2014, the CRO hiring in September 2014, and the creation of working teams and a steering committee. In late October 2014 the city began diagnostic and analytical activities designed to more assess the city's risk profile (i.e., what is the city's exposure), and catalogue the existing portfolio of resilience-related projects, policies, and programs (i.e., what is currently happening that relates to resilience?) See Appendix A for more details on Phase I diagnostic tools and processes), and map a stakeholder engagement plan (see Appendix B). In February, the city hosted a web-based resilience Perceptions Survey for two weeks (see below for a summary of results and Appendix C, pages 26-32 for some additional details). Additional work to be completed in Phase I includes finalizing the PRA and formalizing preliminary focus areas for work in Phase II. (see Appendix C for a draft PRA in powerpoint presentation format – the final format will be a written report).

Resilience Perception Survey – February 2015

In February 2015, the city hosted a web-based Resilience Perceptions survey. Five hundred fifty people responded. To notify the community, the city issued a press release, sent email to the resilience and planning email lists, and issued other social media notices. The survey is not statistically valid because respondents were self-selecting; however, the respondent profile indicates some diversity in terms of tenure in Boulder, place of residence, and work sector. A high level summary of results are noted below, highlighting some potential topics for further analysis and discussion. A full analysis will be incorporated into the final Preliminary Resilience Assessment in May.

1. **Boulder is viewed as having strengths in resilience areas of:** safety/crime deterrence, robust local economy, protection of natural resources and ecosystems, emergency information systems, water supply, sufficient and affordable local or organic food supplies, hazard monitoring and alerts, updated codes and standards and plans for urban development.
2. **The community is viewed as having weaknesses and work to be done in areas of:**
    a. **Community Engagement** – providing greater sense of belonging in the city and being more integrated and inclusive engagement of civil society within the city. Adding measures to promote trust of government.
    b. **Transportation Systems** – Integrating transportation links with other cities/regions, and providing a multi-modal system with inclusive coverage of city.
    c. **Inclusive Housing/Health Care** – Addressing Boulder's affordability and social and economic challenges related to housing and access to health care and mental health.
    d. **Resilient Governance** – increasing transparent, inclusive, and integrated decision-making and leadership; increasing collaboration, and integrating land use and inclusive planning process.

Growing Up Boulder / Youth Engagement – February 2015 - on-going

In collaboration with the City's resilience staff and the Youth Services Initiative (YSI), Growing Up Boulder (GUB) worked with youth to develop their own meanings of resilience through art by considering the Rockefeller definition of resilience: "the capacity to survive, adapt, and grow no matter what kinds of chronic stresses and acute shocks [people] experience." To our knowledge, Boulder is the only member of the Rockefeller network to engage youth in their processes. This pilot was meant to explore ideas of resilience and to test methods that might yield meaningful conversations and useful information (see Attachment D for an interim report). Additional work with children and youth will continue in the fall of 2015. The work included two groups of participants from the Youth Services Initiative, a program of Boulder's Parks and Recreation Department that serves youth from Boulder's public housing sites, as follows:

Approximately 25 middle and high school students
Approximately 10 elementary students from the Kalmia housing site

Growing Up Boulder used a variety of methods to facilitate conversation, including a resilience "question ball," drawing, and mural making with elementary school students, and drawing, photovoice, a nested ecologies activity, and art boxes with middle and high school students.

Elementary School Student Themes:
Not Resilient: School and home; Guns and dying; Bullies; Dangers, such as falling from trees
Resilient: Home, family and pets; Nature, parks, hiking; Ice cream, fresh fruits; Activities, such as art, music, sports and holidays

Middle and High School Student Themes
Not Resilient: Money and the expense of living here; Housing ; Negative global issues as portrayed on the news; Cultural exclusion

Resilience Workshop – April 2014

In April 2014, the city hosted a kick off workshop. Nearly 50% of attendees were city staff, with under-representation from the non-profit and business community. Nevertheless, key takeaways from the workshop have proven consistent with other community engagements over the last 6 months:

1. Boulder is **well prepared to address acute shocks**, as reflected in a high level of preparedness across City-controlled systems for both physical protection and continuity of services;
2. The City has opportunities **to improve its capacity to address chronic stresses**, such as housing affordability, economic diversity, and income inequality;
3. There is opportunity to **better coordinate regionally** to address shocks and stresses that fall outside of Boulder's jurisdictional boundary;
4. For the resilience initiative to be successful, it must **leverage Boulder's existing planning processes** and other ongoing initiatives.
5. **Strong consensus on shocks** - Wildfire, drought, and flooding dominated the discussion, with an additional emphasis on infrastructure, water shortage, economic downturn, and extreme temperatures.
6. Each table/group identified housing affordability as a priority issue, with economic issues a close second.

Preliminary Focus Areas:

Focus areas can correlate directly to specific resilience strengths and weaknesses, specific shocks and/or stresses, and/or cross-cutting issues. The city is working toward identifying initial Focus Areas from the stakeholder engagements to date. Generally, Focus Areas should:

- Address further understanding and analysis of a city's vulnerability to a shock;
- Analyze how shocks and stresses might interact (for example -- how aging infrastructure and poverty impact the city's ability to respond to flooding events);
- Integrate and prioritize existing planning efforts;
- Enable cities to customize and narrow the scope of activities to be undertaken in Phase II, and define a Scope of Work that reflects each city's capacity and needs;
- Build a fact base, and deepen a city's knowledge and understanding around a few specific issues the resilience strategy will aim to address; or
- Help ensure that cities identify actionable priorities and specific initiatives for discovery/planning/implementation.

The expectation is that Boulder will choose three to six Focus Areas to help build out the resilience strategy. However, time, staff, and resource constraints will also determine the number of areas and activities that can be viably undertaken over the next six months. To the extent possible, activities will be aligned with existing city efforts, with the obvious acknowledgement that Focus Areas are intended to address gaps in current data, analysis, and effort and therefore represent new or novel approaches and work elements.

Initial outputs from the Preliminary Resilience Assessment would suggest the potential to focus additional analysis in some of the following areas, not necessarily in order of priority. They are further described in the sections below:

1. Resilient Recovery
2. Resilient Governance
3. Climate Wealth and Security
4. Understanding Changing Risk
5. Business Community Resilience
6. Economic Resilience
7. Ecological Services

Resilient Recovery

- *Gap*: Current assessments of the city's response to the 2013 Flood, as well as the institutional transition to longer-term recovery activities, allow for new or novel policies and plans that build local and regional resilience to future disasters.
- *Existing Areas of Effort*: A staff team dedicated to recovery efforts, BoCoStrong is expanding resilience planning efforts in the county.
- *Potential Focus Area Activity(s)*: Several broad areas that could benefit from further investment have already been identified through staff's on-going assessment of community and organizational performance. For example, there is significant room for new efforts to build community awareness of future wildfire and flood risk and to encourage personal protective action at the neighborhood level. Additionally, specific new hazards, such as groundwater intrusion, require new groundwater mapping and analysis as well as policies to promote mitigative activities at the individual household level. Institutionally, several lessons learned would suggest reexamining flexible staffing and financing options to allow for more efficient and rapid response during crisis. There is potential to leverage emerging resilience projects and funding at the regional/state level through the Colorado Resilience Framework and at the national level through the NIST Resilient Buildings and Infrastructure Framework.

Resilient Governance

- *Gap*: Although many existing city activities can be characterized as 'resilient' (ex. progressive flood plain management), core resilience principles are not well incorporated into city planning, strategy, or budget documents or processes.
- *Existing Areas of Effort*: Sustainability is well integrated in the city's ethos but resilience as a comparable and complementary value system does not yet exist.
- *Potential Focus Area Activity(s)*: The current efforts to update to the Boulder Valley Comprehensive Plan and the Human Services Master Plan provides a unique opportunity to further resilience thinking in Boulder in two major areas (land use and social safety and support programs) and allows for the deep and immediate infusion of resilience policies and programs across a range of city priority areas and activities. The focus on developing cutting edge approaches to resilient land use builds on outcomes from the Phase I scoping workshop on Leveraging Land Use Regulation to Achieve City Resilience Goals, sponsored by 100RC and facilitated by strategy partner HR&A. The potential exists to replicate the workshop at a local level to more deeply focus on integrating resilience that is contextually relevant. Further, by leveraging 100RC platform partner Palantir, the city can support the Human Services Master

plan by designing big data analytics around community well-being trends as performance metrics for the future activities.

Climate Wealth and Security

- *Gap:* Boulder's current energy production and distribution system is not well designed to withstand the shocks associated with future natural hazards nor to mitigate the current and future price volatility in the fossil fuel-based energy markets.
- *Existing Areas of Effort:* Climate Action Plan, Energy Future, Boulder Valley Comprehensive Plan
- *Potential Focus Area Activity(s)*: How can a transition to a low/no carbon community provide new opportunities for individuals, families, and neighborhoods to increase their own resilience to environmental, social, and economic shocks and stresses? Boulder's commitment to low or no carbon future will require a wholesale transformation of the community's energy production and distribution system. The transformation will have several major elements that can benefit from the inclusion of resilience thinking including:
  - How civic engagement can build initiative ownership,
  - Strategies for increasing resilience through a distributed energy system design,
  - Highlighting resilience benefits from both distributed generation and storage at the household or sub-community scale.

  While the timeframe for this energy system transition is well beyond the scope of the 2-year 100RC investment, the early design and community engagement efforts have the potential to enhance both the participation and content of this initiative in both the short and long-term.

Understanding Changing Risk

- *Gap*: Although the city and the community are well aware of the local risks associated with climate change in the most general sense, there has been no comprehensive analysis of likely impacts to the city's infrastructure or ecological systems. Further, specialized analyses that have been conducted are piecemeal and use widely varying climate projections and methodologies, ensuring that policy and planning outcomes are inconsistent.
- *Existing Areas of Effort*: Some climate impact analysis is included in the Multi-hazard Mitigation Plan, Water Utility Master Plan, Drought Preparedness Plan, Climate Change Preparedness Plan
- *Potential Focus Area Activity(s)*: Using local partner Resilient Analytics, the city will conduct an initial climate risk and vulnerability analysis for major city infrastructure assets (e.g. roadways and critical facilities), coupled with a first-order economic analysis of avoided costs through basic adaptation efforts that will provide a roadmap for adopting specific plans and investments in the future. Further, by leveraging the community's vast expertise and talent in climate science, the city will develop a rigorous process for selecting a core set of future climate models and scenarios for use across all city activities to ensure consistent analysis.

Business Community Resilience

- *Gap*: The disasters of the last five years have largely spared the local business community and many businesses remain unprepared for future events.
- *Existing Areas of Effort:* The economic vitality team will be posting resources on developing business continuity planning on their website this summer.
- *Potential Focus Area Activity(s):* In many communities, business preparedness, to the extent that it exists at all, is often limited to encouraging 'business continuity planning' – self-directed planning for business disruption that includes tasks such as off site data storage and flexible

staffing strategies. However, there exists the possibility for developing a deeper level of partnership between city and business interests that facilitates the broader uptake of risk transfer or reduction strategies and/or encourages building relationships and resource development prior to a crisis event. Significant research has shown that communities whose businesses rebound more quickly after a disaster fare substantially better in both the near and long term recovery phases.

Economic Resilience

- *Gap*: While there is a general understanding of Boulder's economic risks, a more robust understanding of the city's exposure to wider economic trends, such as shifts in credit markets and availability, declines in federal investments in research and development, or the role the succession or maturation cycle of Boulder's start up or small businesses play in the wider Front Range economy is lacking.
- *Existing Areas of Effort:* A small economic vitality team, focused largely on business retention.
- *Potential Focus Area Activity(s)*: What steps can the City of Boulder take, if any, to more fully understand, anticipate, and mitigate the exposure of core local economic sectors to trends broader national and global economic trends and risks? Boulder has a diverse economic base and weathered the 2008 economic downturn better than many communities. However, future economic shocks may represent different risks than those experienced before and, further, prevailing economic and political trends may have increased the community's exposure to volatility in the economy since the last crisis. Example economic analysis could include coping with the loss of federal funding to one or more of the research labs, anticipating a dramatic tightening of credit markets for tech start up ventures, or developing a greater understanding of the local risk to increasing wage and housing affordability gaps.

Ecological Services

- *Gap*: The city's current ecosystem management and performance assessment efforts lack coordination and integrated across departments and currently do not provide a broader strategic vision for anticipating, mitigating, and managing rapid changes in the regional ecology.
- *Existing Areas of Effort:* Individual staff across city departments dedicated to urban forestry, integrated pest management, environmental and resource management, and urban wildlife, among others.
- *Potential Focus Area Activity(s):* The creation of an urban forestry master plan would provide strategic direction and activity prioritization for addressing the complex ecological transformation associated with climate change and invasive species, such as the emerald ash borer and the pine bark beetle. Additionally, an urban wildlife and biodiversity corridor plan will allow for leveraged efforts across city departments, such as Parks and Rec, Community Planning and Sustainability, and Utilities, among others, while promoting new habitat and ecosystem resources that serve multiple benefits to community.

Other Resilience Activities:

In addition to the activities directly associated with the 100RC Phase I scope of work detailed above, the CRO has represented the City in several high profile national and regional resilience initiatives:

National Institute for Standards and Technology (NIST): NIST is conducting a national wide effort to develop a framework for disaster resilience buildings and communities. The CRO has participated as an expert in two workshops on both the technical aspects of the framework and the development of a civic

process for actualizing the framework principles. Through this work the NIST framework has become more closely aligned with the 100RC effort and has the potential provide complementary analysis to on-going activities. Further, NIST has designed Boulder to be one of three major case study cities and will undertake an expert analysis of the City's critical infrastructure during the 2013 Flood at no cost to the City. (See http://www.nist.gov/el/building_materials/resilience/index.cfm for more information)

Colorado Recovery Office: Similarly, the CRO has provided expert peer review and guidance to the Colorado State Recovery Office's State Resilience Framework. As a result, the City of Boulder, in partnership with the County, will likely pilot the State's resilience building process in surrounding communities during the summer of 2015, while providing valuable feedback to the Recovery Office. Additionally, the CRO, via the 100RC program, assisted state representatives in the preparation of a phase 1 submission for the HUD sponsored National Disaster Resilience Competition, a $1billion national initiative to enhance resilience building at the local level. (See http://portal.hud.gov/hudportal/documents/huddoc?id=NDRCFactSheetFINAL.pdf)

National Renewable Energy Laboratory (NREL): NREL, based in Golden, CO is developing a resilience planning program for federal facilities under a presidential mandate and is seeking to pilot a resilience analysis and building process in a small set of communities and facilities around the country during the summer and fall of 2015. Initial conversations between NREL and the CRO have explored how an analysis of the federal facilities within the city limits can be integrated in the more holistic assessment being conducted under the 100RC program.

BoCoStrong: Boulder County's community resilience effort, known as BoCoStrong, was successfully awarded an 18 month, $300,000 award from the State of Colorado to advance resilience planning across the County. The award is composed of 4 main elements, all with the goal of developing and sustaining community participation in resilience building activities. The CRO has provided input and assistance in the grant development and has worked to align county-wide activities with those envisioned within the City. (See http://www.bocostrong.org/)

Next Steps:

Following input from Council on May 12, revised Focus Areas will be presented to the Resilience Steering Committee for additional comment and review, with the intention of finalizing areas by the end of May. Once finalized, Focus Areas activities for Phase II through November 2015 will be integrated with existing staff work plans. In mid-October, staff will present a draft outline for the Resilience Strategy, based on outputs and analysis over the next 6 months, for City Council review and input.

Attachments:

A: Overview of individual Phase I diagnostic tools and methods
B: Draft resilience strategy community communications plan
C: Draft Preliminary Resilience Assessment in a presentation format
D: Growing Up Boulder interim report, April 2015

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100 RESILIENT CITIES

City Resilience Strategy

The City Resilience Strategy development process has been designed by 100RC in conjunction with a broad range of global experts, and is a process which all cities in the 100RC Network undertake.

It is a six to nine month process, which requires engaging with a diverse set of city stakeholders, analyzing and understanding the data on a city's risks and assets, and developing a strategy to leverage and address the city's opportunities and challenges in building urban resilience.

This process is designed to help a city think broadly and comprehensively about understanding and planning for its risks and assets, and identifying solutions that will deliver multiple, sustainable benefits. It is also designed to help cities in the network understand the common challenges and opportunities of building urban resilience, facilitate knowledge exchange through the 100RC Network, and identify potential solutions through the 100RC Platform.

The Resilience Strategy Process in Detail

The Strategy process is comprised of two phases, ultimately leading to a period of implementation. The first phase is a 2-3 month period designed to help the city understand its profile, and its risks and potential opportunities. During the first phase, the CRO leads a comprehensive scan of the city's shocks, stresses, risks and assets in relation to building resilience. This is done through stakeholder engagement, research, and application of a number of tools: a) ***City Resilience Actions Inventory*** – which documents and analyzes existing plans, policies and projects in the city; b) ***City Resilience Perceptions Assessment*** – which gathers stakeholder perceptions about the city's resilience, and c) ***Risk Assessment and Asset Scan*** - which identifies the key shocks and stresses a city faces, and the impact of these on the city's assets. The first phase ends with a synthesis of the research and analysis conducted, and a number of key focus areas that the CRO and city want to research in more depth.

The second phase is a 4-6 month period when the CRO and relevant stakeholders undertake further research and analysis in each focus area, and ultimately identify tangible resilience goals and implementable actions that the CRO and city can take next. Each CRO and city will decide what further analysis and diagnostic work will be conducted in this phase, and what human and other resources are available to undertake the work. These resources could include university research institutes or partners from the 100RC Platform.

For further information on the City Resilience Strategy please contact Mariane Jang, Program Manager, 100 Resilient Cities, mjang@100RC.org

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100 RESILIENT CITIES

City Resilience Actions Inventory Tool

Context

The City Resilience Actions Inventory tool was developed by 100RC and Arup ID for cities to use during Phase 1 of the City Resilience Strategy development process. The tool inventories actions taken by city stakeholders (public/private/civil society) and may include any type of action such as plans, programs, projects, practices, initiatives, studies, or legislation. The purpose of the tool is to help cities:

1. **Establish a baseline of where the city is taking action across the 12 drivers of resilience; and**
2. **Identify past, current and planned efforts the City Resilience Strategy can build off of.**

The Actions Inventory is one of the key inputs used by 100RC Member Cities early in the Strategy development process in conducting a Preliminary Resilience Assessment (PRA). From the PRA, the city identifies the key focus areas that the CRO and city will research in more depth during Phase II as they work towards a defined list of resilience goals and initiatives.

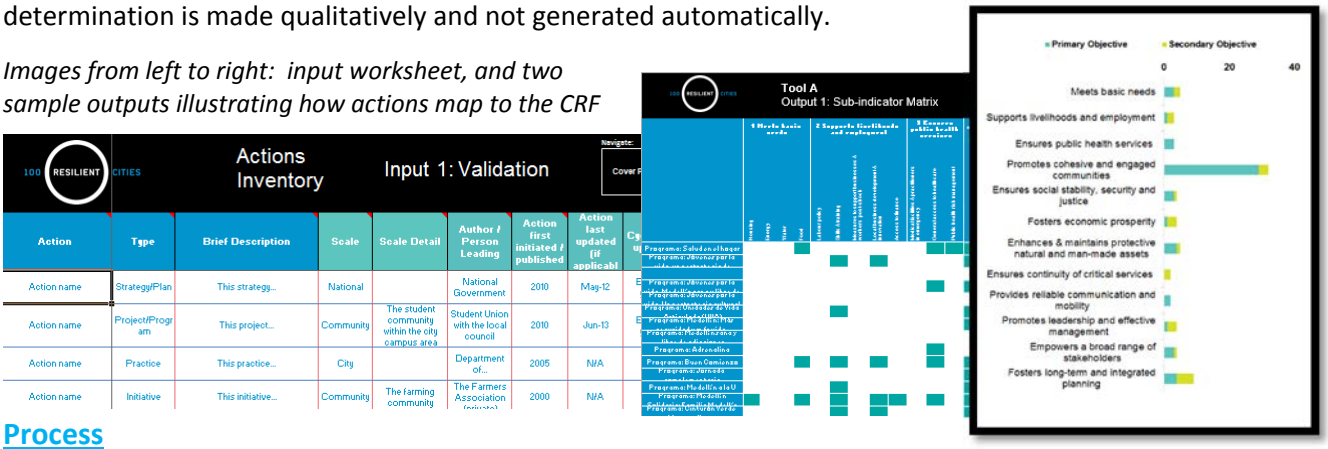
The tool is currently being used by 100RC Member Cities as a required activity in the Strategy development process.

Components

A city's current actions are recorded and classified on a form in excel which is linked to worksheets that automatically generate analysis of the actions across the 12 drivers of resilience which comprise the 100RC City Resilience Framework (learn more about the CRF). The outputs use the CRF to illustrate where the city has most focused its efforts to-date; identify areas of potential coordination; and show where limited action has been taken and opportunities may exist.

The data entry fields have also been explicitly designed to help cities flag actions which may be incorporated into, built off of, or otherwise leveraged in their Resilience Strategy; however, this determination is made qualitatively and not generated automatically.

Images from left to right: input worksheet, and two sample outputs illustrating how actions map to the CRF



Process

The excel workbook is accompanied by a manual which provides: detailed information on the data entry fields, explanation of how to interpret the outputs, guidance for identifying city actions to include in the inventory, and best practices for stakeholder engagement.

To gather the actions which constitute the inventory, cities may use a combination of desktop research, stakeholder engagement, and/or surveys. The process is designed in coordination with the Strategy Partner and 100RC Relationship Manager to ensure that actions taken by a broad range of sectors are included, and to scope the inventory reasonably given the Strategy development timeline.

For further information on the City Resilience Perceptions Assessment please contact Leah Flax, Program Manager, 100 Resilient Cities, lflax@100RC.org

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100 RESILIENT CITIES

City Resilience Perceptions Assessment Tool

Context

The City Resilience Perceptions Assessment tool was developed by 100RC and Arup ID for cities to use during Phase 1 of the City Resilience Strategy development process. The purpose of the tool is to help cities:

1. **Understand what resilience means to a broad range of city stakeholders**
2. **Assess how the city is perceived as performing across the 12 drivers of resilience**

The Perceptions Assessment is one of the key inputs used by 100RC Member Cities early in the Strategy development process in conducting a Preliminary Resilience Assessment (PRA). From the PRA, the city identifies the key focus areas that the CRO and city will research in more depth during Phase II as they work towards a defined list of resilience goals and initiatives.

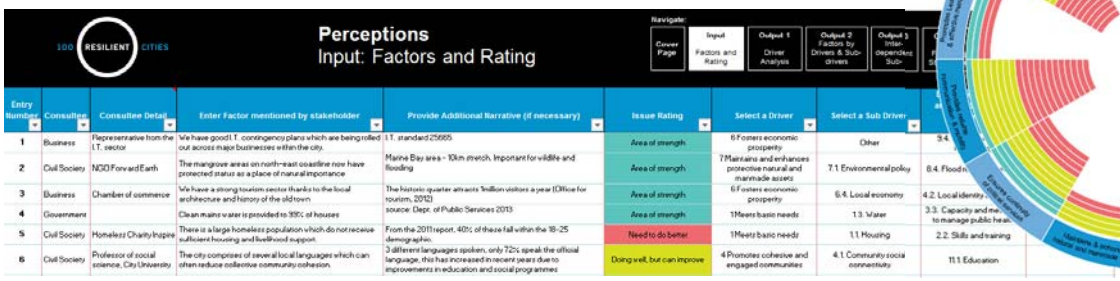
The tool is currently being used by 100RC Member Cities as a required activity in the Strategy development process.

Components

City stakeholder perceptions are recorded and classified on a form in excel which is linked to worksheets that automatically generate analysis of the perceptions in the form of narrative summary and graphs. The classification includes mapping perceptions to the 12 drivers of resilience which comprise the 100RC City Resilience Framework (learn more about the CRF), and rating the cities performance as area of strength, doing well but can improve, need to do better, or unknown.

The outputs illustrate what aspects of resilience are most relevant to the city by stakeholder group, how the city is performing according to stakeholders, and the ways in which issues raised touch on multiple aspects of resilience.

Images: from left to right tool input worksheet, and two sample outputs



Process

The excel workbook is accompanied by a manual which provides detailed information on the data entry fields and how to interpret the outputs, as well as guidance for designing a process to collect stakeholder perceptions that will capture broad and diverse perceptions that are representative of a range of city stakeholders.

Cities may use a workshop, focus group, interviews, surveys, or any combination of methods to gather perceptions. The process is designed in coordination with the Strategy Partner and 100RC Relationship Manager in order to ensure that a broad group of stakeholders, including the poor and vulnerable, are represented.

For further information on the City Resilience Perceptions Assessment please contact Leah Flax, Program Manager, 100 Resilient Cities, lflax@100RC.org

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100 RESILIENT CITIES

City Resilience Risk Assessment & Asset Scan Tool (BETA)

Context

The City Resilience Risk Assessment & Asset Scan tool (BETA) is currently under development by 100RC and AECOM. The purpose of the tool is to help cities:

1. **Prioritize shocks and stresses in the context of different potential future scenarios**
2. **Understand how shocks and stresses are connected to each other**
3. **Assess how potential risks may be exacerbated based on:**
    a. **the condition of physical assets (i.e. roads, buildings, water and sewer systems, etc.)**
    b. **interactions between shocks and stresses**

The Risk Assessment & Asset Scan is being designed for use by 100RC Member Cities as a way to engage stakeholders and gather information that will be used in the city's Preliminary Resilience Assessment (PRA). The PRA is conducted early on in the Strategy development process and results in key focus areas that the Chief Resilience Officer (CRO) and city will explore in more depth during Phase II as they work towards a defined list of resilience goals and initiatives.

Components

The tool is an excel workbook which consists of multiple modules (worksheets) designed to be completed sequentially, but which can be used semi-independently. The modules can be completed using a participatory approach (e.g. focus group or workshop) or as a desktop exercise, and are complimentary to existing data/analysis the city may have already undertaken.

The purpose of the modules are as follows:

1. **Inventory asset data and their conditions**
2. **Identify top shocks**
3. **Impact of top shocks on assets (connects 1 & 2)**
4. **Analysis of potential future scenarios**
5. **Identify top stresses in context of scenarios**
6. **Link impacts of shocks and stresses (connects 2 & 5)**
7. **Weight top shocks & stresses to consider potential connections (mapped in 6)**

The accompanying manual provides detailed information on the modules and further explanation of important concepts such as likelihood, consequence, intensity, frequency, direct, indirect, etc.

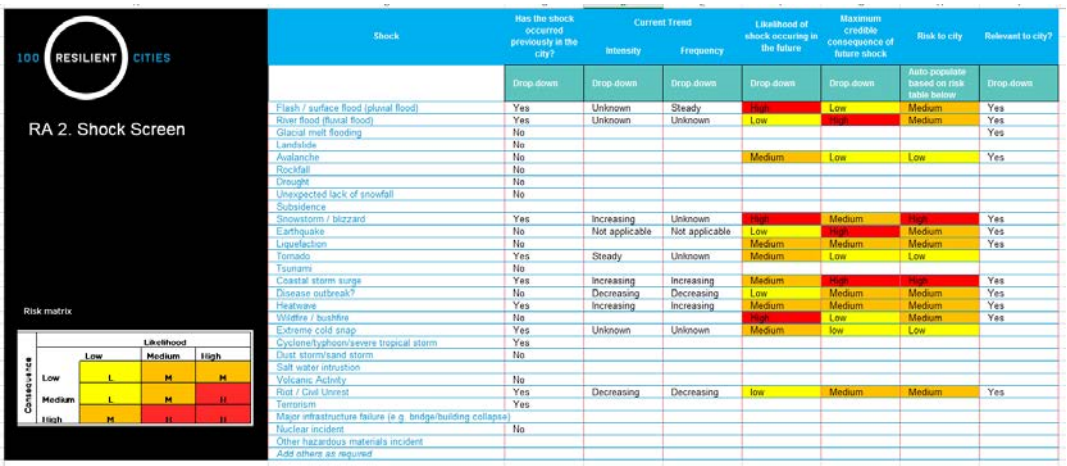

Image: module 2 - shock screen module

DRAFT3

2015-2016 Resilience Communications and Engagement Plan

Project Objectives for 2015 and 2016:

1. Complete series of assessment tools, with both internal and external audiences, to evaluate challenges and opportunities related to building our community's resilience.
2. Draft a resilience strategy that builds on input from an engaged community and bring to council for review and edits or acceptance.
3. Begin implementation of resilience strategy.

Communication Plan Objective:

To provide effective and integrated communications and outreach support for all phases of the resilience strategy effort in 2015, including the evaluation of challenges and opportunities, the creation and vetting of a draft strategy and the public/City Council processes related to its adoption; and the initial stages of implementation.

Communication Plan Goals:

1. Raise awareness about the concept of resilience and how it applies in a variety of contexts related to both acute and chronic shocks and stresses
2. Create meaningful, community-focused engagement opportunities that inform individuals, groups and neighborhoods about the role they play in building resilience and ways they can help shape the city's resilience strategy
3. Promote the city's participation in the 100 Resilient Cities effort, as well as the value to the community of this partnership

Challenges:

- Resilience is a fuzzy concept for many in our community. There is little alignment about what it means, and even among those who work in this area, the context is often limited to acute shocks, like the 2013 flood.
- The city's connections with individual neighborhoods have deteriorated over the years and are in the very early stages of being re-established.
- While this program has been staffed with a CRO, the team working with him is comprised of individuals with other responsibilities and duties and often, very full work plans. There is no non-personnel budget associated with this effort.
- The city is not interested in having a standalone resilience plan that sits on a shelf and becomes the responsibility of one person or one division in a department to implement.

Instead, Boulder wants a holistic strategy that can become a part of what we all do in our organization and that can be embraced by the community and partners in the community. This could add to the complexity of the planning and engagement efforts.

- This is a time of some controversy in our community, especially when it comes to planning for our future. Many community members are tapped in terms of the engagement they are already providing, and others are questioning the path the city is taking. References to "growth" or helping the community "grow" will require particular sensitivity.

Opportunities:

- We have a highly skilled, full-time CRO who is working closely with other CROs across the world and 100 Resilient Cities in a coordinated and continuous learning way. Boulder is not alone in the challenges it faces – and we are already benefitting from the experiences of others and the resources that membership in this impressive group includes.
- The community has a recent history of bouncing back in the wake of disasters – the 2013 flood and before that, a series of wildfires – so there is familiarity with the importance of resilience as well as some pride and momentum created by that survivor spirit.
- The city is reinvigorating its engagement with individual community members and neighborhoods. All City Council meetings and study sessions, as well as many board and commission meetings are being televised live and offered for viewing later, and the city is in the process of hiring a Neighborhood Liaison. There is agreement among city leadership that resilience would be a good starting point for this new liaison. We are also becoming more adept at utilizing effective listserv communication tools, Inspire Boulder and video to share our story with a wider audience.
- There are several significant engagement efforts occurring in 2015, including the BVCP update, the Human Services Master Plan and Boulder's Climate Commitment, that are closely linked with resilience and provide clear opportunities for integration. (This is also a bit of a challenge, as it requires more coordinated and strategic planning, as well as cross-departmental communication. If not managed well, this could lead to action paralysis and overwhelming complexity.)
- Boulder is a community of highly educated people who are passionate about a variety of issues and have shown a willingness to tax themselves to promote a future they believe in. It is also home to the University of Colorado's flagship school and federal labs that could serve as strong partners in this work.

Audiences

1. External
    a. Individual community members
    b. Neighborhood groups (both formal and informal)
    c. Nonprofit organizations and service providers
    d. Business community and potential investors in community resilience efforts
    e. Institutions, including the University of Colorado-Boulder, schools and federal labs
    f. First responders
    g. Other resilience strategy stakeholders
    h. 100 Resilient Cities organization and peer cities

2. Internal
    a. City staff members in departments that are most likely to be called upon to provide support in crisis situations
    b. City staff members in departments that are building infrastructure, social networks and policies to improve resilience in the event of future stresses
    c. Boulder City Council as ultimate adopters of overall resilience strategy

Strategies

- Leverage Boulder's participation in the 100 Resilient Cities program, using strategies and tools that are provided whenever possible, rather than creating new ones.

- Utilize the city's multi-faceted communication and engagement platforms, including the website, a MyEmma account created for resilience, Inspire Boulder, Channel 8 and demonstrated media interest to bring the story and engagement opportunities to where people already are.

- Conduct most, if not all, of our come-to-us engagement opportunities with other planned forums where there is a clear relationship or nexus with resilience and the scheduled topic, i.e. the Boulder Matters approach of several years ago.

- Identify and leverage any door-to-door/face-to-face engagement opportunities by city department, i.e. Fire, LEAD and the CU Green Teams, water conservation, OSMP,etc. through which we can share resilience messages and invite participation.

- Tailor the resilience definition to Boulder's unique needs, assets and sensitivities. Focus on the attributes of what makes a resilient community and the roles individuals, local government, nonprofits, businesses and institutions can play. Capitalize on Boulder's can-do attitude, sense of pride and history of leadership, especially around sustainability.

Tactics

- Update and improve ResilientBoulder.com, which lives on the city's overall website (by early February)

- Build out ResilientBoulder listserv group, create template and start an editorial calendar for a minimum of bi-monthly updates related to this effort (by early Feburary)

- Provide communications support to let internal audience members know about stakeholder mapping, overall process and need for/value of their participation and coordination with other related engagement efforts (February and early March)

- Build and promote external survey to community members and maybe businesses/non-profits/institutions about what they perceive as biggest risks and opportunities (Mid-February to early March)

- Partner early with new Neighborhood Liaison to chart plan for using resilience as a key concept in introductory meetings. Create a calendar, communications materials and a staffing plan to attend targeted neighborhood meetings (start in mid-February with outreach continuing through the end of December)

- Work with Channel 8 on a three- to five-minute video tracing Boulder's work to date on examining the issue of resilience and several likely components of a forthcoming strategy to drive community interest in offering feedback on draft plan (April-May)

- Plan and execute a resilience component at a minimum of six open houses/engagement events that are being held in 2015 (throughout the year)

- Use Channel 8, social media and InspireBoulder as auxiliary methods for sharing surveys, information about events and drafts of the strategy for community feedback. (thoughout the year)

- Solicit and provide information for Daily Camera articles both at the height of seeking community engagement around challenges and opportunities and at the time of rolling a draft strategy out for community vetting (at appropriate points in the process)

- Youth engagement photo project with YSI and Growing Up Boulder

Key Messages:

- Boulder is focusing on resilience to preserve the quality of life we enjoy today and support our community's commitment to leaving a strong and sustainable city for generations to come.
- Resilience, put simply, is the ability of a community to not only bounce back, but bounce forward in the face of stress. Some of the stresses will come on more suddenly, like the 2013 flood, wildfires, acts of violence or pandemics. Others are more gradual and take their toll over time, such as economic recession, social inequality, or the declining health of a community and its members.
- True resilience will require involvement from all sectors of our community, as well as individual participation and accountability.
- We can do this! Boulder has shown time and again that it has the innovation, grit and commitment to rise to challenges and find solutions.
- The city's selection as one of the 32 inaugural 100 Resilient Cities initiative gives us a unique and valuable opportunity to build partnerships, expand our resources and learn from other communities.
- In today's world, every one of us is vulnerable to change and stress, both chronic and acute, and planning for this can mitigate its negative impacts and have positive side benefits, such as building a sense of community, lessening anxiety about the what ifs and helping our children learn to cope and adapt in uncertain times.
- Get involved, stay involved and help us build our community's resilience!

Resources:

There is no non-personnel budget associated with this effort. All communications work will be conducted by Sarah Huntley, media relations/communication manager, in partnership with communication counterparts at 100 Resilience Cities and with reliance on Chief Resilience Officer Greg Guibert as subject matter/content expert. Outreach and engagement efforts will be dependent upon the availability and training of existing city staff, likely across departments and projects. We will need assistance from the newly hired Neighborhood Liaison as well.

Timeline:

Specific deadlines/timelines are in parentheses next to each tactic, but more generally:

- Assessment phase – January through April 2015
- Draft strategy and vetting with the community – May through December 2015
- Adoption of strategy and initial implementation steps – First half of 2016

Measures of Success:

- Active participation in both external and internal assessment efforts, i.e. stakeholder mapping and the community survey
- Sustained engagement and relationship-building with three targeted neighborhoods in 2015 and presentations to at least eight neighborhood groups throughout the year
- Participation that results in meaningful dialogue and positive community feedback in a minimum of three open houses/engagement opportunities with similar audiences or focus as resilience
- Doubling the starting number of individuals who are signed up to receive e-mail updates on this project and meeting our goals to push out helpful and valuable content at least twice a month
- Webpage analytics that show increasing traffic and click-throughs on ResilientBoulder.com
- An increase in community understanding of resilience and the process the city is taking to draft a strategy
- Active community participation in vetting a draft strategy and the development of clear community recommendations/feedback report to City Council
- Two accurate, positive and well-placed articles in the Daily Camera at the appropriate time
- Generally positive and supportive community feedback about the city's efforts and Boulder's involvement in 100 Resilient Cities

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Resilient
Boulder

Agenda

100 Resilient Cities Process and Updates

- Timeline
- Engagement
- Preliminary Resilience Assessment

Boulder's Preliminary Resilience Assessment

- Risk Overview and Profile
- Resilience Perceptions
- City Actions
- Conclusion

Goal

To share findings from early Resilient Boulder Phase I engagements and to get Council feedback on potential Focus Areas for Phase II.


100 Resilient
Cities
Process and
Updates

Resilient systems exhibit certain qualities that enable them to withstand, respond, and adapt more readily to shocks and stresses

Reflective	Resourceful	Robust	Redundant	Flexible	Inclusive	Integrated
Ability to learn	…. and act	…conceiving systems & assets that can withstand shocks & stresses as well as using alternative strategies to facilitate rapid recovery			…planned to take account of city-wide needs and promote coordinated actions	

Timeline

Objective: CRO leads limited evaluation of existing state of resilience and city capacity and generates broad support and engagement for focus area investigation.

Objective: Deep but rapid expert analysis and generation of solutions vetted through a resilience lens. Decision-making around multiple benefits and practical action

Resilient Boulder Engagement

- **Steering Committee** will meet 2-3 times at important junctures to provide input into development of the Resilience Strategy
- **Working Groups** will coalesce around Focus Area topics as scope of Phase II begins to take shape
- **Partnerships** with Platform Partners, trainings, and events with specific departments (e.g., emergency responders or teams involved in the Comprehensive Planning process) will occur periodically
- **Public engagement** will occur through tie-ins to existing events and initiatives and targeted presentations to neighborhood groups

Steering Committee

- **Charged with providing input** on the development and implementation of the Resilience Strategy
- **Composed of a diverse set of members** who are deeply immersed in the concepts around urban resilience, including representatives from:
  - City of Boulder
  - Boulder County
  - Colorado Recovery Office
  - University of Colorado
  - Private sector
  - Non-profits
  - Philanthropy

Stakeholder Engagement Plan

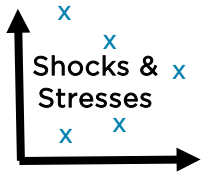
Goals are to:

- **Raise awareness** about the concept of resilience and how it applies in a variety of contexts related to both acute and chronic shocks and stresses
- Create meaningful, **community-focused engagement opportunities** that educate individuals, groups and neighborhoods about the role they play in building resilience and ways they can help shape Boulder's resilience strategy
- **Promote Boulder's participation** in the 100 Resilient Cities effort, as well as the value to the community of this partnership

Phase I Inputs and Outputs

Inputs

Stakeholder Planning



Unique City Context

Preliminary Resilience Assessment

Validated by Steering Committee

Outputs

Resilience Focus Areas & Custom City Approach

Boulder's Context and Preliminary Resilience Assessment

Risk Overview

Results from March 2015 Resilient Boulder mini-workshop

- Well-defined risk from shocks, such as **wildfire, flooding, and drought.**
- City has opportunities **to improve capacity to address chronic stresses** (e.g., housing affordability, economic diversity, income inequality).
- **Social assets** identified through March 2015 mini-workshops include:
  - Retail stores
  - Tech and scientific community
  - Cycling community
  - Local food production systems

We learn a lot from anecdotal conversations, which allow us to identify issues before they start to show up in the data.

Mike Chard
Director,
Boulder Office of
Emergency Mgmt

Risk Profile

Results from March 2015 Resilient Boulder mini-workshop
Incorporating analysis of hazard mitigation plans and April 2014 workshop feedback

High risks

Drought
Floods
Pandemic flu
Wildfire
Winter storms

Medium risks

Dam failure
Extreme temperatures
Infrastructure/building failure
Hazardous materials accident

Top stresses linked to shocks

Environmental degradation

Transportation options

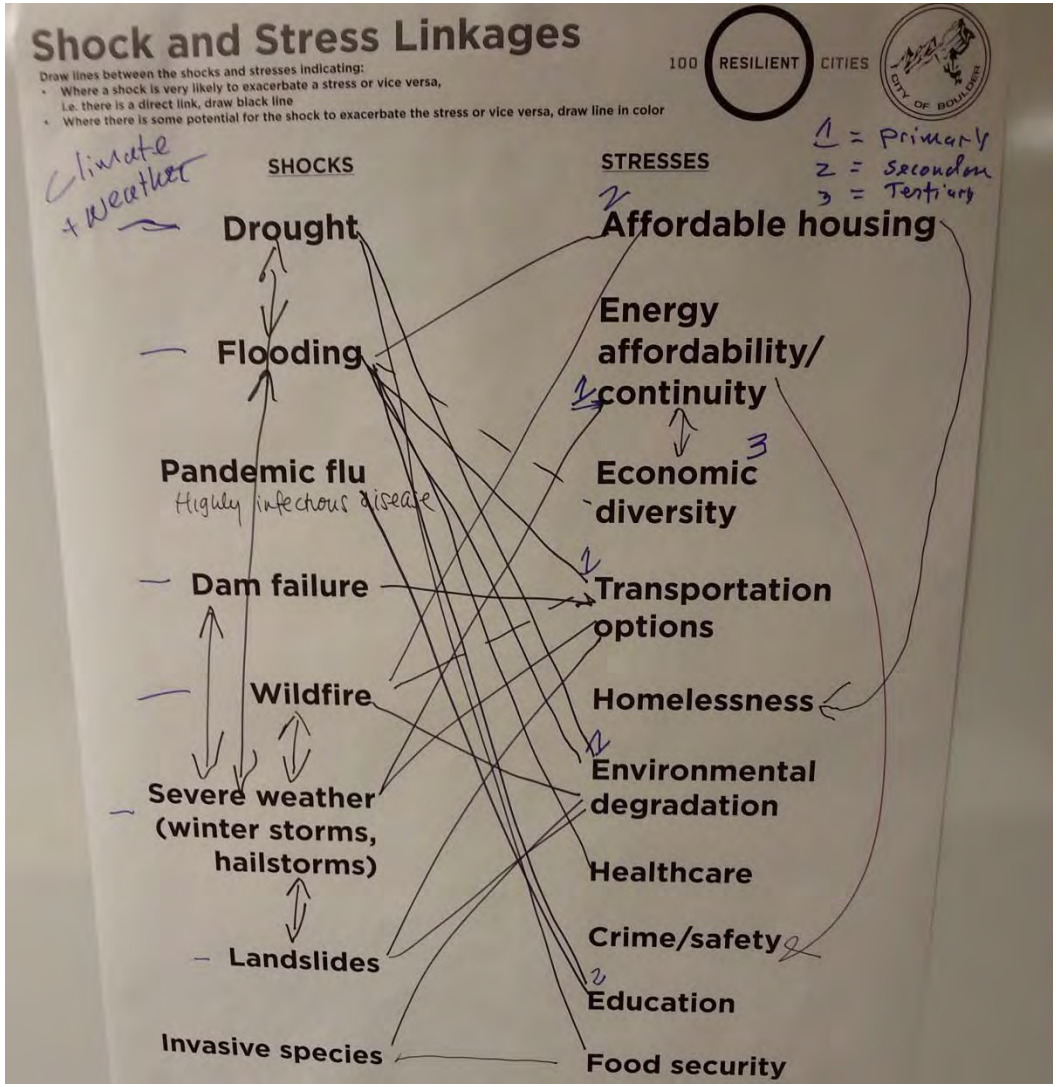
Energy affordability/continuity

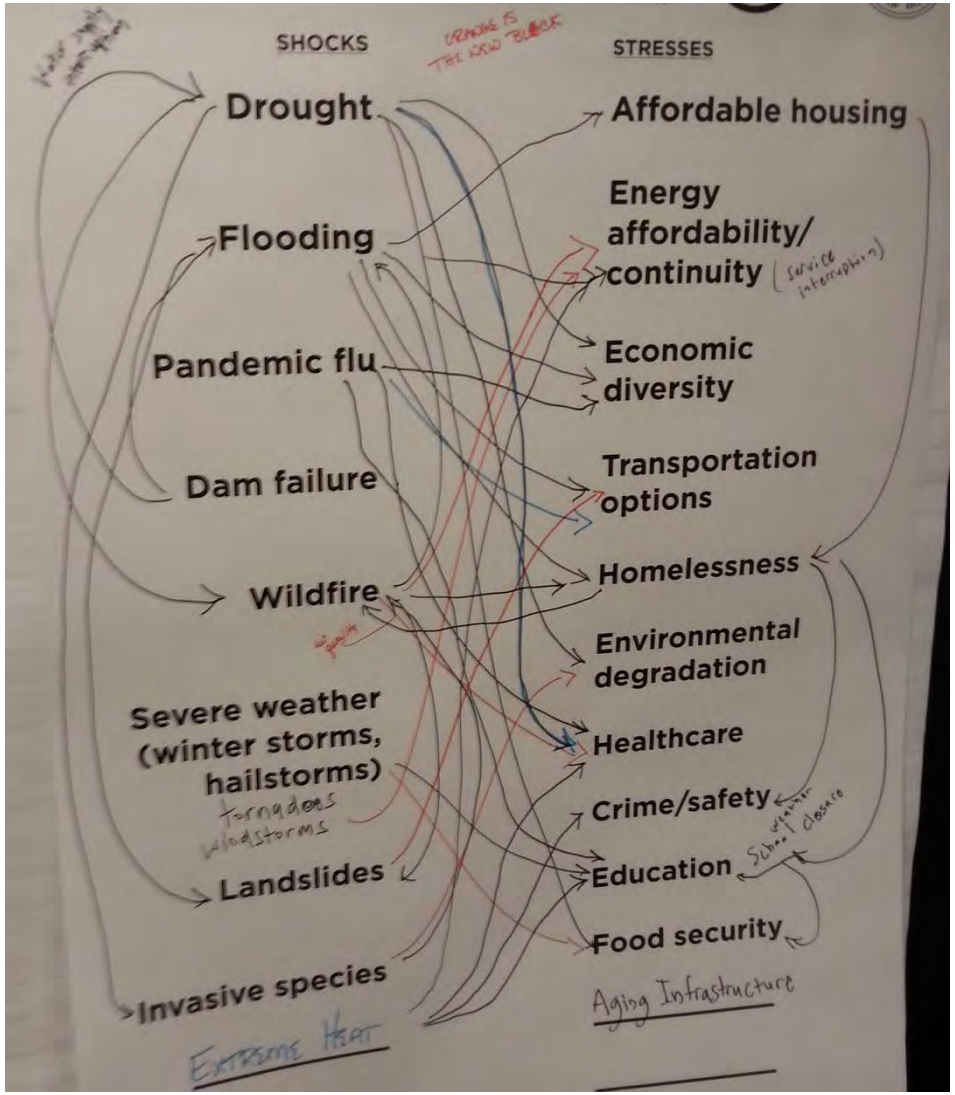
Economic diversity

Housing affordability

Interrelationship of Risk

Results from March 2015 Resilient Boulder mini-workshop
Incorporating analysis of hazard mitigation plans and April 2014 workshop feedback



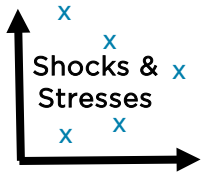


Phase I Inputs and Outputs

Inputs

Stakeholder

Planning



Unique City Context

Preliminary Resilience Assessment

Validated by Steering Committee

Outputs

Resilience Focus Areas & Custom City Approach

Phase I Inputs and Outputs

Inputs

Stakeholder

Planning

Unique City Context

For discussion today through the lens of City Resilience Framework

Kickoff Workshop
April 2014

Citywide Online Survey
February 2015

Topic-Based Workshops
March 2015

Preliminary Resilience Assessment

City resilience has four key elements:

- Health and wellbeing
- Economy and society
- Infrastructure and environment
- Leadership and strategy

Preliminary Resilience Assessment

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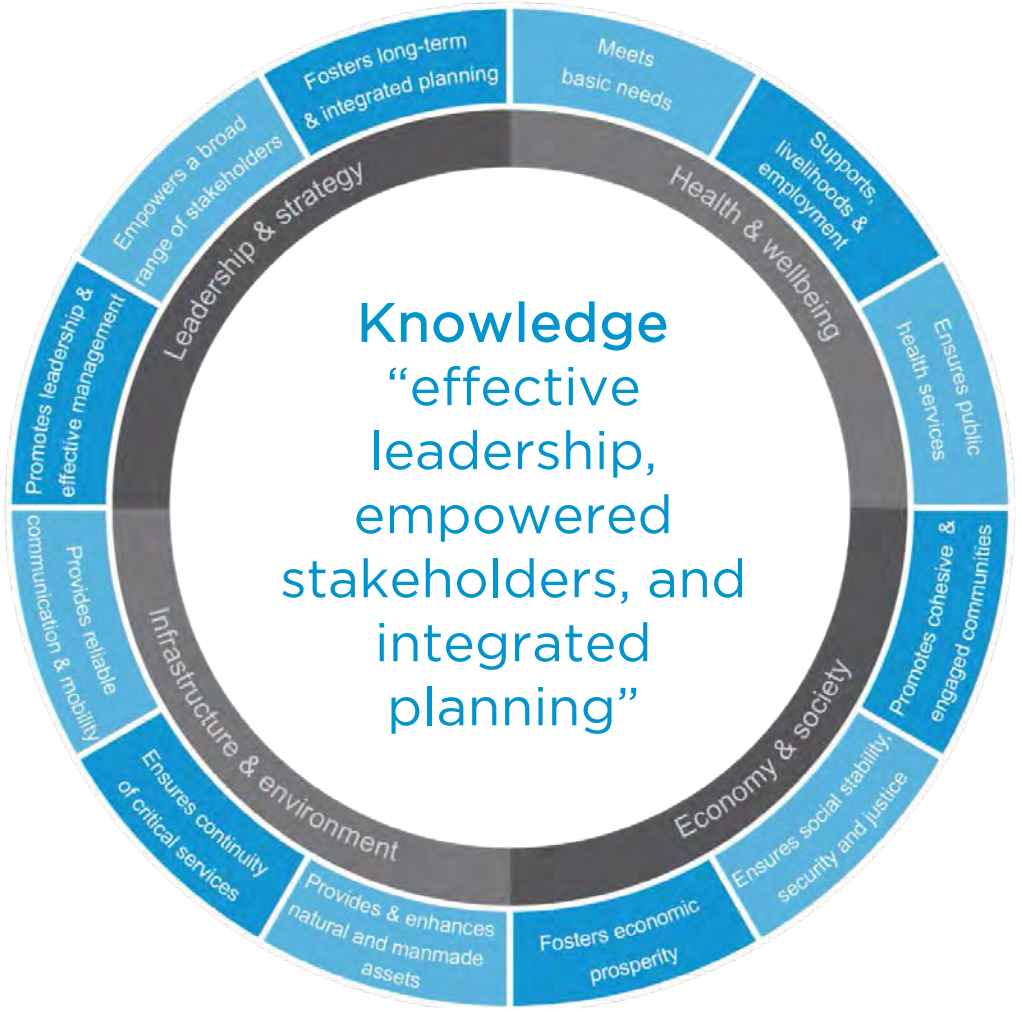
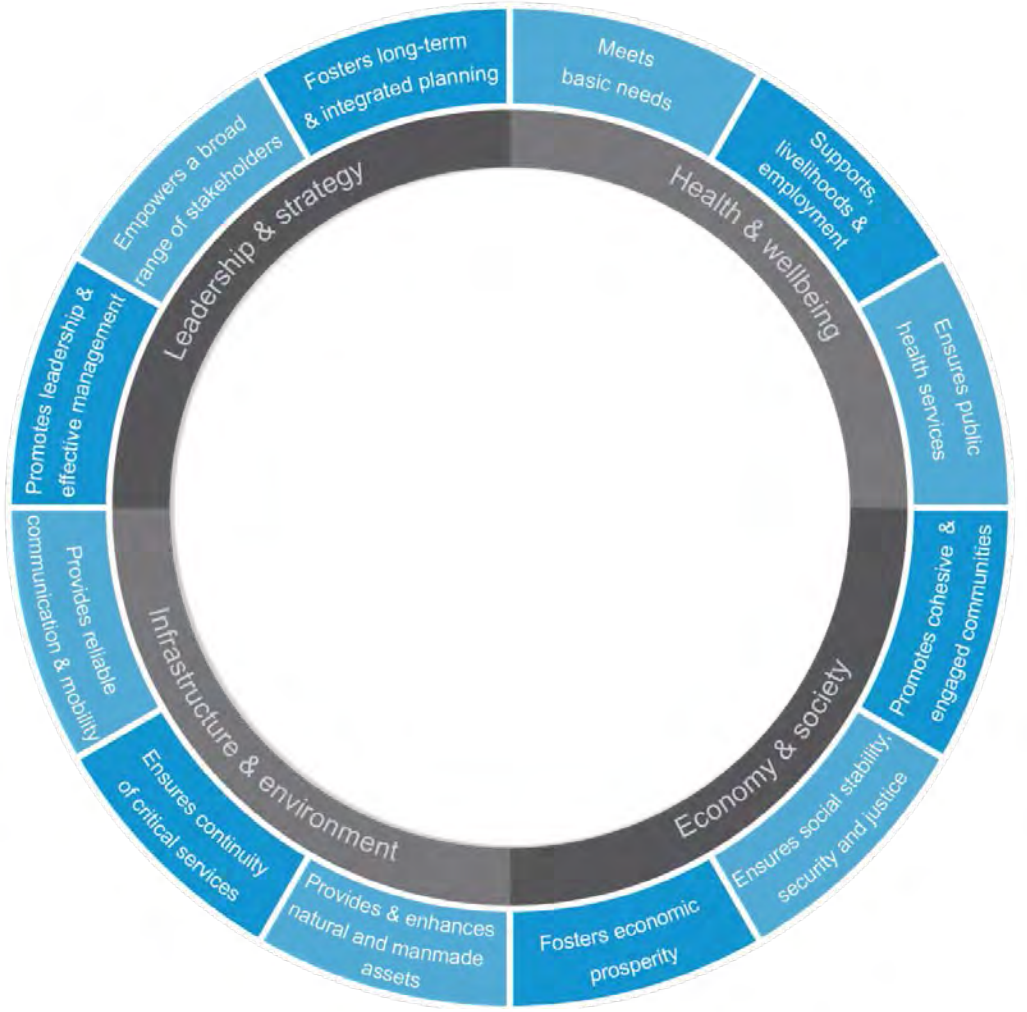


Preliminary Resilience Assessment

City Resilience Framework

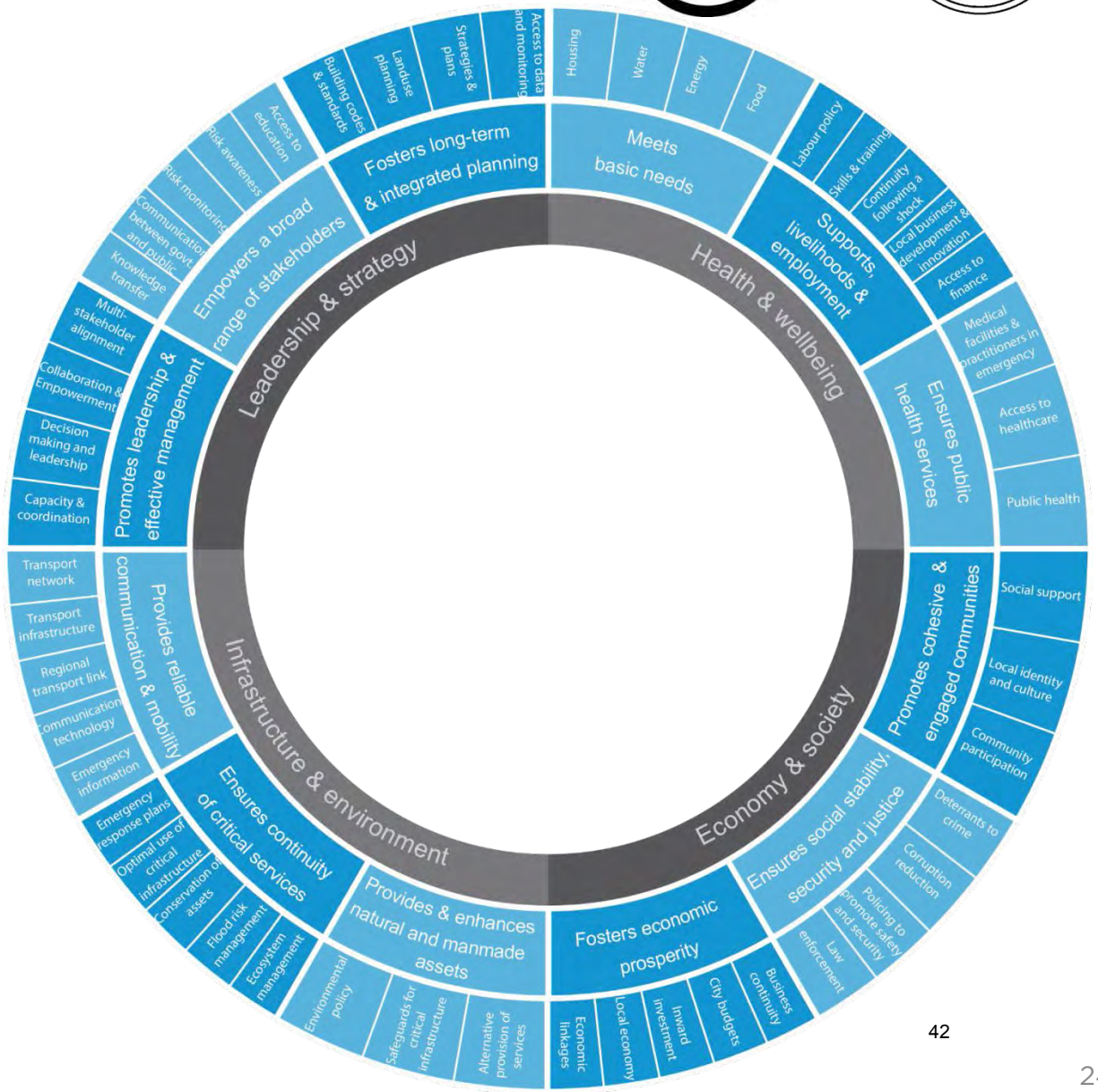
The 12 drivers in the City Resilience Framework collectively determine the city's ability to withstand a wide range of shocks and stresses.



Preliminary Resilience Assessment

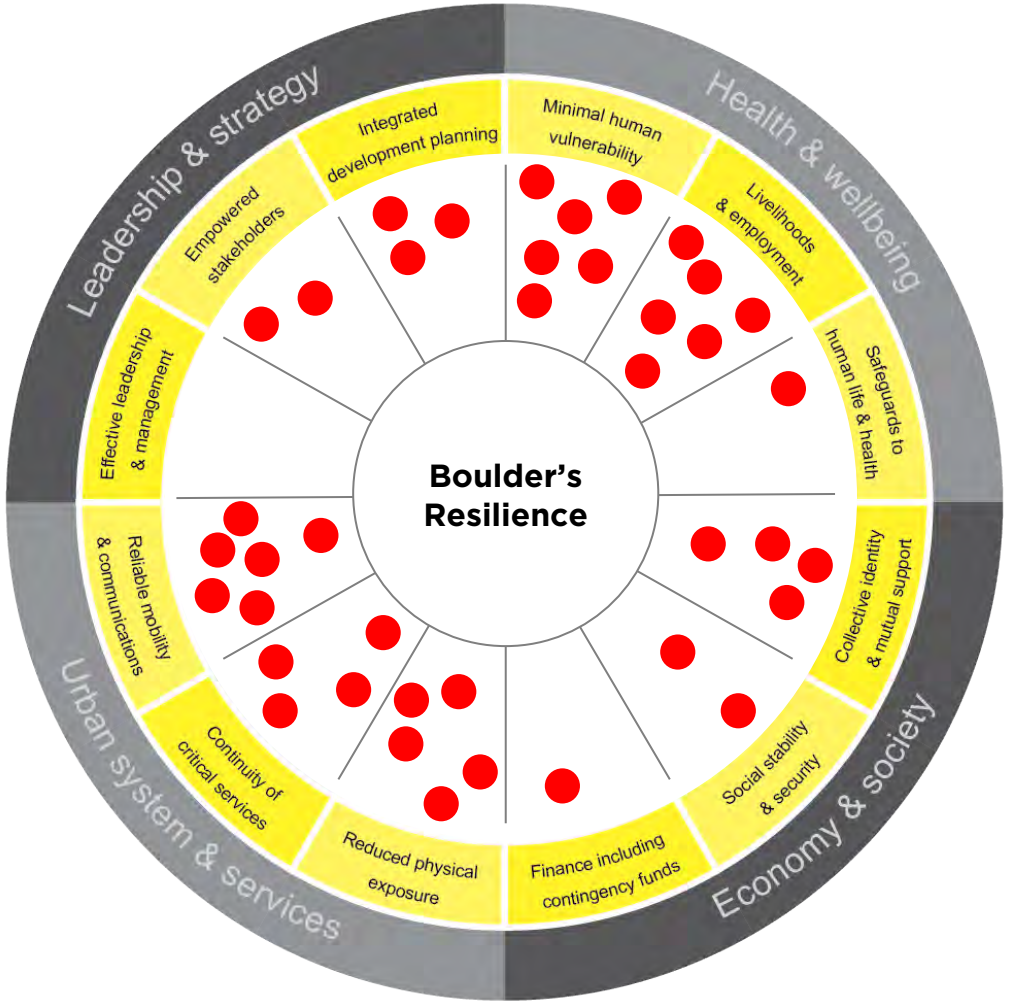
City Resilience Framework

These drivers are comprised of 50 indicators, 3-5 for each driver. We used a condensed list of these indicators to gauge Boulder's resilience through the Preliminary Resilience Assessment.



Resilience Perceptions

Results from April 2014 Resilient Boulder Kickoff Workshop



= Group consensus around weakness

Kickoff Workshop

Using an earlier version of the City Resilience Framework, workshop participants in April 2014 identified the following as particular weaknesses:

- Minimal human vulnerability
- Livelihoods and employment
- Reliable mobility and communications

Discussion around these topics occurred before the standardized development of indicators, meaning participants brought their own interpretations to each driver.

Resilience Perceptions

Citywide Online Survey

Over 400 respondents provided ratings on the list of indicators.
Major survey takeaways:

1. Boulder views itself as a **green, safe, and prosperous** city.

2. Boulder **seeks increased diversity and more inclusive** public processes.

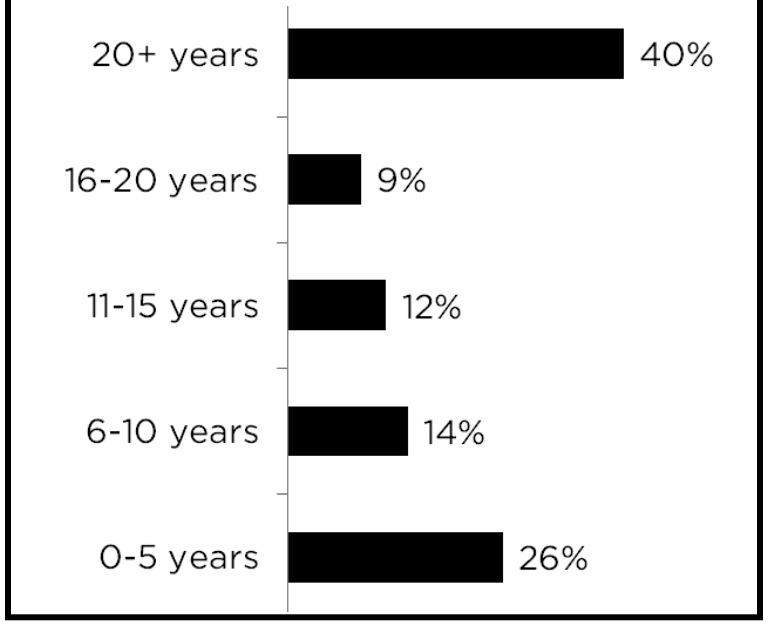
3. Some respondents were **uncomfortable with terminology**, jargon, and/or felt unqualified to answer certain questions.

Resilience Perceptions

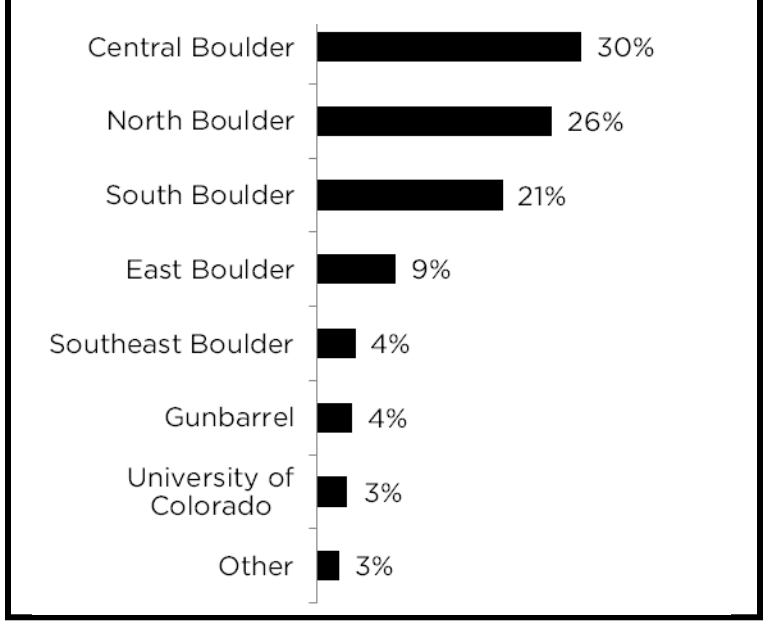
Citywide Online Survey

Resident respondents...

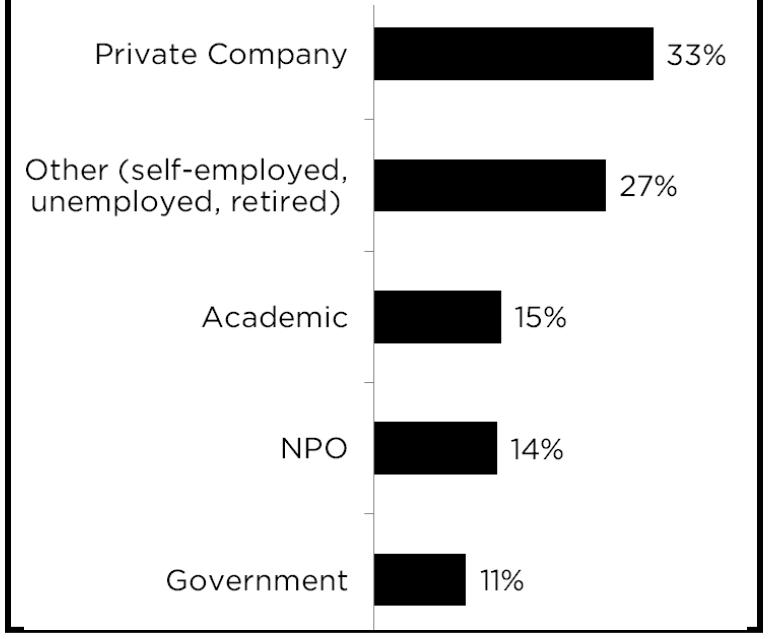
Have lived in Boulder for...



Reside in...



Work in...



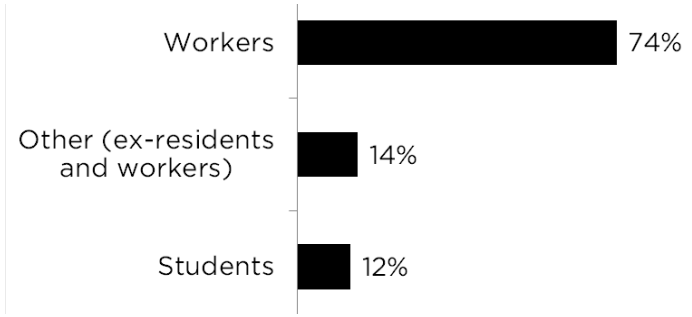
N=435

Resilience Perceptions

Citywide Online Survey

Non-Resident respondents...

Are...



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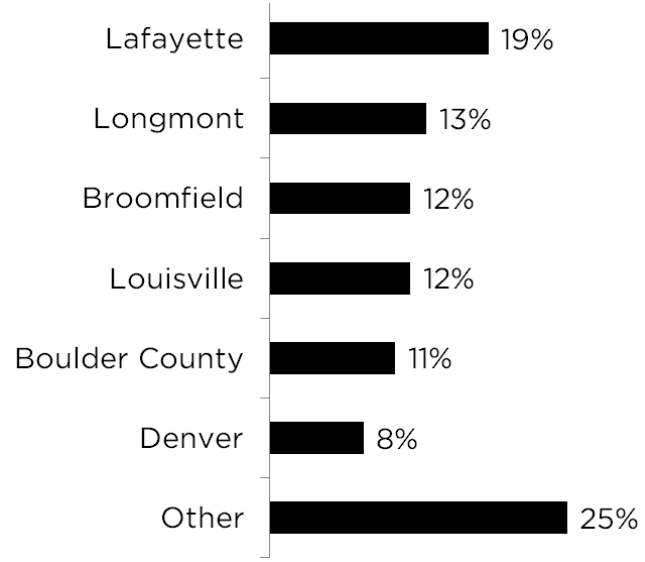
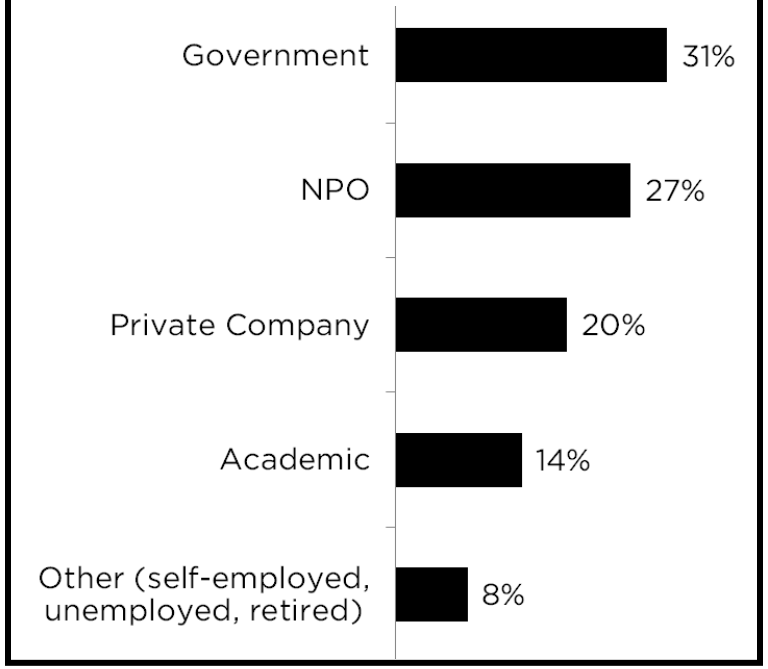


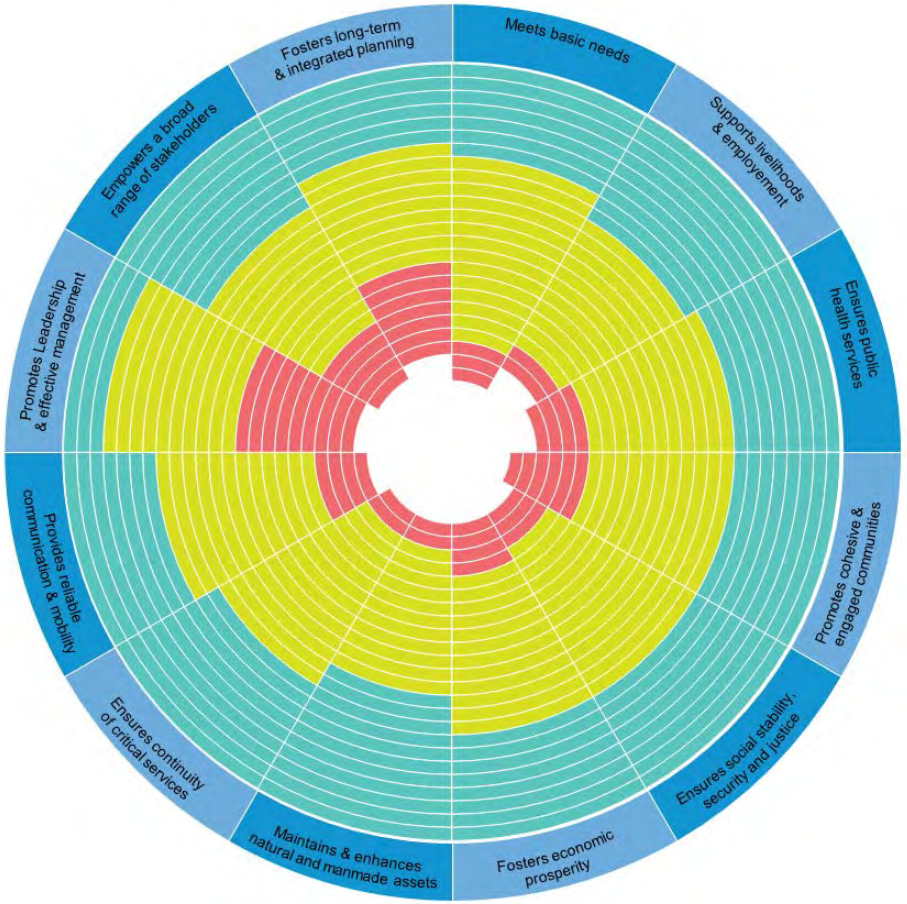
Work in...



N=84

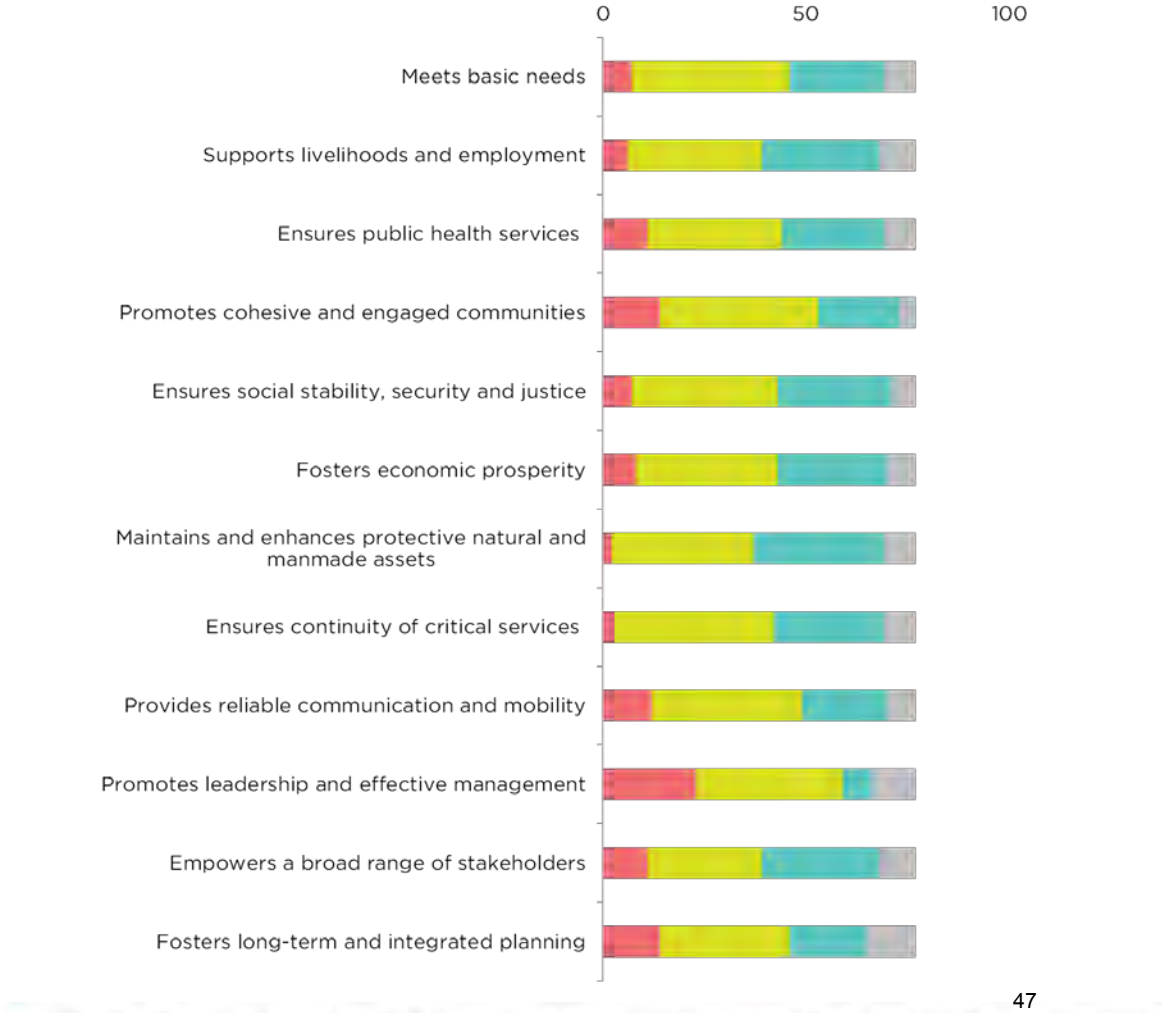
Resilience Perceptions

Results from Citywide Resilience on-line survey



N=435

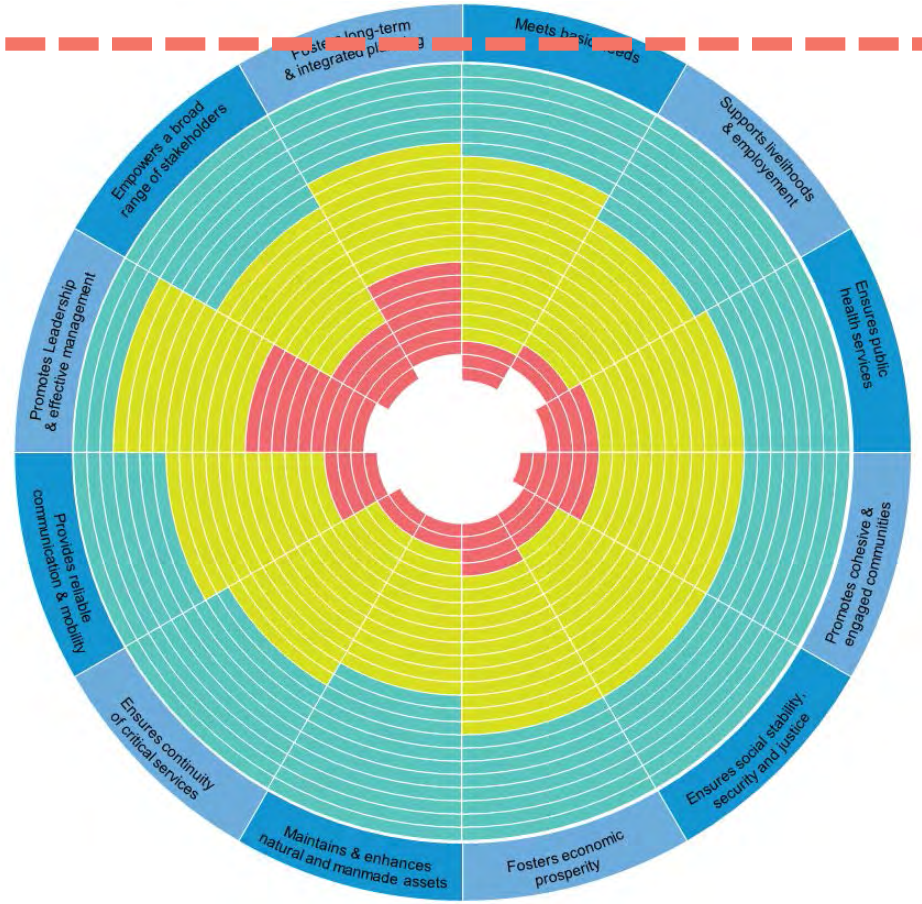
Citywide Online Survey



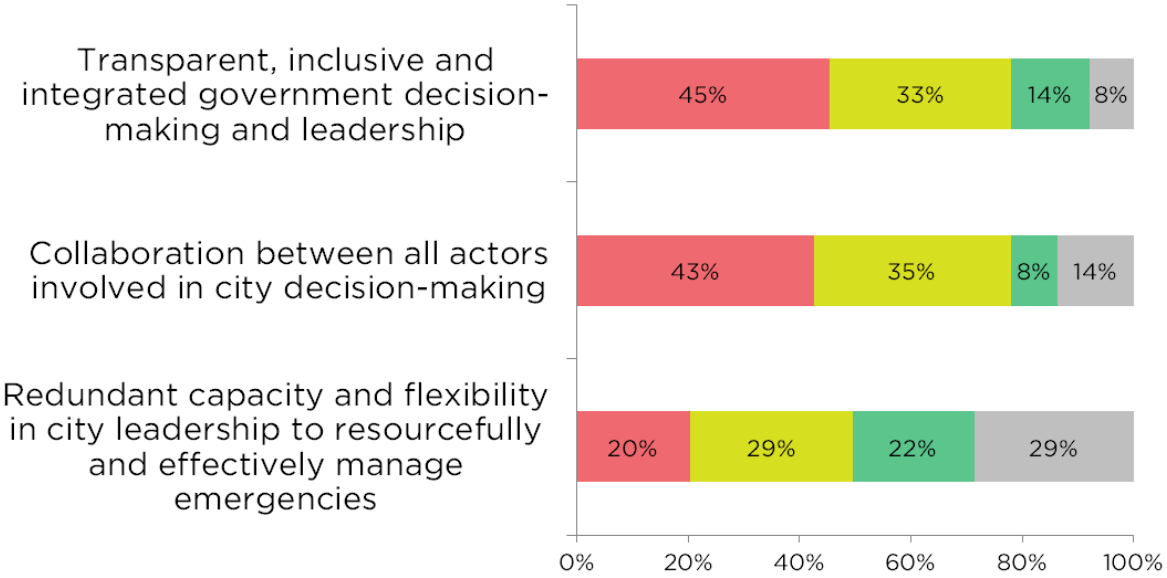
Resilience Perceptions

Results from Citywide Resilience on-line survey

Citywide Online Survey



Promotes leadership and effective management

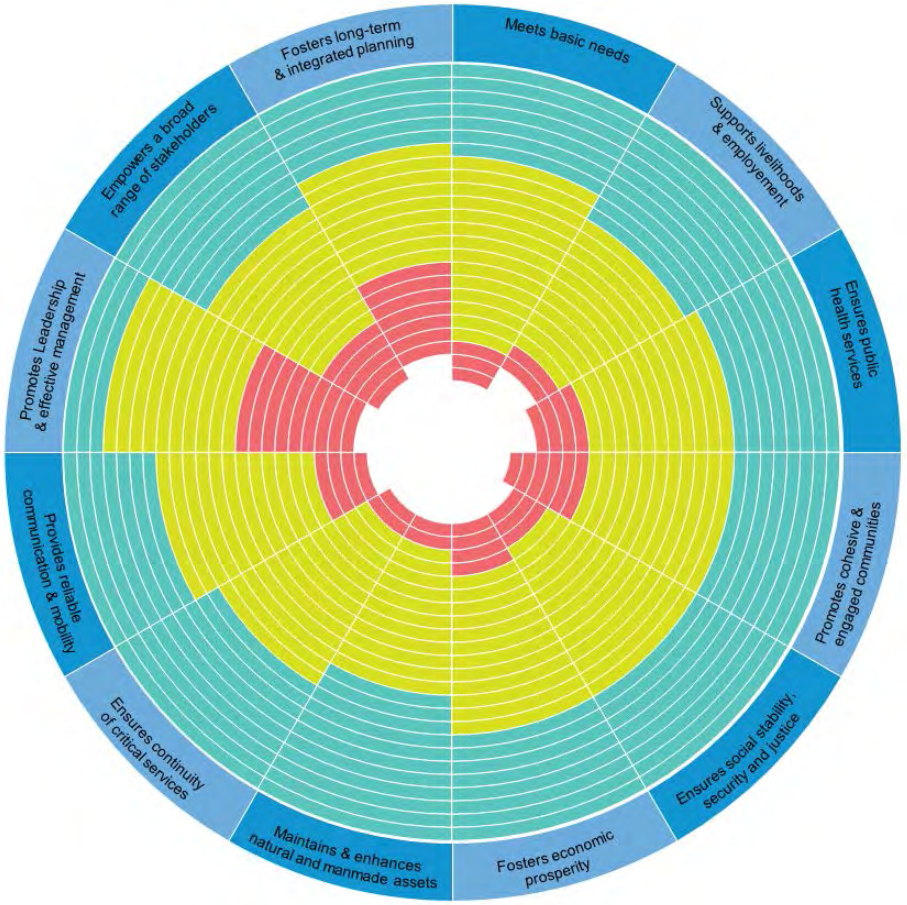


N=398

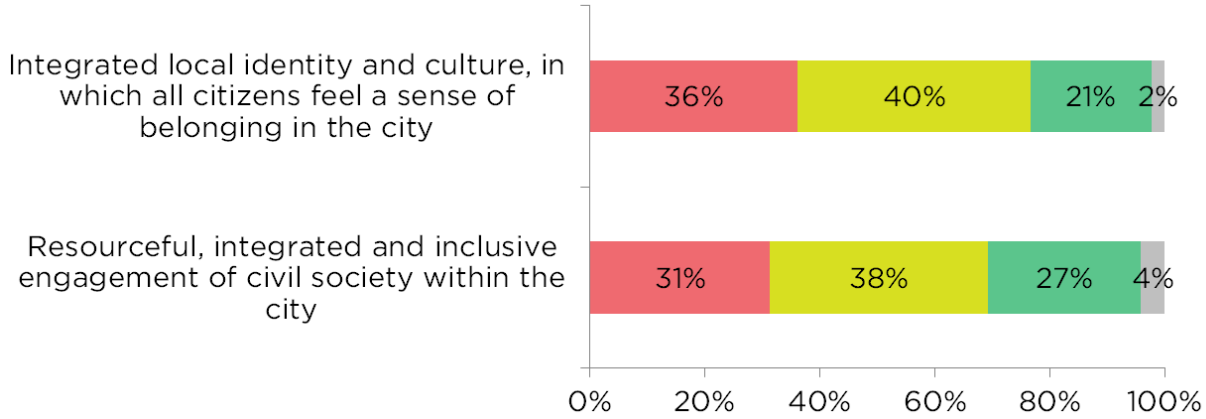
Resilience Perceptions

Results from Citywide Resilience on-line survey

Citywide Online Survey



Promotes cohesive and engaged communities

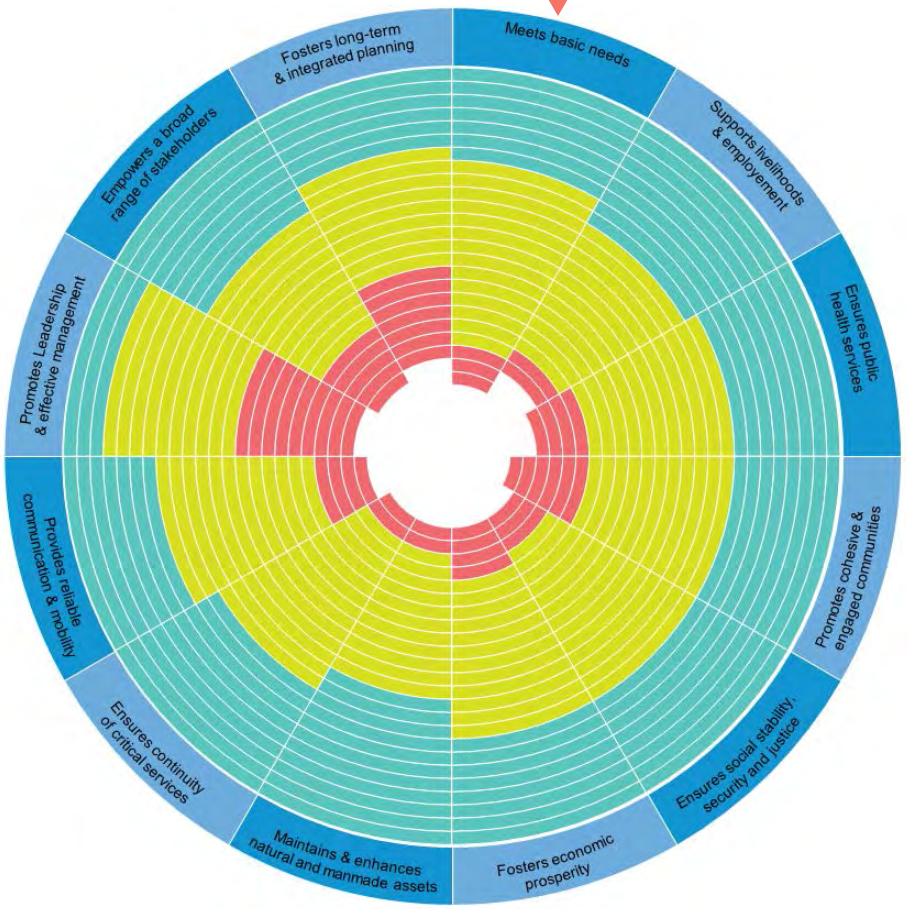


N=430

Need to do better | Doing well, but can improve | Area of strength | Unknown

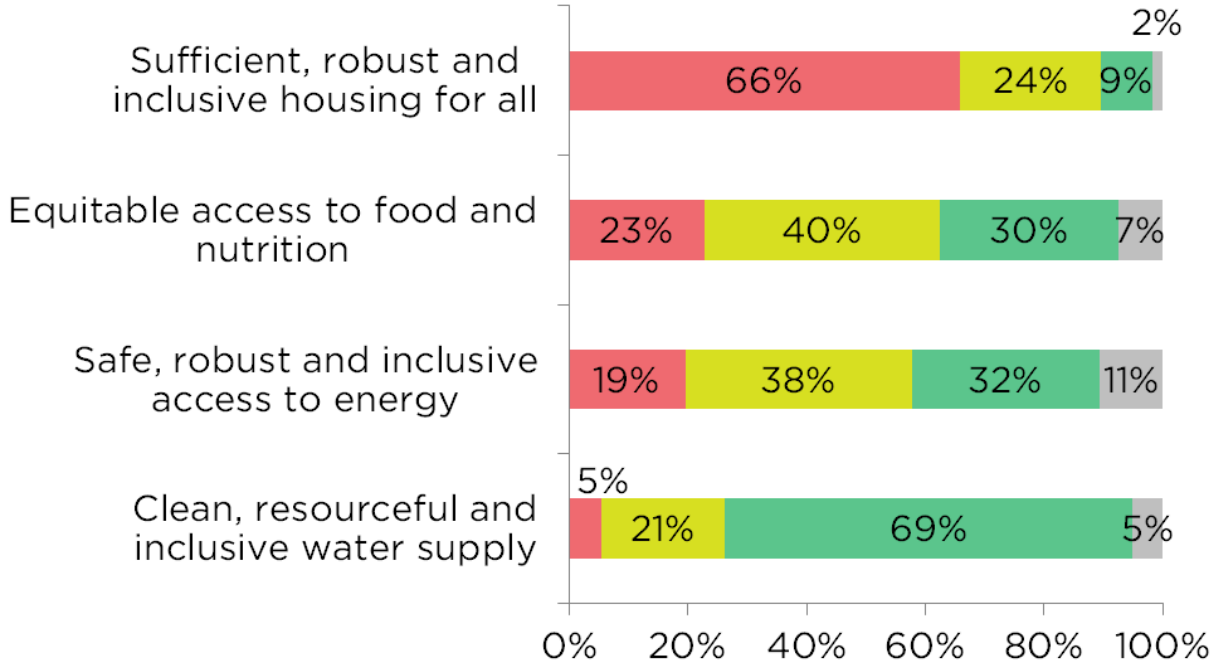
Resilience Perceptions

Results from Citywide Resilience on-line survey



Citywide Online Survey

Meets basic needs



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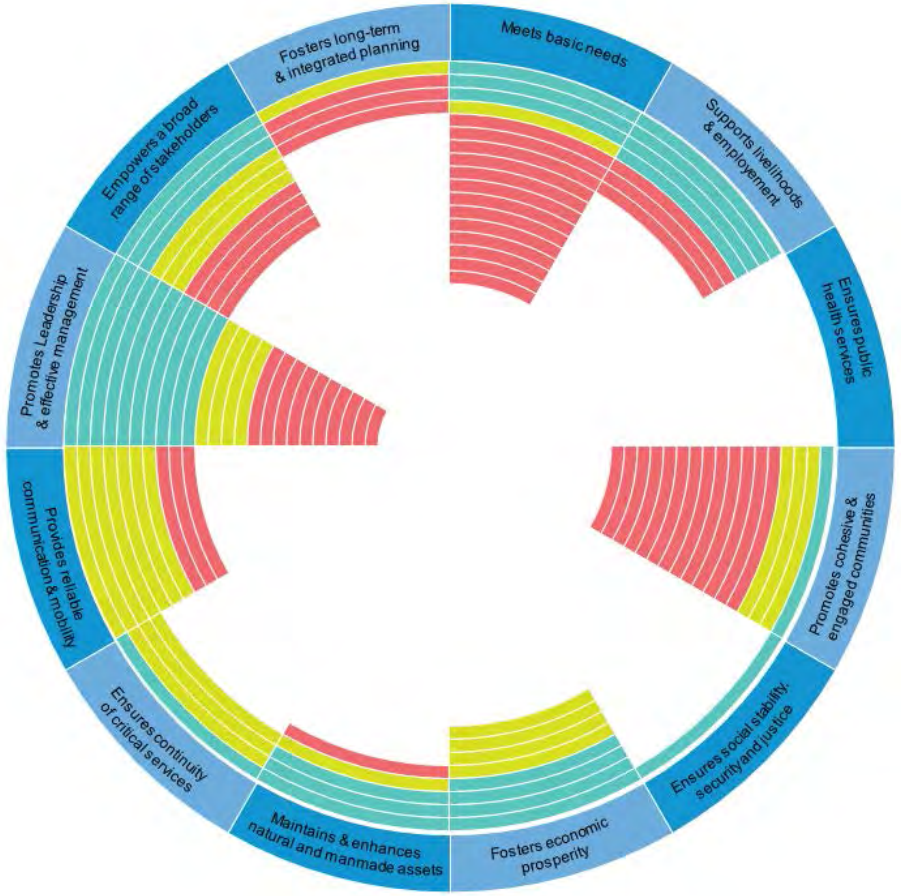
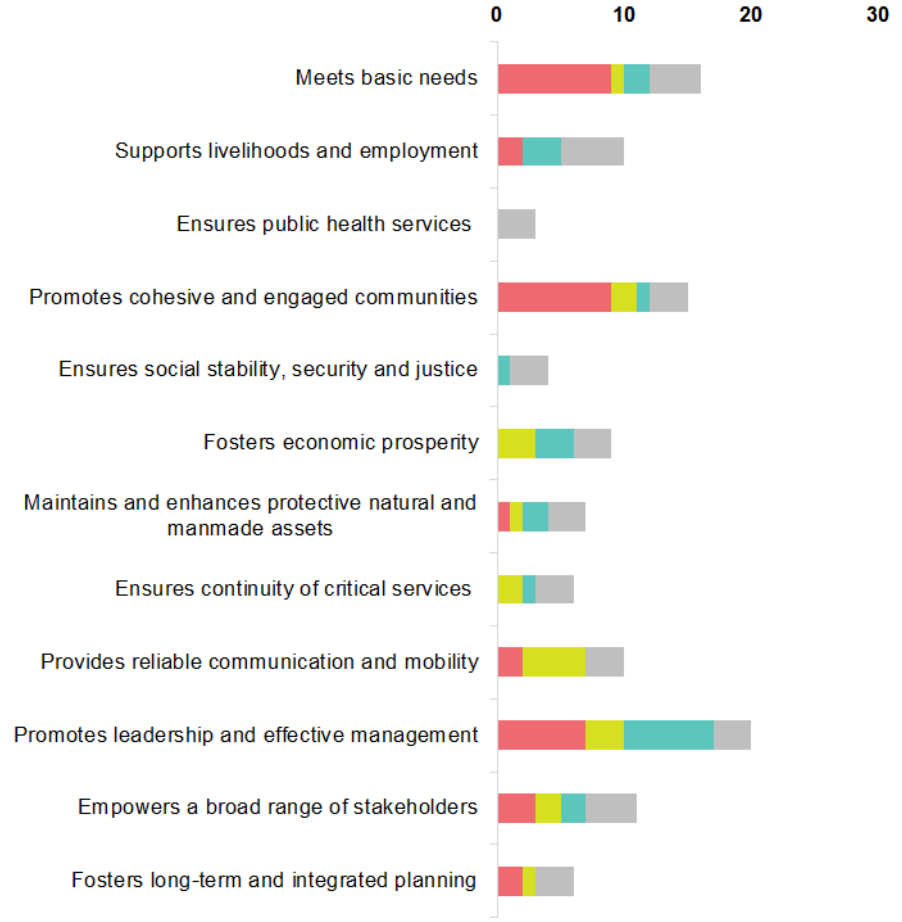
Resilience Perceptions

Results from March 17, 2015 perceptions workshop



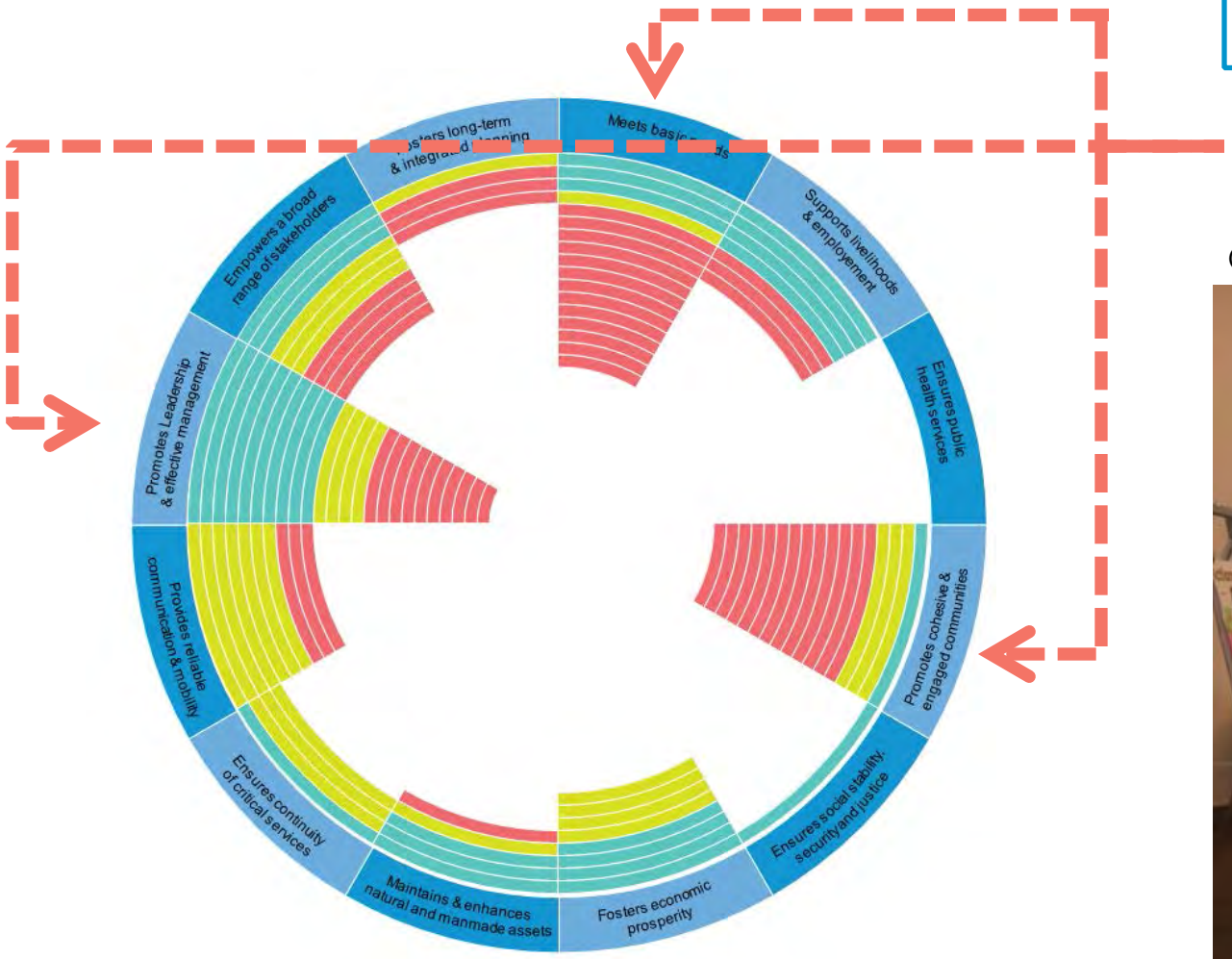
N=18

Topic-Based Workshops



Resilience Perceptions

Results from March 17, 2015 perceptions workshop



N=18

Topic-Based Workshops

Workshop validated survey findings of city's weaknesses.

(Participants were not shown survey results until after the exercise.)

52

Need to do better | Doing well, but can improve | Area of strength | Unknown

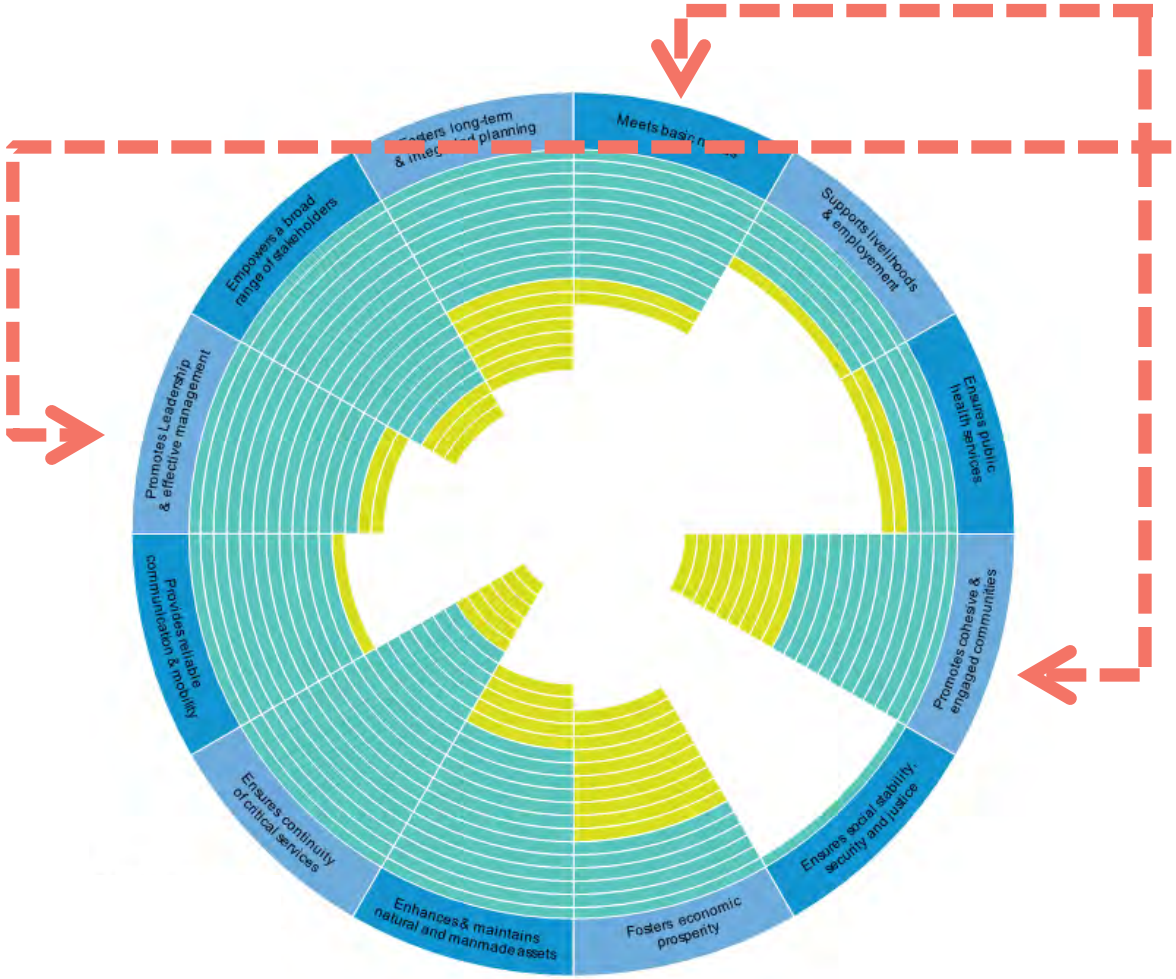
Resilience Actions

Actions include plans, practices, programs, projects, initiatives, assessments, studies, etc. that are current as well as those that are historical. Actions can thus be ongoing, completed or parked on a shelf awaiting additional resources or political will.

Actions can be compared with the City's Resilience Perceptions to identify what gaps may exist in Boulder's initiatives.

Resilience Actions

Results from March 17, 2015 perceptions workshop



N=18

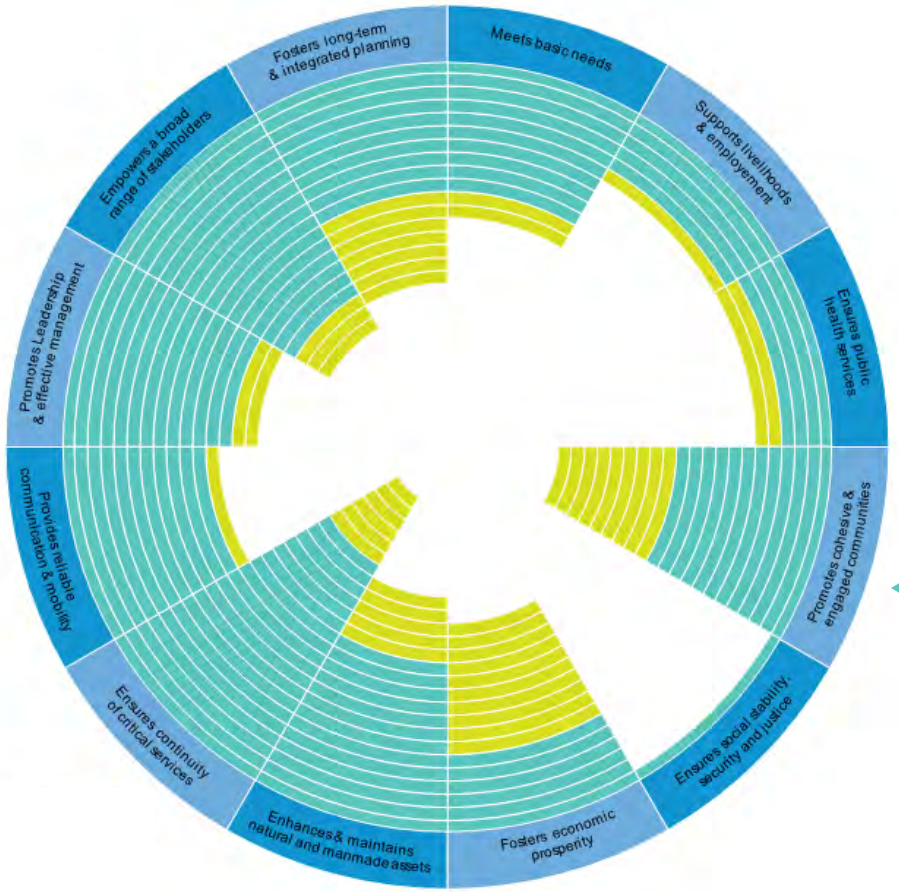
Topic-Based Workshops

Actions exist in categories identified as particular weaknesses in the survey and mini-workshop:

1) Housing affordability
2) Government transparency
3) Community engagement and feedback integration

Resilience Actions

Results from March 17, 2015 perceptions workshop



N=18

Topic-Based Workshops

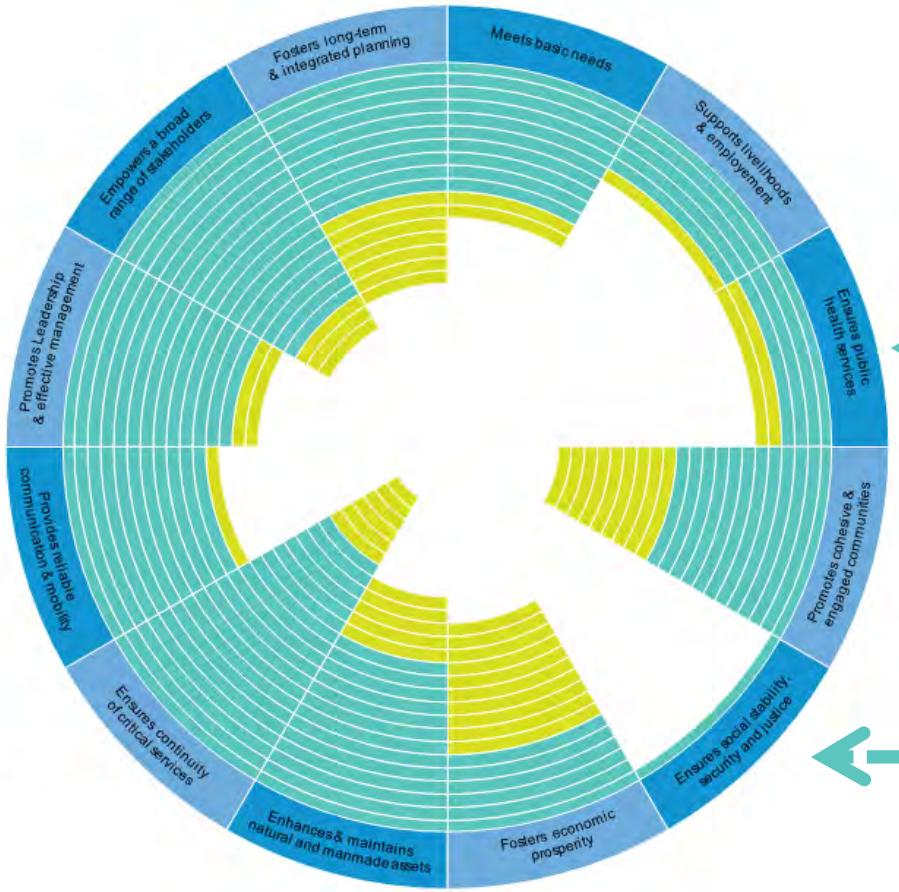
But these initiatives do not necessarily relate to all of the categories within the driver, nor do they reflect the amount of city resources behind these actions.

For example, many actions "Promoting Cohesive and Engaged Communities" are new or in the process of being rethought (Neighborhood Liaison, Code for America).

55

Resilience Actions

Results from March 17, 2015 perceptions workshop



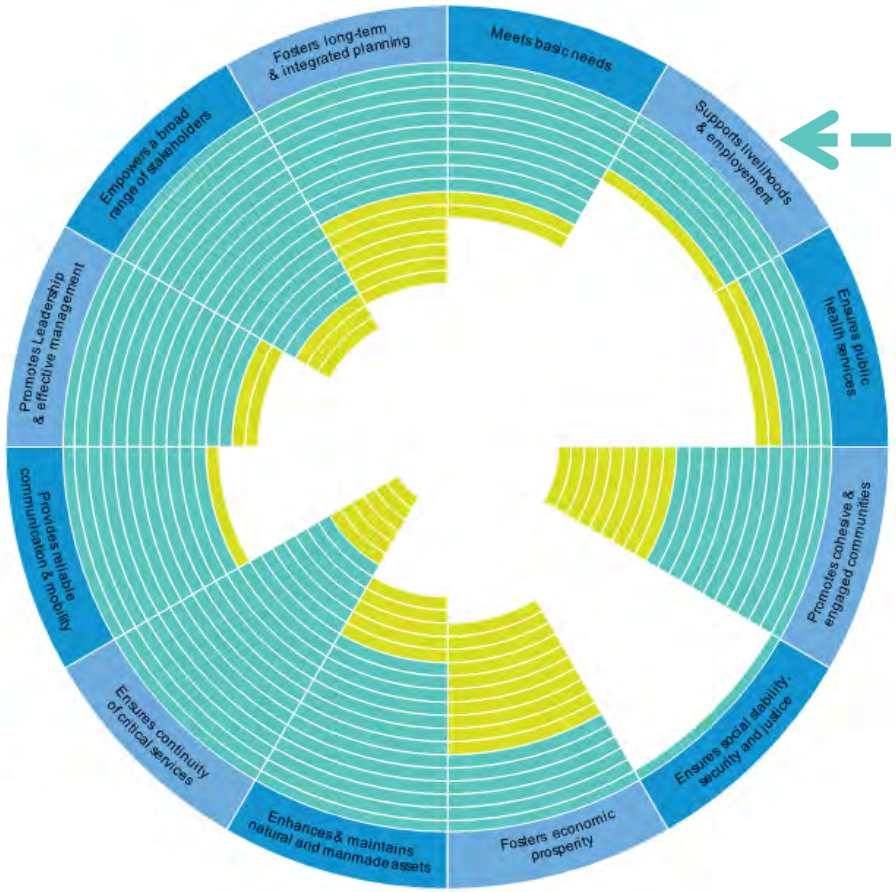
N=18

Topic-Based Workshops

Some gaps in identified City Actions were in areas of relative strength for Boulder (public safety) or was a function of who w as not represented at the workshop (representatives from health care).

Resilience Actions

Results from March 17, 2015 perceptions workshop



N=18

Topic-Based Workshops

Boulder is a very supportive environment for businesses to start up and grow, but face difficulties once they begin to outgrow existing spaces.

Resilience Actions

Results from March 17, 2015 perceptions workshop

N=18

Topic-Based Workshops

Other major initiatives and dialogues occurring within the City, such as Boulder's ongoing examination of energy solutions to meet their carbon-reduction goals, have not yet explored in detail the implications of these initiatives on the City's resilience.

Perceptions and Actions

Common themes have emerged through the survey and mini-workshops that may help to define Boulder's Resilience Strategy:

1) Community **engagement methods could be more transparent** and better demonstrate the integration of public feedback.
2) Boulder's **strong civil society sector is considered to be underutilized** in the daily business of the City.
3) Housing **affordability is the dominant issue in the City**, but can be broadened to be analyzed at the regional scale or through the systems that relate to the City's sustainability goals.
4) The Resilience Strategy should **support ongoing City Actions related to these themes and undertake analysis** to advance ideas where gaps exist.

Focus Areas

Focus Areas are priority topics where the city wants to develop more knowledge, gather more data, and conduct more analysis to shape its work in Phase II of the strategy process.

Focus areas may be designed to:

- **Further understanding and analysis of a city's vulnerability to a shock.** For example, hurricanes, flooding, earthquakes
- **Analysis of how shocks and stresses might interact.** For example, how aging infrastructure and poverty impact the city's ability to respond to coastal storms
- **Integration and prioritization of existing planning efforts.** For example, if a city has many disconnected but important economic development plans
- **A focus on a specific part of a shock or stress which requires deep articulation.** For example, addressing chronic violence in youth and immigrant populations

The Role of Platform Partners

Certain Focus Areas will be led by Platform Partners

These roles will be shaped around specific scopes of work within Phase II Focus Areas or can serve as standalone services that are related to particular Focus Areas.

The Role of Platform Partners

Some of this work is already slated to begin

World Cares Center will be providing a training in June to introduce local leaders and emergency managers to better utilize spontaneous unaffiliated community volunteers and community-based groups in disaster response.

Example Focus Areas

A few cities are ahead of Boulder in the 100 Resilient Cities process and are beginning to define their Phase II scopes

Berkeley, CA CRO Timothy Burroughs

BERKELEY

- Assess and improve the community's ability to care for and shelter vulnerable and displaced residents in the event of a disaster

- Analyze potential mitigation strategies for climate change

63

Potential Focus Areas

Based on stakeholder feedback and the cataloging of existing initiatives in Phase I, a short-list of potential Focus Areas has begun to emerge:

1) Position resilience as driving theme in the design and deployment of Boulder's transition to a new, zero carbon **energy** generation and delivery system
2) Integrating resilience themes into the **Comprehensive Plan update**
3) Further Boulder's **disaster recovery efforts** by focusing efforts towards activities and priority actions that promote the community's long term resilience to shocks and stresses
4) Deepen and broaden the **community's ownership of and participation in city activities** and initiatives

Potential Focus Areas

Based on stakeholder feedback and the cataloging of existing initiatives in Phase I, a short-list of potential Focus Areas has begun to emerge:

5) Further Boulder's ongoing efforts to discuss and address **housing affordability**, both as a persistent community 'stressor' but also in the context of post-disaster planning
6) Improve Boulder's **interaction with the business community**, fostering innovation and encouraging the growth and retention of industries that contribute to other resilience goals (e.g. energy production and services)


Questions &
comments?

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PERCEPTIONS OF RESILIENCE

Interim Report - April 27, 2015

Exploring young people's ideas of resilience in Boulder

In 2014, the City of Boulder was selected to participate in the Rockefeller Foundation's 100 Resilient Cites initiative. The project aims to support cities that have experienced natural disasters in exploring and developing strategies around sudden and long-term issues, such as flood, wildfire, disease outbreak, and drought. As a first step in this process, the City seeks to understand people's perceptions of resilience in Boulder. In collaboration with the City's resilience staff and the Youth Services Initiative (YSI), Growing Up Boulder (GUB) worked with youth to develop their own meanings of resilience through art by considering the Rockefeller definition of resilience: "the capacity to survive, adapt, and grow no matter what kinds of chronic stresses and acute shocks [people] experience."

To our knowledge, Boulder is the only member of the Rockefeller network to engage youth in their processes. This pilot was meant to explore ideas of resilience and to test methods that might yield meaningful conversations and useful information. Additional work with children and youth will continue in the fall of 2015.

The work included two groups of participants from the Youth Services Initiative, a program of Boulder's Parks and Recreation Department that serves youth from Boulder's public housing sites, as follows:

- Approximately 25 middle and high school students
- Approximately 10 elementary students from the Kalmia housing site

Growing Up Boulder used a variety of methods to facilitate conversation, including a resilience "question ball," drawing, and mural making with elementary school students, and drawing, photovoice, a nested ecologies activity, and art boxes with middle and high school students.

Elementary School Student Themes

Not resilient

School and home
Guns and dying
Bullies
Dangers, such as falling from trees

Resilient

Home, family and pets
Nature, parks, hiking
Ice cream, fresh fruits
Activities, such as art, music, sports and holidays

Middle and High School Student Themes

Not resilient

Money and the expense of living here (bottom left)
Housing
Negative global issues as portrayed on the news
Cultural exclusion

Resilient

Supportive benefits of nature
Friends, family, and pets
Skateboarding (bottom middle)
Love (bottom right)

Elementary School Students

Methods and Results

Answering resilience ball questions

Painting the mural

Happy/Resilient - Nature, Sports, Home, Music, Art

Unhappy/Not resilient - Bullies, Death, Guns, School

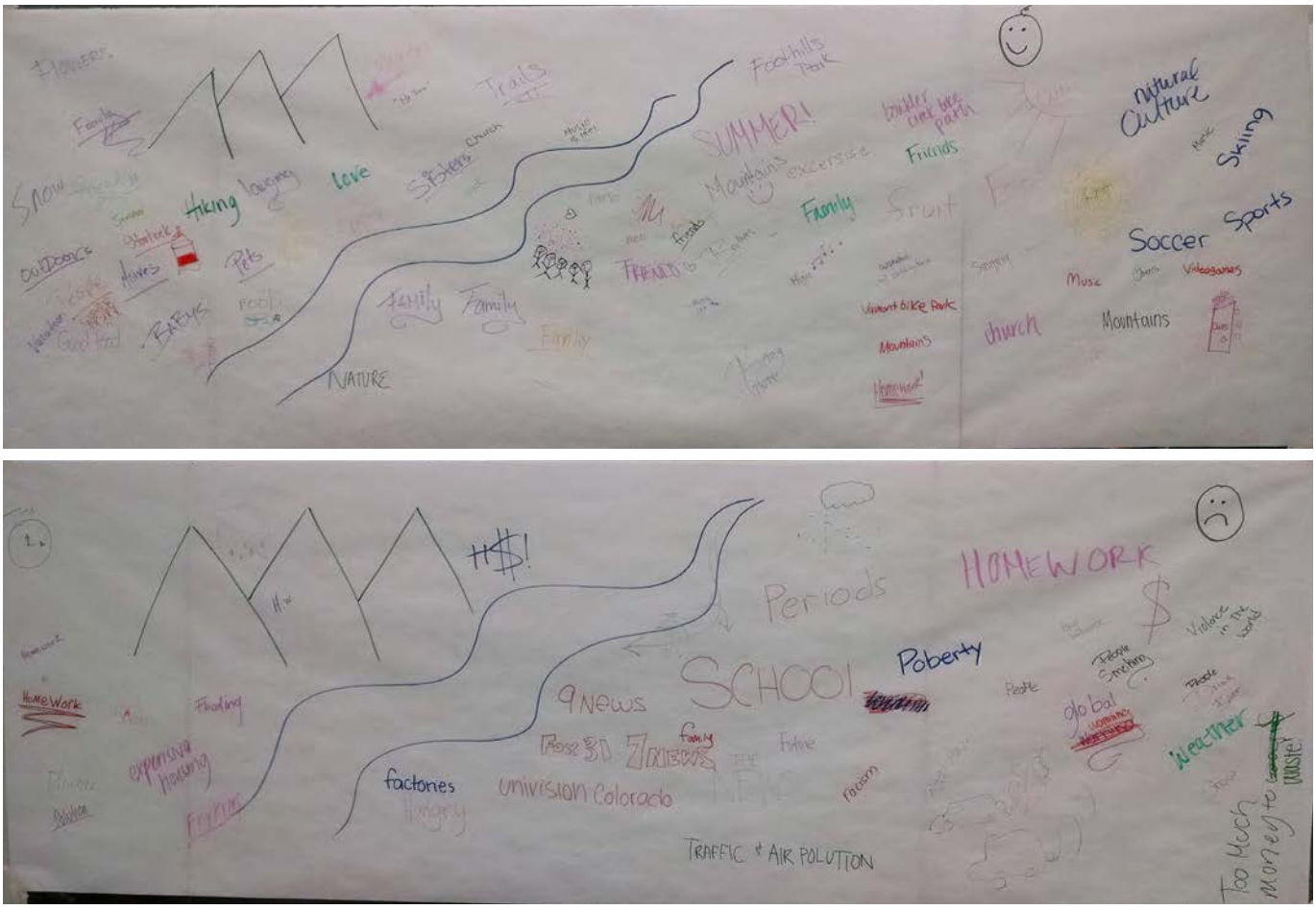
The resilience ball activity asked children to name happy or sad colors (to be used in the mural), places in Boulder that make them feel safe, places they go when they feel unsafe or uncertain, things that make them feel life is good, or things that make them feel that life is hard. The drawing activity included initial responses to these questions and further development of ideas. The mural pulled all these ideas together. In general, elementary children had more ideas about things that promote happiness and resilience, although they displayed some important social issues that do not.

Completed Mural, with ideas that promote resilience (left) and ideas that do not promote resilience (right)

Middle & High School Students

Methods and Results

Middle and high school students began their exploration of resilience with a drawing activity to identify things and/or places that make them feel resilient/happy or not resilient/sad. Participants worked with a professional photographer to take pictures at home and at their program sites. Youth were encouraged to combine images, words, and colors on their boxes and posters. For the nested ecology activity, youth marked a physical diagram with happy, neutral or sad faces to show the degree they felt supported and resilient in their homes, schools, neighborhoods and city.



Drawings of Things that Support Resilience and Happiness (top) and Things that Do Not Support Resilience (bottom)

Not Resilient / Unhappy: time, homework, snow/rain/weather, flooding, expensive housing, fracking, planner, pollution, factories, hungry, money, news, family, school, periods, future, traffic, racism, poverty, people, bad influences, global warming, people smoking, violence in the world, people drinking beer, too much money to waste.

Resilient / Happy: flowers, family, snow, friendly people, outdoors, vacation, people, food, summer, movies, Starbucks, babies, hiking, lounging, pets, pools, Foothills Park, Boulder Creek Path, homework, sun, natural culture, cat, love, open space, nature, mountains, sisters, church, "me time", park, trails, music, friends, brothers, working out, being alone, exercise, fruit, Valmont Bike Park, singing, rest, skiing, sports, soccer, video games, chips.

To see a complete photo gallery, visit the GUB website at www.growingupboulder.org. For more information please contact GUB coordinator Tori Derr, victoria.derr@colorado.edu or Mara Mintzer, mara.mintzer@colorado.edu. Special thanks to GUB coordinator Tori Derr; GUB staff and interns Erica Fine and Emily Tarantini; YSI staff Jen Fitzpatrick, Brad Lautenschlager, and Corina Garcia; Photographer Rebecca Stumpf, and Chief Resilience Officer, Greg Guibert.

Middle & High School Students

Results

Many students took pictures of their favorite activities, including skateboarding or enjoying time with friends. Other pictures revealed an appreciation for nature and relaxation shown in images of sunsets, horses, and pets.

"I chose brotherhood, because my friends and family would always have my back no matter what. Boulder has many struggles, but the community has always been there."

-Middle School Student

The image of the lock prompted a conversation about feelings of cultural exclusion. While the intention of the young artist was to represent the security that brotherhood provides him, others in the group thought it reflected feelings of exclusion that they experience in the city because of language and ethnicity.

The nested ecology activity revealed that youth feel most resilient at home or in the city and less resilient in their neighborhoods or at school as shown in the table and image below.

Nested ecology results

Nested ecology activity

	City	Neighborhood	School	Home
☺	9	6	5	9
😐	2	5	7	2
☹		2	4	

Ideas came together in meaningful ways in students' final boxes and boards. On the spray painted backgrounds, images and words combined to tell stories about the power of nature and community and the influence of money on the quality of their lives.

"Nature makes me feel relaxed and free from the world.."

- Middle School Student

"Which is more important? Money or nature?

- Middle School Student