CITY OF BOULDER
OFFICE OF THE CITY MANAGER

To: Mayor and Members of Council

From: Jane Brautigam, City Manager

Date: July 15, 2016

Re: Action Information Packet

Dear Council Members,

1. The following item requires your attention by July 22, 2016:

Memo regarding energy codes. This action item outlines the staff implementation plan relative to the long-term strategy for Boulder's energy codes and priorities for the next energy code update (late 2016). As the city evaluates and updates its energy codes every three years, staff has developed an implementation plan for the next updates, which will likely go to council for adoption in late 2016 and go into effect in early 2017.

Proposed near-team energy code updates include:

a. Restructuring and updates for the residential energy code, Green Building and Green Points; and

b. New prescriptive requirements for commercial buildings, including only allowing this pathway for renovations and very small new construction.

Please direct council comments or questions regarding these near term updates to Kendra Tupper, Energy Services Manager, 303-441-3434, by July 22, or requests for further council discussion to CAC for scheduling.

2. The following item is informational only:

Memo regarding annexation of city-owned property and Elmer's Two-Mile Park as an enclave. There are several city-owned parcels surrounding and within the city that have never been annexed. The properties were not annexed for a variety of reasons, primarily because they were pieces that were omitted from street construction or were public parcels adjacent to or between other developments that were being annexed. The Boulder Valley Comprehensive Plan (BVCP) annexation policy 1.24 states that the city will actively pursue annexation of enclaves and Area II properties, and may annex city owned properties in Area III when a full range of urban services is not needed. In preparing for potential municipalization, the maps of the city boundaries have been scrutinized very thoroughly. The separation plan requires that the properties be annexed for

the city to provide electrical service without building duplicate facilities. Therefore, these annexations have elevated in priority. Ordinances will be presented to council to annex city-owned properties and the Elmer's Two-Mile Park as an enclave with an initial zoning of P-Public on August 2, 2016. The Open Space Board of Trustees and Planning Board are considering recommendations regarding the annexations to council at their meetings on July 27 and July 28, respectively.

Please direct council comments or questions to Kathy Haddock, 303-441-3020, or requests for further council discussion to CAC for scheduling.

INFORMATION PACKET
MEMORANDUM

To: Members of City Council

From: Jane S. Brautigam, City Manager
Maureen Rait, Executive Director of Public Works
David Driskell., Executive Director of Planning, Housing + Sustainability
Dave Thacker, Chief Building Official
Kendra Tupper, Energy Services Manager **(contact for questions and comments)**
Elizabeth Vasatka, Business Sustainability Coordinator

Date: July 19, 2016

Subject: Energy Codes – Long-Term Strategy and Proposed Near Term Updates and Implementation Plan

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1. EXECUTIVE SUMMARY

This information packet outlines the staff implementation plan relative to the long-term strategy for Boulder's energy codes and priorities for the next energy code update (late 2016). Please contact Kendra Tupper, Energy Services Manager, (tupperk@bouldercolorado.gov; 303-441-3434) by July 22, 2016 with any comments or questions.

Long-Term Strategy

The City of Boulder has set an aggressive goal of having net zero energy (NZE) codes in effect by 2031, and has developed a strategy and pathway to achieve that target. Staff also recognizes that in order to have a truly high performing and sustainable built environment, energy codes must begin to address sustainability issues beyond just energy use, such as transportation, water, indoor environmental quality and waste. Although the city is on the leading edge of both commercial and residential energy codes, staff believes that strategic changes and updates are needed to successfully implement a path to NZE codes in order to support the city's larger Climate Commitment and sustainability goals.

Proposed elements of the long-term strategy for energy codes include:

1. Pathways for achieving high performance, NZE codes, including: the phased schedule for NZE deadlines, early adopter incentives, allowance of off-site renewables, future adoption of outcome-based codes and the encouragement of all-electric buildings
2. A six-year cycle for major updates linked to the national code adoption schedule, with local evaluation and updates every three years
3. The prioritization and phasing schedule of non-energy sustainability requirements for commercial energy codes

Proposed Near-Term Updates and Implementation Plan

As the city evaluates and updates its energy codes every three years, staff has developed an implementation plan for the next updates, which will likely go to council for adoption in late 2016 and go into effect in early 2017.

Proposed near-team energy code updates include:

1. Restructuring and updates for the residential energy code, Green Building and Green Points (link to the current Green Building and Green Points program); and
2. New prescriptive requirements for commercial buildings, including only allowing this pathway for renovations and very small new construction.

Please contact Kendra Tupper by July 22, 2016, with any comments or questions regarding these near-term updates.

2. BACKGROUND

1.1 Goals and Objectives of the City's Energy Codes

The overall long-term goal for the city's energy code is to build high performance, net zero energy (NZE) residential structures and commercial buildings. The objectives below are designed to support this overarching goal:

Supporting the Climate Commitment

- To achieve and sustain significant greenhouse gas reductions in support of the city's overall Climate Commitment
- To reach NZE codes by 2031
- To support technologies and practices that will move the community towards local, distributed and renewable energy systems (for both buildings and transportation) that support the goal of 100% renewable electricity as well as economic vitality and community resilience

High Performance Buildings

- To promote sustainable building practices throughout the lifecycle of the building process (e.g., waste management, water management, transportation impacts, etc.)

- To promote the development and ongoing maintenance of safe, comfortable and high performing buildings
- To support energy resilience (the ability to maintain operations during grid failure)

Effective and Viable Codes

- To adopt codes that are feasible to update regularly, implement and enforce
- To provide building owners and design professionals with viable and economically feasible paths to comply with energy codes that are straightforward and easy to understand

1.2 What is Net Zero Energy (NZE)?

While NZE can be defined a number of ways, in this context, NZE means:

> *The amount of renewable energy produced on site, plus the amount purchased from approved community energy systems or carbon offset programs, is equal to or greater than the annual energy consumption of the site.*

This definition makes it possible for all buildings to become NZE even with poor solar access or other site constraints.

1.3 Connection to the City's Climate Commitment

The City of Boulder has set an aggressive goal of having NZE codes in effect by 2031, and is working to develop a clear strategy and pathway to achieve that target. Staff also recognizes that in order to have a truly high performing and sustainably built environment, city codes must also address sustainability issues in a more integrated manner, including not only energy use but also transportation, water and waste. In the past, although the city has been on the leading edge of energy codes, the updates have been somewhat incremental. Staff believes that larger, more strategic changes and updates are needed to both successfully implement a path to NZE codes and to support the city's larger Climate Commitment and sustainability goals. In fact, when staff projected emissions reductions out to 2050, savings from the implementation of progressively more stringent energy codes was the largest of *any* building efficiency program, including Energy Smart, SmartRegs and the Building Performance Program.

1.4 Overview of Energy and Green Codes

Many components of the long term strategy, as well as the short term updates, rely on the national suite of building and energy codes. This section provides background information on those codes, definitions of key terms that are used throughout this memo, and brief history of Boulder's energy codes.

The International Code Council (ICC) publishes an extensive series of model codes every three years. In Colorado, these codes can then be adopted by local jurisdictions along with modifications or exclusions, as desired. The International Energy Conservation Code (IECC) and the International Green Construction Code (IgCC) are two such codes, and both are based on

standards developed by the America Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE).

Table 1: Summary of National Energy and Green Codes

National Code	International Energy Conservation Code (IECC)	International Green Construction Code (IgCC)
Scope	Building energy performance – applies to both commercial and residential buildings	"Green Code" addressing many aspects of sustainability beyond energy; applies only to commercial and high-rise (>3 stories) residential buildings
Use in Boulder Code	Residential: IECC 2012 with local amendments (Green Building and Green Points) Commercial: 30 percent more stringent than IECC 2012	Not currently adopted
Alternate compliance via ASHRAE	Commercial: 30% more stringent than ASHRAE 90.1-2010	ASHRAE 189.1 (2014 is equivalent to IgCC 2015)
Important Notes	IECC 2015 is only slightly more stringent than the 2012 version[1], and still far less stringent than Boulder's current codes. IECC 2018 is expected to have more significant updates and changes when released.	IgCC 2018[2] will be merged with the ASHRAE Standard 189.1-2017, reducing confusion and pulling the best aspects from both codes.

While the IgCC is now available to provide green code language for commercial buildings, there is still no suitable national model code[3] for low-rise residential buildings. There are also many voluntary residential green building programs, but most of them have third-party evaluators, cost money to participate and verify, have their own compliance guidelines and were not designed to be "codified" (e.g., LEED for Homes, etc.) As a result, Boulder will continue to update and evolve its residential green building code, the Green Building and Green Points program.

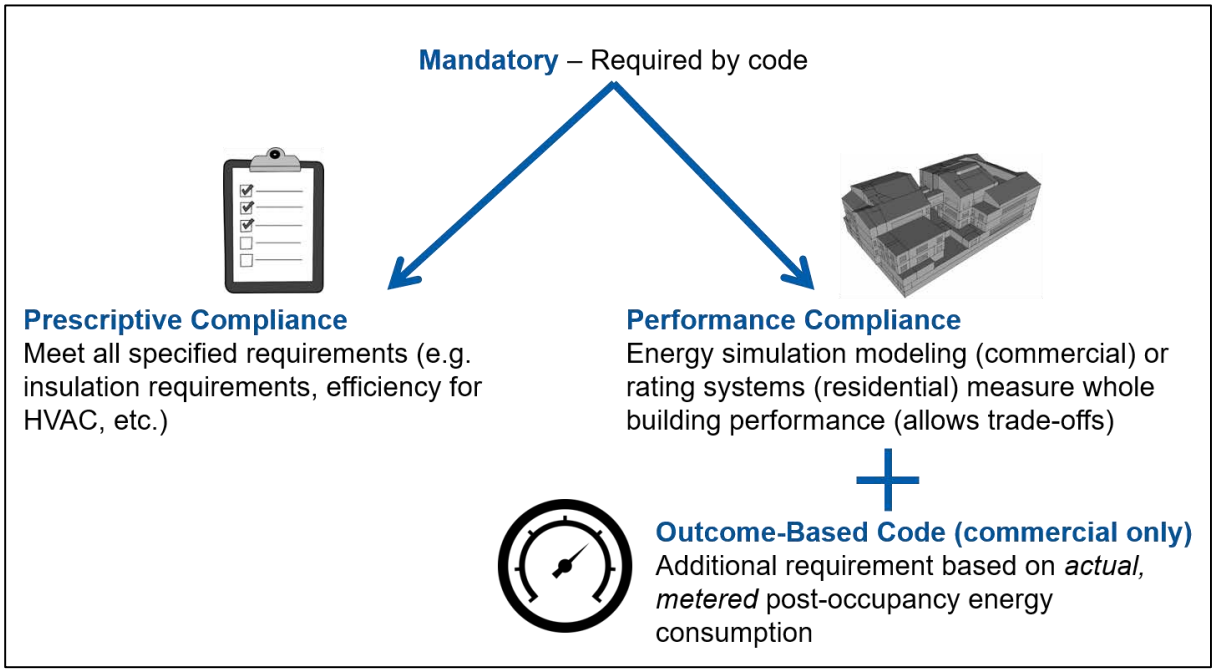
Pathways for Compliance

Energy codes have traditionally included at least two paths to compliance, prescriptive and performance (see Figure 1, below). More recently, an additional option of outcome-based

[1] IECC 2015 compared to IECC 2012: 8.7% more stringent for commercial buildings and 0.73% more stringent for residential buildings (according to Department of Energy)
[2] Planned for release in late 2017
[3] National Green Building Standard (NGBS) is the only known option, but is not recommended because the energy chapter is not set up to guide builders to reach NZE and because it requires that certification is achieved through the Home Innovations Research Lab, a subsidiary of the National Association of Home Builders.

energy codes has emerged. Mandatory requirements must be met regardless of which path is chosen.

Figure 1: Energy Code Pathways for Compliance



One limitation to both prescriptive and performance pathways is that they only address efficiency characteristics of building design. Studies have shown that these design aspects only account for 50 percent or less of the total energy consumption of the building. Characteristics that are just as important include good building maintenance, efficient process and plug loads, and operating practices by occupants and building staff.

To account for the energy performance of the entire building as used after occupancy, the addition of *outcome-based* compliance is being explored for commercial buildings. This is an approach that uses performance modeling to establish an energy consumption target during the design stage, but final compliance is shown by monitoring of a building's energy consumption over a period of time (typically one year) following full occupancy. A building that exceeds the target energy consumption established at the design stage must then take corrective actions to reduce consumption. This type of code is currently being evaluated for inclusion in IgCC, IECC, and in several jurisdictions. It is as also being piloted in Seattle as an optional compliance path with a lower energy target than the performance path alone (link to 2014 ACEEE paper on Seattle's program). Outcome-based codes verify and guarantee that new buildings are actually performing to the efficiency levels to which they were designed, but they also feature more complicated compliance verification and contract structures, as compliance responsibility is spread over multiple parties, including building occupants.

Metrics for Energy Code Stringency and Compliance

As the energy codes become more stringent, new methods of showing compliance or describing stringency are evolving. As a result, several metrics have been established to compare energy code stringency. These metrics will be referred to later in this memo.

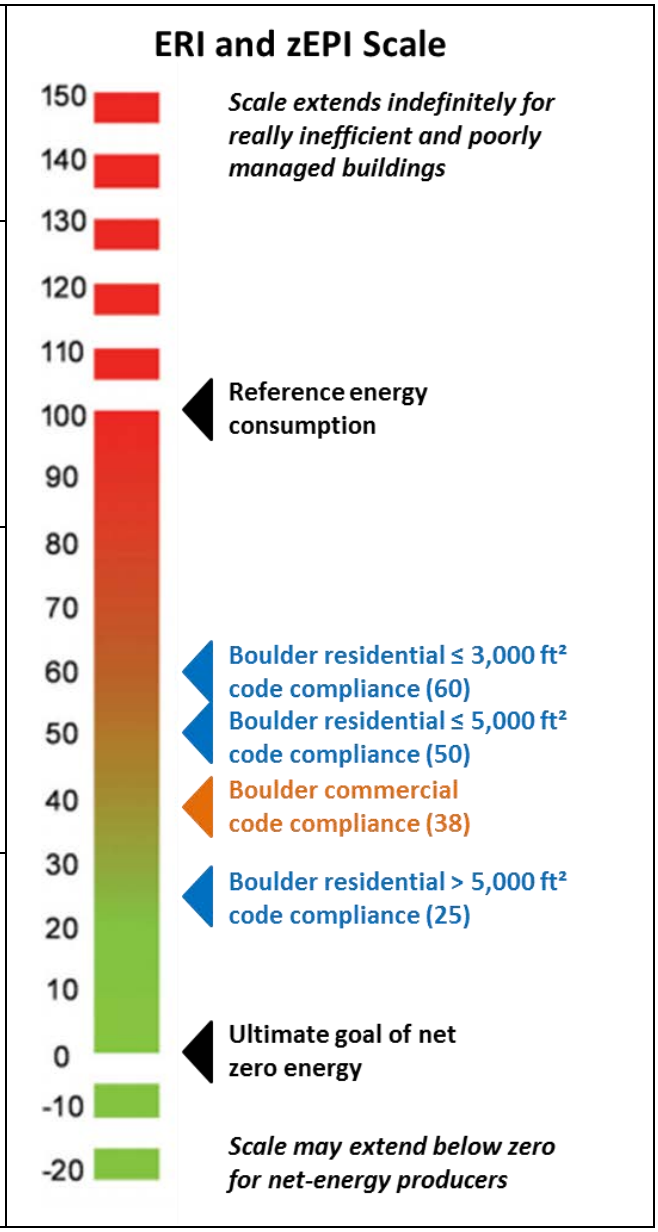
Figure 2: Metrics and Energy Rating Scales

EUI (Energy Use Intensity): the total annual energy used per square foot of gross floor area. It is expressed in unit of kBtus (thousand British thermal units) per square foot per year (kBtu/ft^2-yr).

HERS (Home Energy Rating System): A nationally recognized index created by RESNET and used as the industry standard to measure the energy efficiency of a house. It is a scale where 0 is a NZE house and 100 is the energy consumption of a typical new construction house that meets the IECC 2006 for energy efficiency.

ERI (Energy Rating Index)[4]: The ERI is essentially a non-trademarked equivalent of the HERS index. It is used as the scale for establishing the performance path target by the current version of the IECC for low-rise residential buildings. Current Boulder residential energy code requires a HERS score/ERI ranging from 25 to 60, depending on house size.

zEPI (Zero Energy Performance Index): This is a scale for commercial buildings that is similar to the ERI for residential buildings. This scale also uses 0 for NZE buildings, but a score of 100 is representative of the EUI of typical existing building (opposed to new construction) from the 2003 CBECS[5] data. The current Boulder energy code is equivalent to a zEPI score of 38.



The metrics described in Figure 2 above can help establish more stringent energy code requirements by specifying a lower zEPI or HERS/ERI requirement, thereby moving toward

[4] Because ERI is the metric used in national energy codes, the city will use this term in place of HERS.

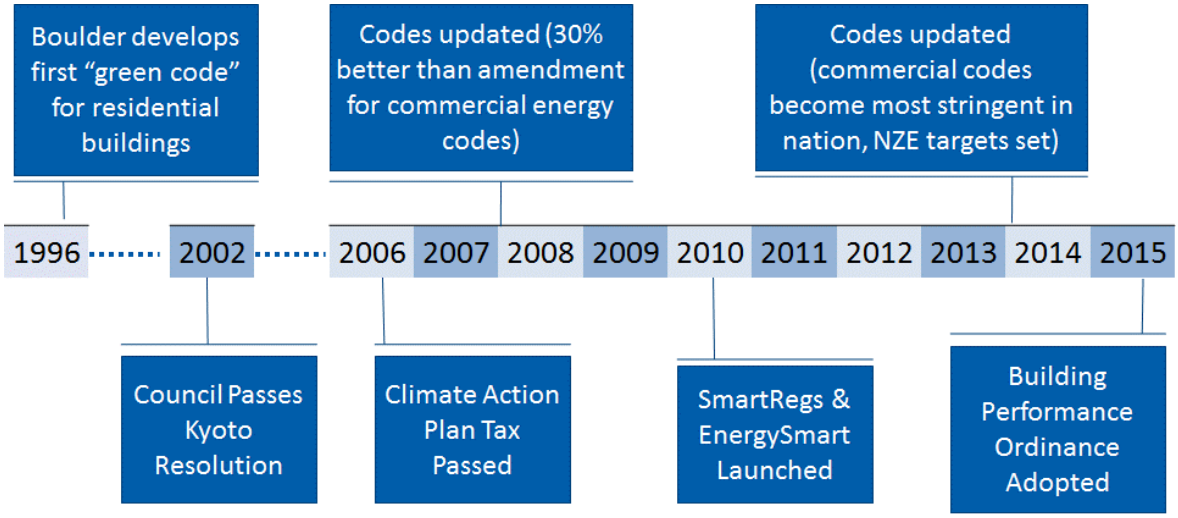
[5] Commercial Building Energy Consumption Survey – The Energy Information Administration (EIA) conducts a survey of existing building energy use by building type and climate zone to form this dataset.

NZE. By using these metrics, the comparison with energy code requirements throughout the country is possible, regardless of which model code is adopted. However, compliance with the commercial energy code requires modeling the energy usage of the reference building. This can vary by building type, floor area and other factors. In the future, there is an opportunity to simplify the commercial energy codes greatly by stating energy targets by building usage in terms of Energy Use Intensity (EUI), which then eliminates the need for modeling a fictitious reference building.

Brief History of the City's Energy Codes

The city has a long history of "green" (also referred to as "above" or "sustainability") code programs, and more recently, it has acquired a reputation of boldly adopting aggressive energy code requirements. Below is a summary and brief timeline of code and policy adoption that has put the city at the forefront in progressive and stringent building and energy code requirements, with supporting programs such as Energy Smart, SmartRegs, and the Building Performance Program.

Figure 3: Overview of Boulder Energy Code History



Currently, the city evaluates and amends the latest national codes on a three-year cycle, and usually adopts the newest suite of national/international code every six years. Because the city has not yet adopted a national green building code, such as the IgCC for commercial buildings, other portions of the city's codes and Design Standards currently address many non-energy sustainability issues (such as transportation and water). Please refer to Attachment A for a more complete history of the city's residential and commercial energy codes, including a comparison of their stringency to other energy codes.

3. COMMUNITY FEEDBACK ACTIVITIES

City staff reached out to relevant city boards and industry stakeholders to gather feedback on potential residential and commercial code amendments. Table 2 summarizes these engagement activities. More details about community feedback on this topic can be viewed in Attachments B through E.

Table 2: Outreach Activities to Solicit Feedback

Date in 2016	Outreach Activity	Number of Respondents	Description
March 2016	Interviews with staff working for jurisdictions that have adopted IgCC	Five respondents	Questions focused on how and when the code was adopted; the general impact of adoption; any training; and budget and staffing impacts.
April 27	Open House Board Meeting	Six city boards 19 respondents	City staff presented an overview of the history of Boulder code, the current codes in place, and introduced a list of green code topics to be considered for potential adoption as part of the code updates this year. Attendees were asked to prioritize the green code topics for both commercial and residential construction.
April 25 to May 6	Stakeholder Survey	240 (127 complete) (113 partial)	City staff sent out a survey to the licensed building professionals to solicit feedback from the stakeholder community about the same green code topics introduced during the Open House.
May 24	Residential Energy Code Key Stakeholder Meeting	Four	City staff organized a meeting to invite long-term, prominent residential building stakeholders to discuss and give direct feedback on the existing Green Building and Green Points program.
May 27	Commercial Energy Code Key Stakeholder Meeting	Six	City staff organized a meeting to invite long-term, prominent commercial building stakeholders to discuss and provide direct feedback on commercial energy code adoption, amendments and sustainability measures.

4. ANALYSIS: LONG-TERM STRATEGY

Proposed elements of the long-term strategy for energy codes include:

1. The long-term pathway for achieving high performance, NZE codes including:
   a. The allowance of off-site renewables to meet energy code requirements.
   b. The adoption of an outcome-based pathway for commercial energy codes.
   c. A schedule for when new buildings would need to meet a NZE code.
   d. Early adopter incentives for designing NZE buildings before the requirements ARE phased in.
   e. The encouragement of all-electric buildings.
2. A six-year cycle for major updates linked to the national code adoption schedule, with local evaluation and updates every three years (see section 1.7).

3. Prioritization and a proposed phasing schedule of adopting IgCC's non-energy sustainability requirements for commercial codes, and subsequently amending other portions of the city's codes that may currently address these issues (see section 1.8).

The City of Boulder has set an aggressive goal of having NZE codes in effect by 2031, and this recent work effort represents staff's first attempt at charting a clear strategy and pathway to achieve that target. The figure and table below provide more details on the key components of the long-term strategy and illustrate when each is suggested to go into effect.

Figure 4: Long-Term Strategy Key Component Timeline

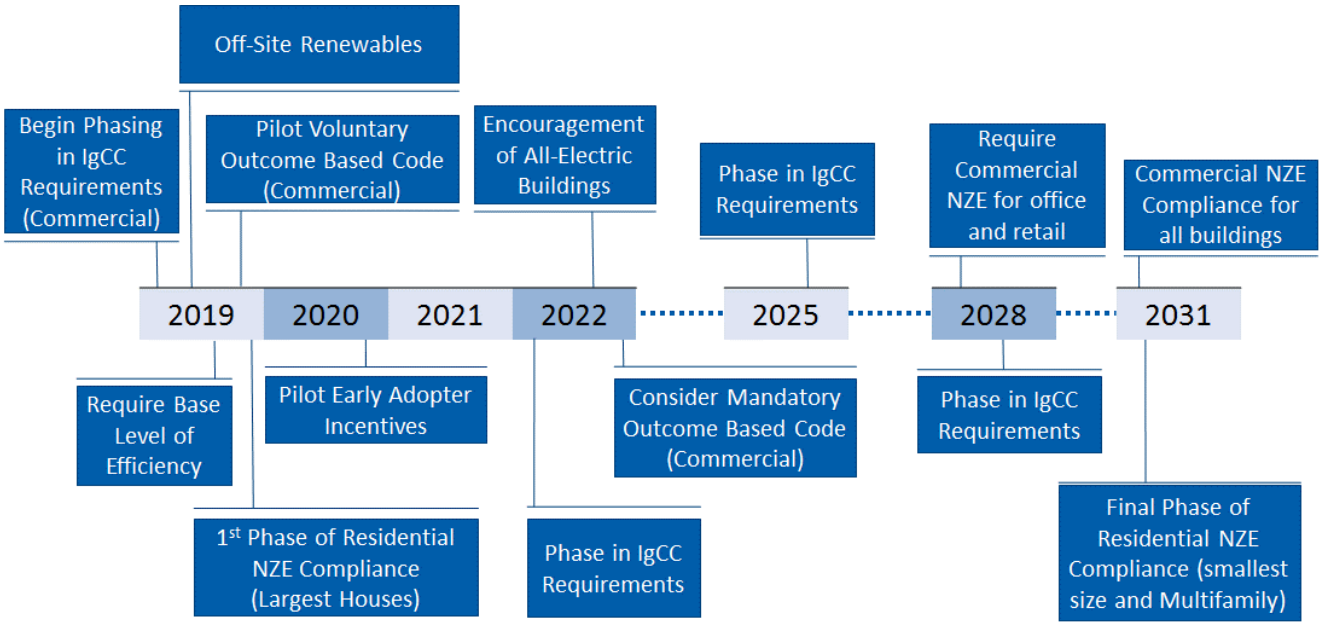


Table 3: Long-Term Strategy Key Components (Post 2016/2017 Updates)

Key Component of Long-Term Strategy	Description	Scope	Phasing
Require a Base Level of Efficiency Prior to Renewables	The following method will ensure that building efficiency is prioritized before the use of renewables: • A zEPI score (commercial) or ERI (residential) is required for overall compliance. • A zEPI score of 45 or an ERI of 50 must be achieved through efficiency alone; renewables can then be used to achieve the code specified energy target (currently zEPI 38 for commercial and ERI value of 25 to 60 for residential).	Commercial and Residential	2019
Off-Site Renewables (see Attachment F for more details)	Due to shading, roof space constraints, and high energy intensity buildings (such as a data center or lab), off-site renewable energy will be required for many buildings to achieve NZE. Off-site renewable options will only be allowed if all on-site renewable options have been exhausted. Community solar gardens and a local carbon offset fund, but not Renewable Energy Credits (RECS), will be allowed to meet required overall zEPI scores for new buildings and major renovations.	Commercial and Residential	2019
Outcome-Based Codes for Commercial Buildings	Staff plans to pilot a voluntary outcome based energy code for new commercial buildings, which will be based on the actual, measured energy consumption of the building post-occupancy. • Outcome-based codes bring energy behavior of occupants, maintenance and operating practices under the purview of the codes. These factors can account for 50 percent of a building's energy use. • This is a new approach to energy codes; compliance and enforcement approaches are still under development nationally. • Data collected from the Building Performance Program will aid this process.	Commercial	Voluntary pilot 2019; possibly mandatory in 2022 (depending on pilot outcome)

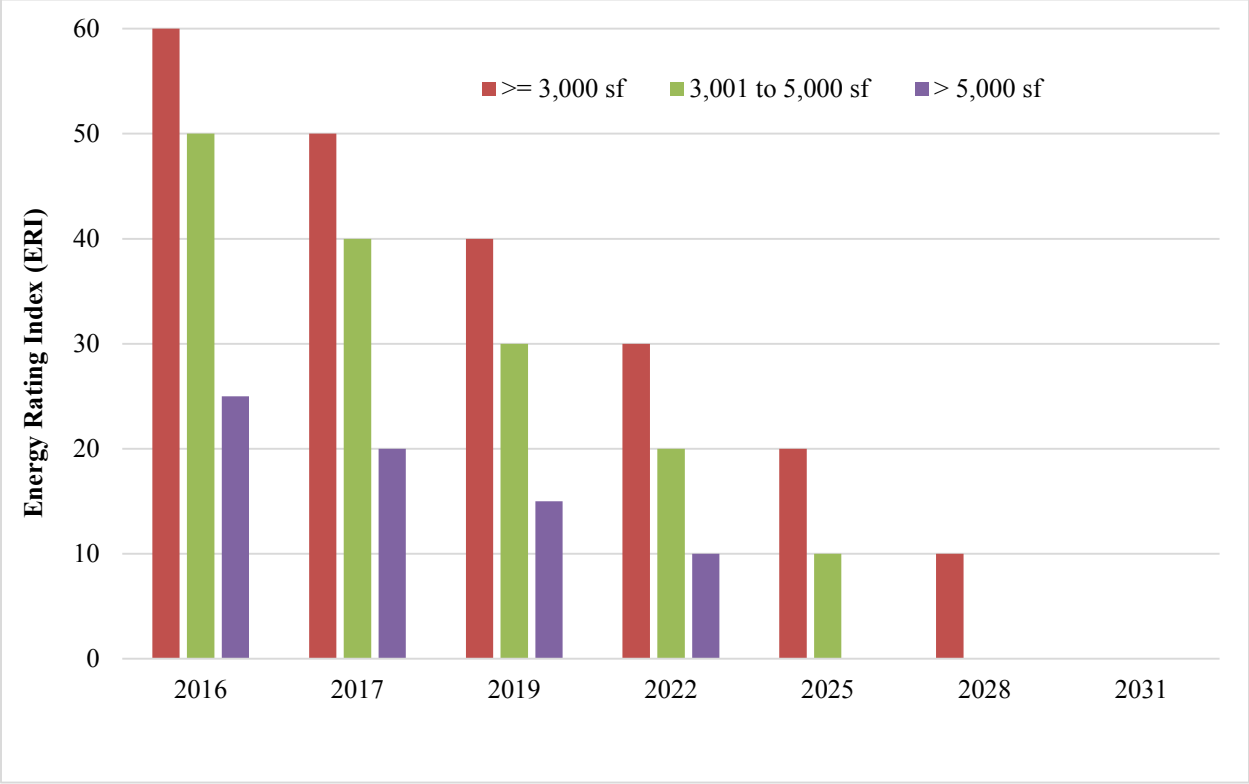
Key Component of Long-Term Strategy	Description	Scope	Phasing
Schedule for NZE Compliance (see sections 1.5 and 1.6 for more details)	Staff is planning a slightly accelerated schedule for NZE for new residential and commercial –buildings. Those with low energy use intensity and high roof to floor area ratios, can reasonably be required to be NZE sooner than 2031. This allows NZE requirements to be phased in over time to minimize enforcement issues, and accelerates achievement of the city's Climate Commitment goals.	Commercial and Residential	2019 to 2031
Early Adopter Incentives	• Providing incentives for buildings to be NZE before it is required by code encourages owners and design teams to develop advanced designs and share feasible examples for other buildings. • These incentives might include reduced city fees, expedited plans approvals and/or positive publicity.	Commercial and Residential	2020
Encouragement of All-Electric Buildings	To support long-term goals, local code amendments should begin encouraging all-electric buildings within the next five years. • Many of the city's long-term goals will eventually require that the use of natural gas in buildings be minimized or eliminated: the goals of having all new buildings be NZE; moving the city towards local, distributed and fossil-fuel-free energy systems; and achieving and sustaining significant greenhouse gas reductions. • Buildings that use natural gas be made net zero with onsite or building-owned resources. They must have a market to allow excess renewable energy to be sold to other buildings to offset the gas consumption. • Minimizing the use of natural gas in new buildings facilitates the long-term achievement of a sizeable population of net zero buildings.	Commercial and Residential	2022

1.5 Residential Energy Codes: NZE Deadlines

Currently, the city's goal is that all new buildings will be required to be constructed as NZE compliant by 2031.

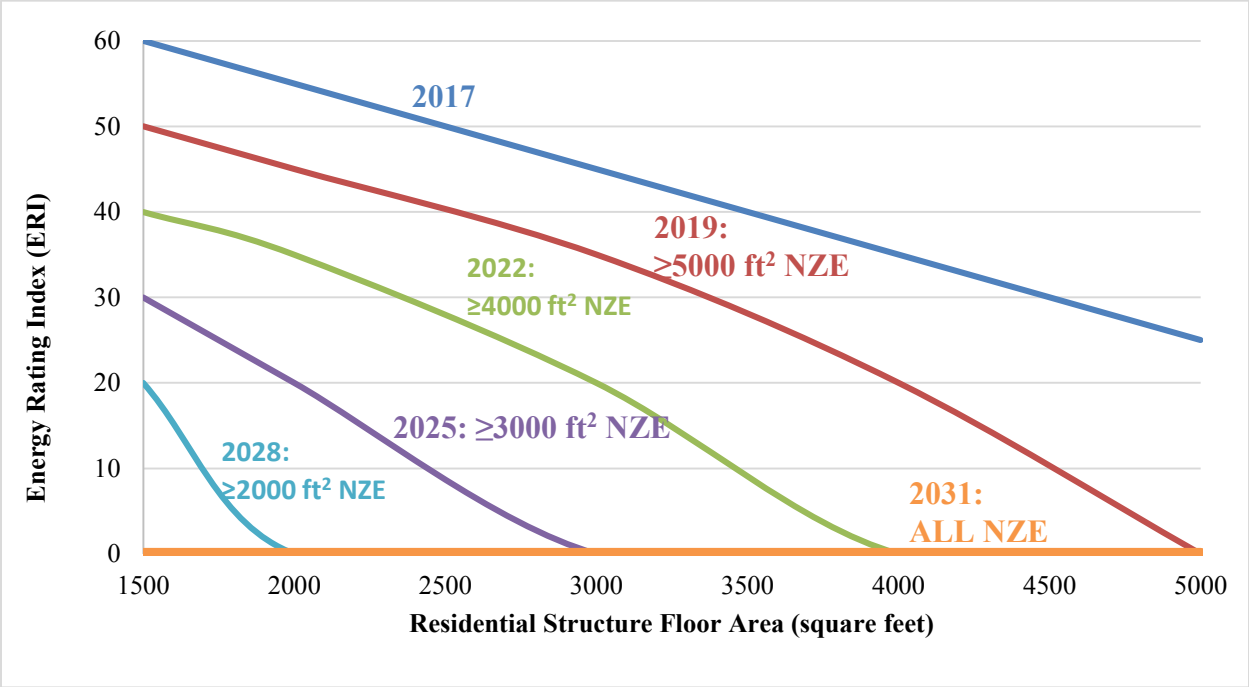
Because the existing residential program has energy target requirements tiered by house size, larger houses will be required to be NZE sooner than 2031. Further, since it is much easier for residential structures to achieve net zero status than for commercial buildings, ***staff is planning an accelerated timeline for new residential structures to be NZE by 2025***. Figure 5 shows the current trajectory of city codes with the largest houses achieving NZE by 2025, and all new residential structures being NZE by 2031.

Figure 5: Current Trajectory of Boulder's Residential Energy Codes



The issue of having distinct size thresholds when energy requirements become more stringent was clearly identified as a major challenge during the stakeholder engagement process. There was a strong preference from the stakeholder groups to have a sliding scale for the ERI score, similar to what is done in Boulder County's BuildSmart Program. Figure 6 shows a new, proposed sliding scale that would be reduced each year until all buildings reach NZE by 2031. In this sliding scale, the ERI requirements for 2017 would become more stringent for the floor areas between the current size thresholds, but it would eliminate the stark jumps in requirements.

Figure 6: New Trajectory and "Sliding Scale" for Boulder's Residential Energy Codes



In this new scenario, staff also plans to accelerate the timeline for the largest houses to reach NZE status, as soon as 2019 for houses larger than 5,000 ft^2. These more aggressive deadlines are consistent with those in other progressive jurisdictions. Boulder County already requires large houses over 5,000 ft^2 to be NZE and will require all new residential structures to be NZE conforming by 2022. California has a goal of all residential construction being NZE by 2020.

It is important to note that any requirement that all residential buildings be NZE compliant will require the availability of acceptable off-site renewable energy options because of limited roof space and inadequate orientation. This is an example of why staff is proposing this amendment in the near-term updates slated for 2019, to coincide with the earliest deadline for NZE new construction.

1.6 Commercial Energy Codes: NZE Deadlines

While NZE deadlines are not currently tiered by size for commercial buildings, staff plans to require NZE for lower energy intensity building types[6] (e.g., office, warehouse and retail buildings) in the update cycle prior to 2031 (2028). Phasing in these building types earlier will allow the industry and city staff time to adjust to the NZE requirements for commercial buildings before the requirement takes effect

1.7 Energy Code Update Cycle

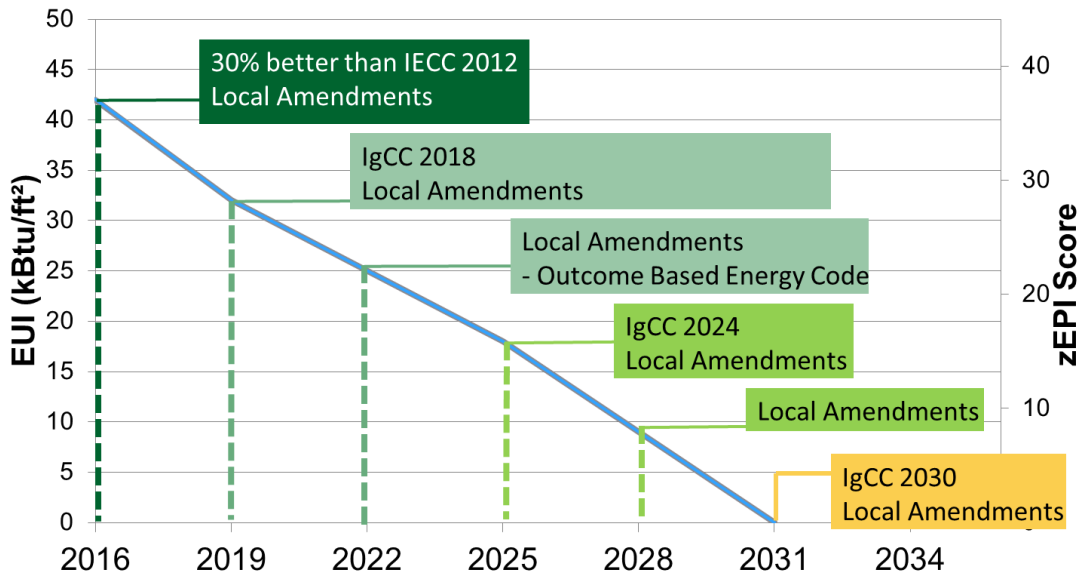
To achieve the city's aggressive greenhouse gas emission reduction goals, significant code updates will be necessary. However, a strategy for gradual implementation of new base codes (the national code upon which local amendments are layered) is often the best approach. This

[6] With an exemption if more than half of the floor area is for servers or process loads.

allows the building community and review and enforcement staff to adapt to the changes in a manner that will facilitate compliance.

City staff plans to adopt new national codes on a six-year cycle, with evaluation and amendments on a three-year cycle. The amendments will allow energy requirements to be made more stringent gradually, without requiring the industry to learn an entirely new base code every three years. It will also allow selected sustainability requirements to be added over time (based on the prioritization in the previous section). An example of what this might look like for commercial energy code requirements is shown below in Figure 7.

Figure 7. Illustrative Commercial Code Adoption and Amendment Cycle



1.8 Commercial: Prioritization of New Non-Energy Sustainability Requirements

While the commercial energy code does not currently address non-energy sustainability issues (such as water, waste, and transportation impact), local amendments in portions of other codes (plumbing, electrical, etc) as well as the city's Design Standards do address some of these topics. Staff believes that replacing these local amendments with sections of a national green building code, the International Green Construction Code (IgCC), will greatly improve the compliance process. Stakeholder feedback indicated a strong preference to use national codes versus local amendments whenever possible, to simplify the building codes and improve consistency and compliance rates.

Due to the difficulties that would come from implementing IgCC in its entirety, city staff will prioritize the various sustainability topics phase in adoption over a number of three-year code updates. Each time an IgCC requirement is adopted, other portions of the codes will need to be amended to eliminate redundancy or conflict and address the requirement in only one place.

These various sustainability topics/categories were shared at the open house with boards and were prioritized as part of an online survey to local stakeholders (see Attachments C and D). While each of the feedback/outreach activities resulted in slightly different rankings of these

green code topics, Waste Management was a high priority across the board, and Water Efficiency, Preservation of Natural Resources and Indoor Environmental Quality also generally ranked high. Sustainable Products seemed to consistently to be one of the least popular topics along with Energy Metering, Monitoring and Display. To develop the overall recommendations of when to phase each requirement in, staff took this feedback into consideration, along with information about emerging trends and the city's overall Climate Commitment targets.

The table below represents staff's current plan to phase in adoption of the IgCC requirements over time.

Table 4: Timing for Adoption of IgCC Requirements for Commercial Buildings

	2016	2019	2022	2025	2028
Water Efficiency: Require high efficiency indoor water fixtures and efficient irrigation systems.	*This will continue to be addressed under the plumbing codes*				
Solar PV "Ready": Require that buildings be solar photovoltaic (PV) ready if they do not have solar installed.[7]	X				
Electric Vehicle "Ready": Require electric vehicle charging stations for multi-family buildings and for commercial buildings with significant amounts of full time employees (to provide workplace charging options).	X				
Waste Management: Require the reduction of deconstruction and construction waste.		X			
Transportation Impact: Require best practices to encourage biking and low emissions vehicles (e.g. bicycle racks, showers, and preferred parking).		X			
Energy Metering, Monitoring and Display: Require ongoing energy metering and real time energy use display.		X			
Preservation of Natural Resources: Require the following: o Protection of wetlands, conservation areas, etc.; o Best practices for vegetation and soil management; and o Best practices for stormwater management.		X			
Indoor Environmental Quality: Require best practices to ensure thermal comfort, indoor air quality, access to daylight and views, etc.			X		
Heat Island Mitigation: Require best practices to reduce surface temperatures surrounding a building site (e.g. permeable sites, shading).				X*	
Sustainable Products: Require reused, recycled, bio-based, environmentally certified or locally sourced materials.				X**	
** If this isn't already a mandatory requirement in IECC by 2025* *** This could be phased in sooner, pending additional research on the cost benefit and feasibility.*					

[7] This entails having a design plan showing where the PV panels would go, how they would be supported, and installing pre-wiring for future connections. The amount of energy required is based on roof area.

Because the IgCC does not currently address electric vehicles charging stations, and this has been identified as an important partner technology to achieving an electricity system powered by renewable energy, staff plans to include these requirements in the next set of code updates. Also, most new commercial buildings are already being constructed with renewable energy in order to meet current energy code requirements. As a result, staff recommends that the next set of updates require that all buildings be at least solar ready, to facilitate the achievement of a new zero building stock in future years.

While Energy Metering, Monitoring and Display was deemed a low priority by external stakeholders, this will play an important role in assisting occupants to understand how their actions affect energy use and achieve future outcome-based energy code requirements. Therefore, staff plans to phase this in during the 2019 updates. Data on sustainable products (building materials) are not widely available yet, and there is debate about the data that is available. This requirement could be phased in sooner pending additional research.

5. ANALYSIS: NEAR-TERM CODE UPDATES AND IMPLEMENTATION PLAN

As the city evaluates and updates its energy codes every three years, staff is beginning to draft amendments for inclusion in the next update, which will likely go to council for adoption in late 2016 and take effect in early 2017. Specifically, staff is planning the following near-term energy code amendments:

- Restructuring and updates to Green Building and Green Points (GBGP), including amendments to the International Residential Code to require electric vehicle charging infrastructure
- New prescriptive requirements for commercial buildings, including amendments to the International Building Code to require solar PV-ready and electric vehicle charging infrastructure for multi-family and commercial buildings

In addition, the city plans to improve the compliance process by streamlining steps and providing more consistent and detailed guidance. Please see Attachment G for a summary of the scope and intended outcomes of this compliance improvement effort. Staff also plans to make a few administrative updates to clarify the common points of confusion, such as how to measure for square footage in compliance with the Green Points code.

1.9 Near-Term Residential Energy Code Updates

Challenges with the Current Program

The GBGP program was the first residential "green" code in the country, and it has brought both benefits and challenges. One of the larger challenges is that the program is customized to Boulder, making it time intensive to maintain and update. Even though the updates and transitions with the program have evolved to promote more nationally recognized codes and programs (i.e. IECC 2012 and ENERGY STAR optional pathways for points), the challenges in administering and updating the program are becoming increasingly apparent. Through the stakeholder processes, the following challenges were identified:

1. The complexity of the "Green Points" review and compliance process result in a high burden of time and management for staff and our customers.
2. Having size threshold limits for energy and point requirements creates issues with projects trying to just come in below the thresholds, and then finding that the square footage calculations are actually above it.
3. The scope of requirements for renovations are determined by the size of the project, which can lead to "scope creep" during construction.
    a. For example, identifying mold behind walls or asbestos mitigation, both of which can impact the original declared floor area of the project, increasing the number of Green Points needed. If scope creep occurs during a renovation it often triggers additional Green Points during construction, causing challenges for homeowners, contractors and inspection staff.
    b. Some needed renovations, many that would address health and life/safety issues, may be avoided for fear of triggering the need for additional Green Points. This leads to frustration for homeowners, contractors and inspection staff.

Green Building and Green Points (GBGP) Update

Research and best practices directed staff towards using a similar structure to Boulder County's BuildSmart program. Over the years, the county and city have worked together to gain a better understanding of various green code regulations. The principles and goals of BuildSmart are similar to GBGP, with both programs requiring a very high level of energy efficiency, construction waste management and sustainability measures.

As part of the county's 2015 code revision, a program template was created that clearly informs the applicant what is required for a specific project, including renovations. The template provides a flow chart for each type of construction; most notably, the path to NZE is gradual and incremental, similar to the proposal in Figure 6.

Planned amendments to Green Building and Green Points are as follows:

1. Eliminate the points structure and prioritize and update key measures as mandatory (see Table 5)
2. For this update, continue using the IECC 2012 as the base energy code
3. Implement a sliding scale of ERI scores per floor area (see Figure 8)
4. Require an ERI score for additions and renovations to establish a "baseline efficiency rating" and require some percentage improvement from the baseline score[8]
5. For renovations, provide a prescriptive list of efficiency requirements when the project scope is "like for like" (e.g. renovating a bathroom, will require low-flow fixtures, etc.)

[8] Percentage to be determined prior to coming back to council with proposed code amendments.

Table 5: Proposed Changes to the Point Structure of GBGP

Requirements	Current Requirements	Proposed Requirements
Energy Performance*	ERI/HERs	ERI/HERs
Waste Management	Mandatory	Mandatory
Preservation of Natural Resources: Require shading from existing and new trees; organic, low water landscaping practices; and stormwater management	Optional point	Mandatory
Solar Photovoltaic "Ready:" Pre-wire for solar PV and a space allocation roof plan	Optional point	Mandatory
Electric Vehicle Charging Infrastructure: Require the installation of charging outlets in any dedicated parking space for single family homes and in a percentage of shared parking spots in multi-family garages	NA	Mandatory (NEW)
Water Efficiency: High efficiency kitchen and bathroom fixtures	Optional point	Already covered in the IRC**
Sustainable Products: Require the use of re-used, recycled, bio-based, environmentally certified or locally sources materials	Optional point	Not required
Solar Thermal "Ready": Require solar thermal systems to heat hot water (water heating, space heating and/or pools and spas)	Optional point	Not required
Material Efficient Framing: Require efficient use of lumber and methods to frame a house and design the structure	Optional point	Not required***
Indoor Air Quality: Require means of detecting, reducing and mitigating indoor air pollutants	Optional point	
Design Process and Education: Require green building design professionals and an owner manual for efficient operation	Optional point	

**For additions and renovation projects, it depends on project's scope of work's floor area ratio compared to existing structure*
*** Staff will review current requirements in the International Residential Code (IRC) and amend if necessary*
**** An updated HERS rating software will be released in the 2017, which will incorporate these sustainability attributes.*

Benefits of moving in this more streamlined direction include, but are not limited to:

- Providing a level of consistency between city and county residential sustainability programs, and enabling collaboration on future updates.
- Providing multiple pathway options that are in line with the community's sustainability and energy values.

- Encouraging more renovations to address health, safety and energy issues by making the code easier to understand and comply with.

1.10 Near-Term Commercial Energy Code Updates

New Prescriptive Energy Requirements for Commercial Buildings

Current prescriptive requirements in the commercial energy code are extremely stringent as they attempt to be 30 percent more stringent than each individual requirement, without the tradeoffs allowed through the modeling-based performance path. A preponderance of public feedback indicates that the requirements are confusing and extremely difficult, if not impossible, to achieve. In fact, since adoption of these requirements, the majority of renovations have had to take an alternate path where the design team can submit a plan showing how they could meet the 30 percent requirement within five years. Further, an unintended consequence of making the prescriptive path so stringent is that many building owners are choosing to not renovate their buildings to avoid triggering the code.

For new construction, the performance approach allows the design team to come up with creative solutions to achieve the high efficiency mandated by the code. The prescriptive approach, however, removes that creativity and results in very stringent requirements if similar energy performance is to be achieved. At some point in the progress toward NZE, it becomes impossible to define prescriptive requirements that make sense and meet the energy goals. ***Staff believes the city is at that point, and plans to require that all new commercial buildings and additions with a project cost greater than or equal to $500,000 be required to use the performance path.***[9]

Requiring performance compliance for renovations of existing buildings, however, would be onerous and costly in most cases. Staff plans to retain a prescriptive option for renovations and additions, by amending the prescriptive requirements from IECC 2012 to be of equivalent stringency to what is being proposed for IgCC 2018. The new prescriptive requirements would be more stringent than those in the IECC 2012, but still achievable and easy to understand. While these new requirements will not be as stringent as the city's current prescriptive path, they will be achievable, and overall compliance and the number of renovations is expected to increase as a result. For instance, some of the current prescriptive requirements for insulation have gone beyond the point where no additional energy savings will be garnered (such as requiring R-50 insulation for roof decks), and yet the requirement presents costs and constructability challenges.[10]

The following table shows the existing prescriptive criteria for a few code components for the city's current prescriptive path versus proposed new requirements.

[9] A threshold of a project cost of $500,000 was chosen as the limit for allowing the prescriptive path for new construction and additions based on the typical costs of energy modeling require for the performance and outcome based paths. This limit should keep the modeling costs to below 2.5 percent of the total project cost.
[10] The "R-value" is the capacity of an insulating material to resist heat flow. The higher the R-value, the greater the insulating power.

Table 6: IgCC and Current Prescriptive Code Comparison (commercial buildings)

Component	Current City Prescriptive Requirements	New Prescriptive Requirements
Flat Roof Insulation Above Deck	R-50	R-32
24-inch on Center Steel 6-inch depth Steel Framed Wall Insulation Cavity/Continuous	R-19/R-21	R-19/R-10
Lighting power (Office spaces)	0.45 W/ft²	0.90 W/ft²

Requirements for Solar Photovoltaic (PV) Systems for Commercial Buildings

Staff plans to add a new prescriptive requirement for commercial building projects to include on-site solar PV systems. This would require a certain amount of PV based on the unshaded roof area available. For commercial building renovations, staff is proposing that the requirement be scaled based on the cost of the renovation project, with no requirement for projects below a certain cost threshold (to be determined). Since this will be a prescriptive (versus mandatory) requirement, this will not apply to new construction projects following the performance pathway (those commercial projects would have more flexibility in achieving energy performance requirements).

Requirements for Electric Vehicle (EV) Charging Infrastructure for Commercial Buildings

Studies have shown that providing workplace electric vehicle charging can be quite beneficial for commercial buildings with a significant number of full time employees (FTEs) who are at the site for multiple hours at a time (e.g., office buildings, hospitals, etc.). Workplace EV charging provides employees that live in multi-family units without EV charging the opportunity to drive an EV. There is also a need for EV charging facilities at lodging facilities, as more and more rental car agencies are beginning to offer EV options. However, there has been very little usage in general public charging stations provided at commercial buildings for transient visitors.

With this in mind, staff plans to amend the building codes to include prescriptive requirements for pre-wiring for EV charging stations equivalent to:

- Office, School, Industrial Plant, Retail, Sports facilities, Recreation Centers
    - Some percentage (likely 5 to 15 percent) of the peak number of FTEs
- Transit Projects
    - Percentage to be determined
- Hotels or Motels
    - Two percent of the total number of parking spaces (but not less than 1)
- Multi-family (if not covered under Residential codes)

- Require the installation of charging outlets in any dedicated parking space and in a percentage of shared parking spots in multi-family garages

6. NEXT STEPS

In terms of the next code updates, there are several more steps in the coming months:

- Q3 2016: Staff will review near-term energy code amendments with the relevant boards (i.e., Planning Board, Landmarks, Environmental Advisory Board, Transportation Advisory Board, etc.)
- Q4 2016: Staff will bring forward energy code amendments to city council for adoption
- Q1 2017: Amendments to energy code become effective (following 60-day grace period after adoption)
- Q1 2017: Noresco, the city's consultant for this work, will conduct staff training and develop supporting documentation and resources on the city's website to help explain the energy codes
- Q2 2017: Staff will implement changes to improve energy code compliance (see Attachment G)

Once the 2018 version of the national codes are released, the city will work quickly to adopt the 2018 versions of the codes, with local amendments.

- Q1 2018: Staff will review the newly released 2018 codes, including IECC 2018 and IgCC 2018
- Q3 2018: Staff will review the next building code update with the relevant boards, including moving from IECC 2012 to IECC 2018 and beginning to adopt portions of IgCC 2018
- Q4 2018: Planned adoption of full set of ICC 2018 building codes, with amendments
- Q1 2019: New building codes (based on ICC 2018 codes) becomes effective

7. FISCAL IMPACT

Of all current and planned energy efficiency programs and policies, energy codes have the largest projected GHG emissions savings, and the proposed code updates for 2016 and future cycles represent a strategic and fundamental next step in the continued evolution of the city's energy codes. Specifically, by acknowledging the need to address non-energy sustainability requirements through the adoption of the International Green Construction Code (IgCC) for commercial buildings (and subsequent amendments of other portions of the code), the city is significantly expanding the depth and breadth of what has traditionally been covered under "energy codes."

However, like many other small to medium cities, Boulder does not currently have a dedicated staff position to lead the continued improvement and evolution of our energy codes. Other cities

that are innovating in the area of energy codes (e.g., Seattle, Washington D.C., and even Boulder County) all employ an FTE who is not a code official, but is dedicated to long term energy code strategy, stakeholder engagement, streamlining processes, etc. Further, interviews with staff in jurisdictions (see Attachment B) that have adopted IgCC stressed that these standards are a big change and require a dedicated FTE to guide the city and the impacted community members through the process.

The City of Boulder is evaluating current staffing resources, and any needs will be outlined as part of the 2017 Budget Process.

8. COMMUNITY SUSTAINABILITY ASSESSMENT AND IMPACTS

Updating current energy and building codes can produce economic, environmental and social benefits at multiple levels across a community. High performance buildings reduce energy and environmental impacts, improve economic vitality, increase community pride and may decrease utility rates by making peak energy demand more manageable.

- Economic: Higher performing buildings increase property values, command higher lease prices, cost less to operate and improve occupant comfort in addition to reducing greenhouse gases. However, initial costs to construct these buildings are higher. While staff is not proposing to significantly increase the stringency of the energy performance requirements of the codes in the update coming later this year, some of the new requirements do present unique challenges to the traditional cost-benefit analysis. In this traditional approach, measures that have been shown to be cost effective, usually over the life of the building, have been added to the codes. This approach has worked well over the last 30 years, with the goal being simply to increase the efficiency of buildings.

  However, with the evolution of energy and sustainability goals, such cost-benefit analyses become problematic. Many non-energy sustainability requirements have benefits that are difficult or impossible to quantify in cost terms. Requiring that the building provide bicycle storage, for example, requires the use of numerous assumptions about occupant response to establish a cost benefit. Similarly, while improved daylighting and indoor air quality have been repeatedly linked to improved worker productivity or increased sales, there is no direct way to quantify these benefits. Most other non-energy requirements face similar difficulties.

  Additionally, when the goals of the energy code change from “make the building efficient” to “make the building net zero,” cost-benefit analysis needs to become more holistic as opposed to evaluating measures in isolation. Also, financial incentives and predictions of future energy costs need to be considered as well. With this in mind, staff plans to acknowledge and describe these non-quantifiable benefits and holistic costs in future assessments of code updates, and use this to supplement the traditional cost-benefit analysis.

- Environmental: Using building and energy codes to ensure the energy efficiency and sustainability of a building is within the limits of the code and will benefit the environment by reducing greenhouse gas (GHG) emissions. Further, staff recognizes the need to begin to incorporate sustainability measures beyond just energy use (e.g. water and waste management) into energy and building codes. The additional measures will have other

environmental benefits such as improved air quality, preservation of natural resources, reduced impacts from climate changes, etc.

- Social: Improving the energy codes above the minimum standard requires energy conservation in the residential, public and private sectors. This results in less money flowing to energy costs over time, leaving more household and business income free for other uses. Additionally, the net outcome of decreased greenhouse gas emissions promotes a community-wide shift toward conservation and being good stewards of the built and natural environments. Finally, decreasing the community's reliance on centralized fossil fuel-based energy sources will improve Boulder's energy resilience in the future.

9. ATTACHMENTS

The attachments include detailed information on the various data gathering activities completed to date as well as additional details regarding and used to inform the path forward.

A. History of the City's Energy Codes
B. IgCC and NGBS Research and Interview Results
C. Stakeholder Feedback from Open House
D. Stakeholder Survey
E. Stakeholder Meetings
F. Additional Details on Off-Site Renewables
G. Summary of Scopes and Outcomes of Compliance Improvement Effort

Attachments

The attachments include detailed information about the various data gathering activities completed to date, as well as additional details that were used to inform the proposed path forward.

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A. HISTORY OF THE CITY'S ENERGY CODES

Residential Energy (Green Building) Code

In 1996, the city adopted and implemented the first "green" residential building code in the country. This was called the Green Points program. Since the original adoption, the program has evolved and been updated periodically (2001, 2007 and 2013).

This code is additional and layered on top of the adopted suite of international building code requirements for residential construction. The objective of the above code program is to require green building measures that go above just energy use, by requiring the applicant to select and implement a specific amount of "Green Points" for the building project to receive a building permit. The flexible list of Green Points requires an applicant to choose which sustainability measures will be integrated into the construction project to achieve the required number of points.

In addition to "Green Points," which can be achieved through a variety of measures, there are also specific mandatory requirements, identified as the "Green Building" component of the program. The mandatory, Green Building code requirements are listed below:

1. Energy efficiency requirements exceeding the IECC 2006 (varies by house size)
2. Deconstruction waste diversion requirements (65 percent of material by weight) for projects removing 50 percent or more of the house
3. Construction waste recycling (50 percent of material by weight) for new construction
4. Energy audits for renovations and additions

The number of Green Points required per project is determined by the scope of work. There are four general categories of the residential construction projects: new, additions, renovations and combined additions/renovations.

The last Green Building and Green Points (GBGP) update was in 2013, when the city adopted the IECC 2012, which became the base energy code for residential and commercial construction. This update increased HERS rating requirements. These requirements may be found in Boulder Revised Code (BRC) 10-7.5-3 and BRC 10-7.5-4, as well as in the table below.

Table 1: Tiers for New Construction Energy Efficiency and Green Points Thresholds

Type of Project	***Square Footage***	***Energy Efficiency Thresholds Above IECC 2012 Code***	***Required Green Points***
New Construction	Up to 3,000	14 percent more energy efficient (HERS/ERI 60)	20
	3,001 – 5,000	43 percent more energy efficient (HERS/ERI 50)	40
	5,001 and up	64 percent more energy efficient (HERS/ERI 25)	60

Multi-Unit Dwellings	Applies to all	14 percent more energy efficient (HERS/ERI 60)	10-30*
Number of Green Points required depends on size of units.			

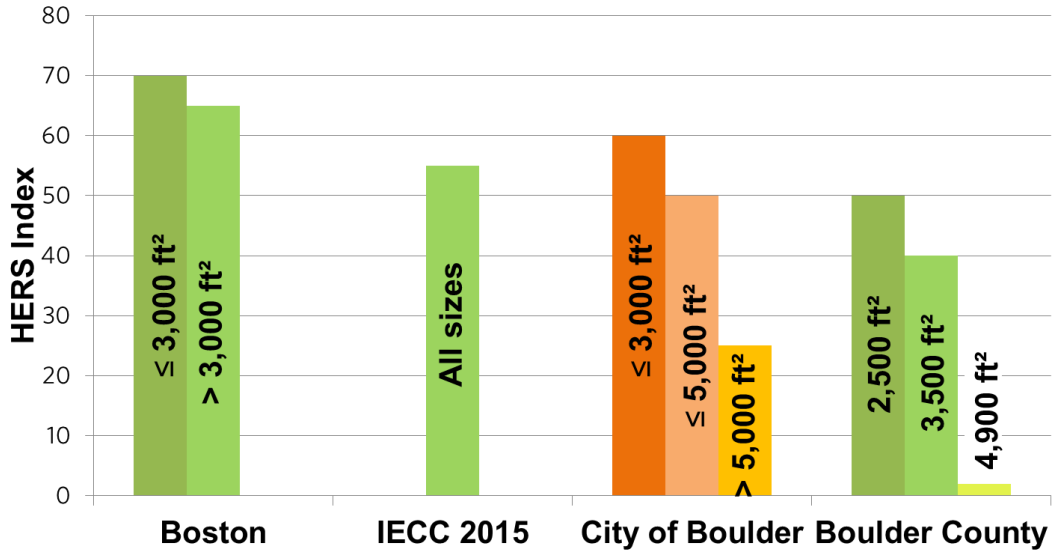
Similar to new construction, additions and renovations may require a HERS/ERI score, depending on the scope of work relative to the original and final floor area of the structure. When of sufficient size, additions are considered new construction and are subject to the same energy requirement as new construction. Table 2, below, presents current GBGP requirements for additions and renovations.

Table 2: Addition and Renovation Energy Efficiency Thresholds and Green Points Requirements

Total Conditioned Area	*HERS/ERI Rating*	*Energy Efficiency Thresholds Above IECC 2012 Code*	*Green Points Required*
Up to 3,000 sq. ft.	70	5 percent	10 to 30*
3,001- 5,000 sq. ft.	60	15 percent	30 to 45**
5001 sq. ft. and up	50	30 percent	
**** Varying number of points for a remodel or addition. Remodels are less than additions.*** ***** The number of Green Points required is determined by the combined size of the project.***			

In terms of stringency, Boulder's current residential energy code is more stringent than most cities in the country, with the exception of Boulder County's BuildSmart program. Figure 1 shows a comparison of the stringency of the current version of IECC, as well as the few other municipalities that adopt energy requirements that differ from some version of IECC.

Figure 1: Comparison of Stringency of Residential Energy Codes



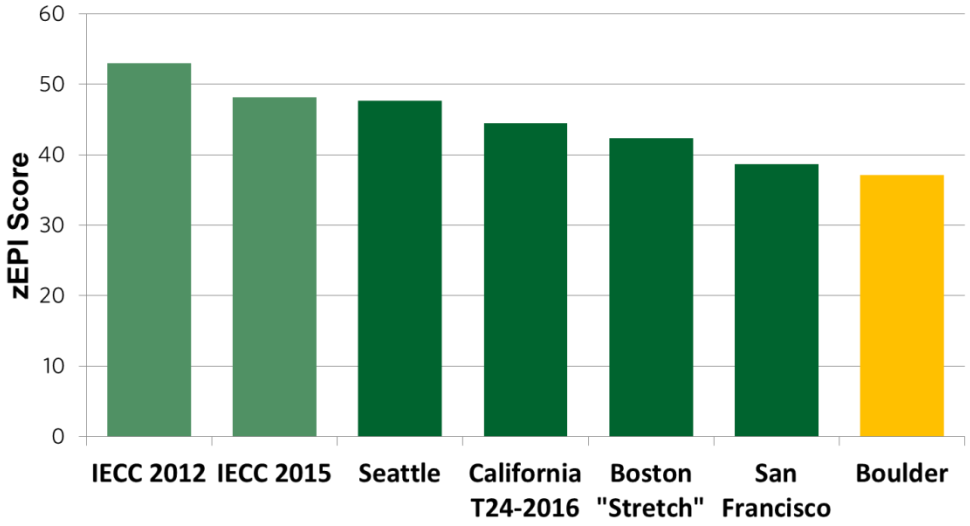
Commercial Energy Code

In 2007, City Council approved amendments to the city's building and energy codes. The adopted energy code amendments for commercial buildings incorporated the IECC 2006 standard as well as the ASHRAE 90.1-2004 standards, with additional local amendments requiring a 30 percent increase in performance requirements.

In October 2013 (link to council memo), City Council approved of amendments to the city's building and energy codes (Ordinance 7925). The changes went into effect on Jan. 31, 2014. The adopted energy code amendments for commercial buildings incorporated the IECC 2012 standard as well as the ASHRAE 90.1-2010 standards, with additional local amendments requiring a 30 percent increase in performance requirements. The amendments also revised the Prescriptive Commercial Energy Code to be based on IECC 2012, but customized to be equivalent to 30 percent more stringent overall.

As shown in Figure 2, this energy code is currently the most stringent commercial energy code in the country and represented a significant step toward improved energy efficiency in buildings while also balancing the cost impact for new construction.

Figure 2: Boulder Commercial Energy Code Comparison to Other Jurisdictions



During the 2013 to 2014 update, the city also provided a custom prescriptive path that was designed with the goal of having similar energy performance to the performance approach of being 30 percent more efficient than IECC 2012. This custom prescriptive path is very stringent and extremely difficult to comply with for renovations/additions. This means items that would generally be simple upgrades can turn into very challenging projects.

It was also in 2013, when City Council approved a goal of NZE codes by 2031, meaning that all new buildings (residential and commercial) of any size, would be constructed to NZE standards from 2031 onward. It was expected that in future years, a path and energy code adoption timeline would be developed to achieve this goal.

B. IGCC AND NGBS RESEARCH AND INTERVIEW RESULTS

As part of developing the Commercial Green Code topics and the residential restructuring, the consultant team researched the International Green Construction Code (IgCC) and the National Green Building Standards (NGBS). Through these interviews, staff determined that NGBS is not the best for the City of Boulder at this time, but that IgCC would work, if phased in over a number of code cycles.

International Green Construction Code (IgCC)

NORESCO conducted interviews with five staff members who work for cities that have adopted IgCC. We asked the representatives the following questions:

- When was IgCC adopted and was it adopted in its entirety or was it amended?
- Were additional energy codes for compliance also used?
- What was the general impact of adopting the IgCC on the local industry?
- Was any training or IgCC certification implemented?
- Were any tools or resources developed to help the industry to comply or the staff to enforce the code?
- What was the impact on the city's staff related to budget and full time equivalent (FTE)? How many employees did you need to add to enforce the IgCC, if any?

All the staff we spoke with shared that their city had adopted IgCC 2012, and that they had amended the code to meet their cities' needs. Two staff mentioned that they intended to update each cycle. In addition to IgCC, four of the staff confirmed they had adopted IECC as well.

None of the staff we spoke with mentioned any big impacts or issues with adopting the code. Two of the five mentioned additional incentives were provided and the fact that the code was adopted in a voluntary capacity at first.

As is shown in the table below, only one of the five staff said that any training or certification was involved as part of the adoption process; however, all five staff mentioned developing some form of tool and/or resources to help with the process.

None of the staff indicated additional staff were hired or needed as part of the adoption process. Either staff reported that too few projects were happening to need additional staff, or that existing staff had the availability to absorb the additional workload. One of the interviewees suggested third-party consultants might be the best path based on the size of the building department.

Table 3: Interview Responses

City	Additional Energy Codes	Training or IgCC certification?	Tools or Resources?	Additional FTE
Baltimore, MD	Did not answer	No training or certification	Developing internal check-list	Using existing staff
Maplewood, MN,	IECC 2015	IgCC certification NGBS	Design support	Not enough for additional full time staff
Carbondale, CO,	IECC	Did not answer the question	Commissioning check-list	Did not hire, third-party consultant?
Scottsdale, AZ,	IECC	No training, offering voluntary lectures	Developed check-list	No added funds
Boise, ID	IECC 2012	No training or certification	Building check-list and commissioning forms	Current staff can absorb additional work

National Green Building Standards (NGBS)

NGBS is a certification that covers more than energy efficiency. There are six key areas to NGBSSite Design, Resource Efficiency, Water Efficiency, Energy Efficiency, Indoor Environmental Quality, and Building Operation and Maintenance.

The consultant team interviewed the following individuals as part of the effort to explore if NGBS would be useful in future development of residential green code:

- City of Longmont
- Boulder County
- Home Innovation Research Labs
- Home Innovation Research Labs
- US-EcoLogic/TexEnergy Solutions

Through these interviews, the team determined that NGBS was not the best fit for the City of Boulder at this time for a number of reasons.

- The standards could be difficult to administer and are not easy to amend. The city must be able to amend whatever set of standards are used going forward to allow more stringent requirements to be adopted gradually.

- The certification process requires a certified third-party verifier, and there are few in the area.
- NGBS does not focus on getting a home to NZE, which is one of the city's main goals.
- The 2015 NGBS has not been published yet, and it is unclear when it will be available.
- Very few homes in Colorado have been NGBS certified.
    - Since the beginning of the program in 2009, 45 single family homes have been certified and six are in the process. For multifamily, 11 buildings are certified and 52 buildings are in the process.

C. STAKEHOLDER FEEDBACK FROM OPEN HOUSE

The city boards and public were invited to an open house on Wednesday, April 27, 2016. City staff and consultants from NORESCO presented a brief history of the city's energy code, what the current energy code requirements are now, and discussed near-term and long-term objectives and possible ideas of how to achieve those objectives.

City Boards in Attendance:

- Water Resources Advisory Board
- Parks and Recreation Advisory Board
- Environmental Advisory Board
- Transportation Advisory Board
- Landmarks Board
- Planning Board

Residential Feedback

Stakeholders who attended the open house ranked the following topics from highest to lowest priority to implement as a mandatory requirement into residential code:

1. Waste Management
2. Preservation of Natural Resources
3. Water Efficiency
4. Sustainable Products
5. Solar Photovoltaic
6. Material Efficient Framing and Structure
7. Design Process and Education
8. Indoor Air Quality
9. Electric Vehicle Charging Infrastructure

Finally, attendees were split on their opinion on Solar Thermal, with equal numbers of people ranking it "high priority" and "not recommended."

Commercial Feedback

When asked to prioritize a similar list for commercial code, the stakeholders who attended the open house meeting ranked the green code topics as follows:

1. Water Efficiency
2. Waste Management

3. Preservation of Natural Resources
4. Renewable Energy
5. Energy Metering, Monitoring and Display
6. Transportation Impact
7. Sustainable Products
8. Indoor Environmental Quality
9. Heat Island Mitigation

Group Discussion and Comments

Attendees were asked to provide feedback through group discussions, comment cards and by providing their feedback on what green code amendment topics should be considered for commercial and residential. The open house was attended by about 30 people total, including board members and public.

During group discussions, participants shared additional thoughts the city could consider, while working through the update process, including:

- Revising standards to be more consistent with Boulder County.
- Making the timeline to reach NZE even more aggressive.
- Focusing on energy productivity and not just EUI.
- Considering the social cost of carbon.

Also several concerns and additional thoughts were brought up during discussions and submitted on comment cards including:

- Commercial requirements are difficult to understand.
- It is tough to get questions answered around compliance, and there are challenges working through the permitting process.
- Costs need to be considered as requirements change.
- Residential accessory buildings fall under NBI, and that is an issue.
- In some cases, it seems the intent of the code is being missed.
- There should be focus on demand reduction, and also energy productivity.
- There needs to be better cost/benefit analysis.
- There are some weaknesses with green points, including loopholes builders have found, and the fact that many inspectors do not understand or check the points system thoroughly.
- Meetings like this are productive and should be held annually as climate change considerations are important to board and department decisionmaking.

- There are more opportunities when the entire site is considered and not just the building - irrigation, heat island, geothermal, etc.
- Reservations around NZE goal may discourage dense development, which is important to climate strategy, and more focus should be on land use and transportation systems.

Green Code and Green Point Amendment Prioritization Feedback

Each attendee was given two flyers (See Figure 3), one commercial and one residential, with a list of possible green code and Green Points amendments on each, and a set of red, yellow and green stickers. Attendees were asked to mark the amendments as "High priority," "Low Priority," and "Not Recommended" using the colored stickers.

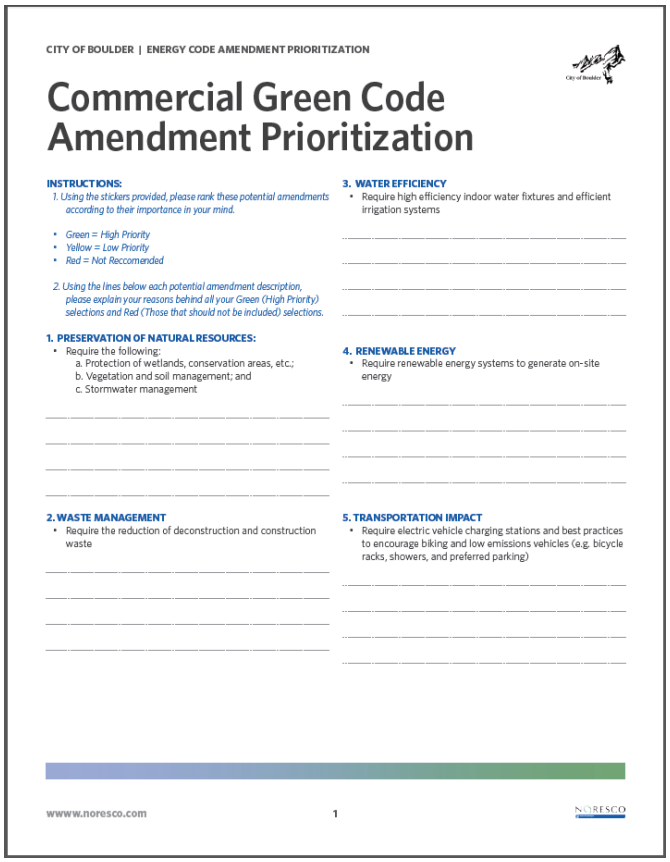
Residential Green Points topics were:

- Site Development
- Waste Management
- Water Efficiency
- Solar Photovoltaic
- Solar thermal
- Electric Vehicle Charging Infrastructure
- Material Efficient Framing and Structure
- Sustainable Products
- Indoor Air Quality
- Design Process and Education

Commercial green code topics were:

- Preservation of Natural Resources
- Waste Management
- Water Efficiency
- Renewable Energy
- Transportation Impact
- Heat Island Mitigation
- Sustainable Products
- Indoor Environmental Quality
- Energy Metering, Monitoring and Display

Figure 3: Example of Green Code Flyer for Commercial



CITY OF BOULDER | ENERGY CODE AMENDMENT PRIORITIZATION

Commercial Green Code Amendment Prioritization

INSTRUCTIONS:

1. *Using the stickers provided, please rank these potential amendments according to their importance in your mind.*

- *Green = High Priority*
- *Yellow = Low Priority*
- *Red = Not Reccomended*

2. *Using the lines below each potential amendment description, please explain your reasons behind all your Green (High Priority) selections and Red (Those that should not be included) selections.*

1. PRESERVATION OF NATURAL RESOURCES:

- Require the following:
  a. Protection of wetlands, conservation areas, etc.;
  b. Vegetation and soil management; and
  c. Stormwater management

2. WASTE MANAGEMENT

- Require the reduction of deconstruction and construction waste

3. WATER EFFICIENCY

- Require high efficiency indoor water fixtures and efficient irrigation systems

4. RENEWABLE ENERGY

- Require renewable energy systems to generate on-site energy

5. TRANSPORTATION IMPACT

- Require electric vehicle charging stations and best practices to encourage biking and low emissions vehicles (e.g. bicycle racks, showers, and preferred parking)

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<u>Feedback on Green Code and Green Points Prioritization</u>

Between board members and public attendees, 20 people provided their feedback on the prioritization of green code amendments for commercial and 19 people provided their feedback on green point amendments for residential (See the table below).

- *Residential:* When asked to prioritize the residential list of possible Green Points topics, attendees ranked Waste Management, Preservation of Natural Resources, Water Efficiency, and Sustainable Products as the most important sustainability requirements. The requirements for Solar Photovoltaic, Material Efficient Framing and Structure, and Design Process and Education were also deemed relatively high priorities. Indoor Air Quality and Electric Vehicle Charging Infrastructure ranked as the lowest priorities. Attendees were split on their opinion on Solar Thermal, with equal numbers of people ranking it "high priority" and "not recommended."

- *Commercial*: When asked to prioritize the commercial list of possible green code topics, attendees ranked Waste Management and Water Efficiency as the most important sustainability requirement. The requirements for Preservation of Natural Resources, Renewable Energy, and Energy Metering, Monitoring and Display were

also deemed relatively high priorities. Indoor Environmental Quality, Sustainable Products and Heat Island Mitigation ranked as the lowest priorities.

Table 4: Feedback on Green Code and Green Points Topic Prioritization

Commercial Green Code Topics			
Category	**High Priority**	**Low Priority**	**Not Recommended**
Preservation of Natural Resources	7	3	2
Waste Management	10	5	0
Water Efficiency	10	6	0
Renewable Energy	8	7	2
Transportation Impact	9	7	3
Heat Island Mitigation	3	5	2
Sustainable Products	2	8	1
Indoor Environmental Quality	4	3	2
Energy Metering, Monitoring and Display	7	6	2
Residential Green Points Topics			
Category	**High Priority**	**Low Priority**	**Not Recommended**
Preservation of Natural Resources	7	7	1
Waste Management	8	5	0
Water Efficiency	8	4	1
Solar Photovoltaic	6	6	2
Solar Thermal	6	4	6
Electric Vehicle Charging Infrastructure	2	5	2
Material Efficient Framing and Structure	5	2	2
Sustainable Products	6	2	1
Indoor Air Quality	1	6	3
Design Process and Education	5	3	2

D. STAKEHOLDER SURVEY

A stakeholder survey was sent out to over 600 licensed industry professionals, and the city received 240 responses. In the survey, respondents were asked to prioritize a list of Green Points Topics for residential code, and a similar list of green code topics for commercial.

Residential Feedback

Based on survey responses, stakeholders ranked the following topics from highest to lowest priority to implement as a mandatory requirement into residential code:

1. Water Efficiency
2. Waste Management
3. Material Efficient Framing and Structure
4. Site Development
5. Electric Vehicle Charging Infrastructure,
6. Sustainable Products
7. Indoor Air Quality
8. Design Process and Education
9. Solar Photovoltaic
10. Solar Thermal

This survey indicated that the lowest priority topics included Solar Photovoltaic and Solar Thermal, with almost the same number of people ranking Solar Thermal as “Not recommended” as those who ranked it a “Low priority.”

Commercial Feedback

When asked to prioritize a similar list for commercial code, the stakeholder respondents ranked the green code topics as follows:

1. Water Efficiency
2. Preservation of Natural Resources
3. Indoor Environmental Quality
4. Waste Management
5. Heat Island Mitigation
6. Energy Metering, Monitoring and Display
7. Transportation Impact
8. Sustainable Products
9. Renewable Energy

No categories were ranked as "Not recommended" most often, but the topics with the higher instances of "Not recommended" included Renewable Energy, Transportation Impact, Sustainable Products, and Energy Metering, Monitoring and Display.

Survey

Industry professionals were invited to participate in an on-line survey between April 25 and May 6 to provide feedback on the Residential Green Building and Green Points Program and the current commercial energy code requirements. Over 600 survey invitations were sent out to licenses contractors, and a total of 240 surveys were submitted with a completion rate of 52.9 percent. There was a high number of partial completes, which may stem from the fact that many respondents work only in commercial or in residential and therefore only filled out half the survey. General contractors were the largest participant group (43.6 percent), followed by architects (25.6 percent) and trade and sub-contractors (24.6 percent).

Survey Details: Residential

The majority of the respondents have been involved with at least one project that required complying with the Green Building and Green Points Program since 2008. Most of these respondents have been involved with one to five projects (30.7 percent) or more than 16 projects (26.5 percent).

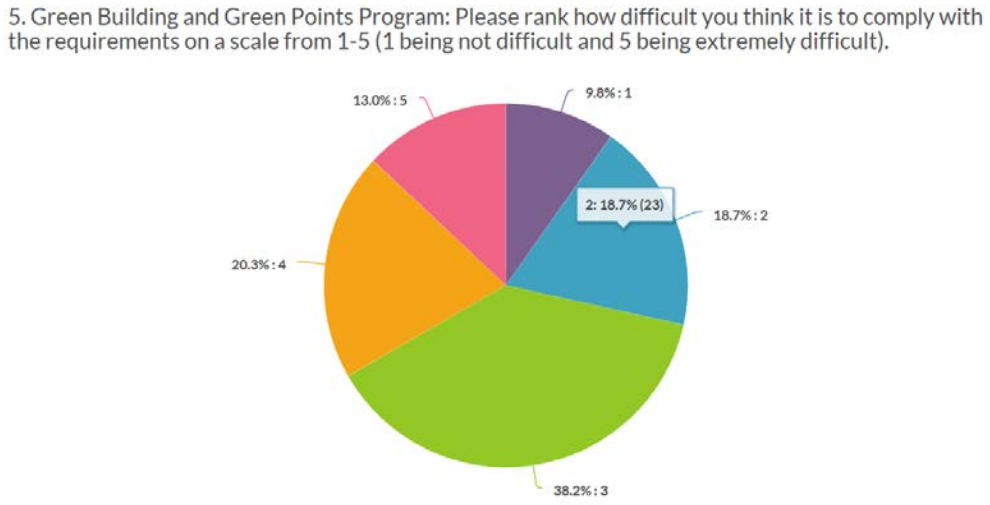
When asked to rate various components of the Green Building and Green Points Program using a scale of 1 to 5, with 1 being not successful and 5 being the most successful, most components were ranked a 3 or a 4. Responses are shown in Figure 4 below. On a similar 1 to 5 scale, when asked how difficult it was to comply with the requirements, with 1 being not difficult and 5 being extremely difficult, most respondents ranked the difficulty a 3, as shown in Figure 5 below.

Figure 4: Green Building and Green Points Program Components

4. Green Building and Green Points Program: Please evaluate and rate the success of the components of the program on a scale from 1-5 (1 being not successful and 5 being most successful).

	1	2	3	4	5
Comprehensive and easy to follow, guidance material is readily available and easy to understand.	16 12.8%	25 20.0%	39 31.2%	37 29.6%	8 6.4%
City staff is responsive to questions about the code and provides helpful guidance.	11 8.7%	15 11.9%	35 27.8%	43 34.1%	22 17.5%
The permit forms are straightforward and easy to complete.	19 15.2%	28 22.4%	32 25.6%	36 28.8%	10 8.0%
The code has resulted in the construction of energy efficient and sustainable homes.	11 8.7%	14 11.1%	37 29.4%	39 31.0%	25 19.8%
The "Green Point" aspect of the program provides flexibility while still promoting high performance construction practices.	19 15.2%	20 16.0%	33 26.4%	41 32.8%	12 9.6%

Figure 5: Difficult to comply with Green Building and Green Points Program Requirements



Survey respondents were also asked to rank the same residential Green Points topics that were presented at the open house.

- Site Development
- Waste Management
- Water Efficiency
- Solar Photovoltaic
- Solar thermal
- Electric Vehicle Charging Infrastructure
- Material Efficient Framing and Structure
- Sustainable Products
- Indoor Air Quality
- Design Process and Education

As shown in Figure 6, Water Efficiency was the top priority. Waste Management and Material Efficient Framing and Structure were a medium priority (meaning almost the same number of people ranked these as a high priority as ranked them a low priority). Site Development, Electric Vehicle Charging Infrastructure, Sustainable Products, Indoor Air Quality, and Design Process and Education were all ranked low priority. This survey indicated that the lowest priority topics included Solar Photovoltaic and Solar Thermal, with almost the same number of people ranking Solar Thermal as “Not recommended” as those who ranked it a “Low priority.”

Figure 6: Residential Green Points Topic Ranking

	High Priority	Low Priority	Not Recommended
Site Development: require the following: i: shading from existing and new trees; ii: organic, low water landscaping practices; and iii: stormwater management	42 35.3%	56 47.1%	21 17.6%
Waste Management: require the reduction of deconstruction and construction waste.	53 43.4%	54 44.3%	15 12.3%
Water Efficiency: require high efficiency kitchen and bathroom fixtures and efficient irrigation systems.	80 67.2%	30 25.2%	9 7.6%
Solar Photovoltaic: require solar electric systems to generate on-site electricity.	30 24.8%	50 41.3%	41 33.9%
Solar Thermal: require solar thermal systems to heat hot water (for water heating, space heating, and/or pools and spas).	20 16.4%	50 41.0%	52 42.6%
Electric Vehicle Charging Infrastructure: require the appropriate outlet installation for electric vehicle charging.	33 27.0%	55 45.1%	34 27.9%
Material Efficient Framing and Structure: require efficient use of lumber and methods to frame a house and design the structure.	49 40.2%	50 41.0%	23 18.9%
Sustainable Products: require the use of reused, recycled, biobased, environmentally certified or locally sourced materials.	33 27.0%	57 46.7%	32 26.2%
Indoor Air Quality: require means of detecting, reducing and mitigating indoor air pollutants.	49 40.2%	54 44.3%	19 15.6%
Design Process and Education: require green building design professional and a homeowner manual for operating the house efficiently.	41 33.3%	49 39.8%	33 26.8%

Survey Details: Commercial

A little less than half of the respondents have been involved in a commercial project that required meeting commercial energy code (46.9 percent) since 2008. Most were involved with one to three projects (24 percent).

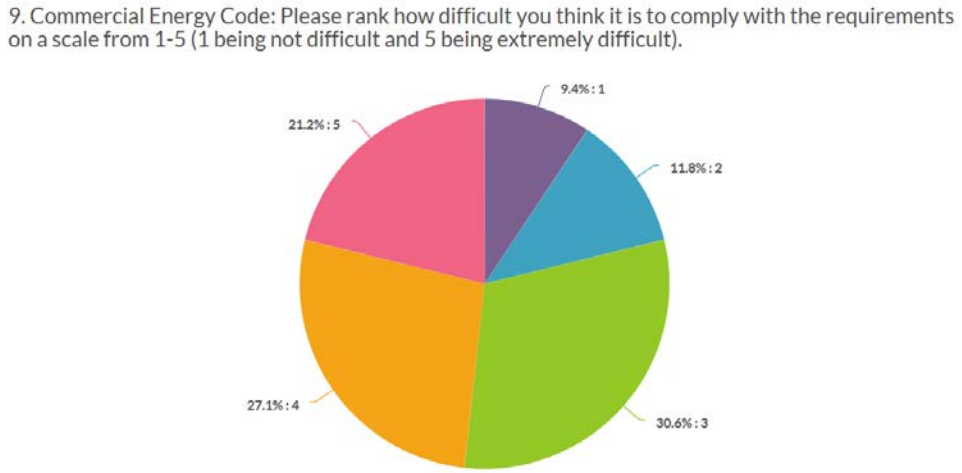
When asked to rate various components of the Commercial Energy Code using a scale of 1 to 5, with 1 being not successful and 5 being the most successful, most components were ranked a 3. Responses are shown in Figure 7 below. On a similar 1 to 5 scale, when asked how difficult it was to comply with the requirements, with 1 being not difficult and 5 being extremely difficult, most respondents ranked the difficulty a 3 or a 4, as shown in Figure 8.

Figure 7: Commercial Energy Code Components

8. Commercial Energy Code: Please evaluate and rate the success of the components of the program on a scale from 1-5 (1 being not successful and 5 being most successful).

	1	2	3	4	5
Comprehensive and easy to follow, guidance material is readily available and easy to understand.	18 20.2%	16 18.0%	35 39.3%	17 19.1%	3 3.4%
City staff is responsive to questions about the code and provides helpful guidance.	11 12.4%	14 15.7%	33 37.1%	20 22.5%	11 12.4%
The permit forms are straightforward and easy to complete.	11 12.6%	19 21.8%	38 43.7%	14 16.1%	5 5.7%
The code has resulted in the construction of energy efficient and sustainable commercial building.	6 6.9%	16 18.4%	38 43.7%	19 21.8%	8 9.2%

Figure 8: Difficult to comply with Commercial Energy Code Requirements



Survey respondents were also asked to rank the same commercial green code topics that were presented at the open house.

- Preservation of Natural Resources
- Waste Management
- Water Efficiency
- Renewable Energy
- Transportation Impact
- Heat Island Mitigation
- Sustainable Products
- Indoor Environmental Quality
- Energy Metering, Monitoring and Display

As shown in Figure 9, Water Efficiency, Preservation of Natural Resources, Waste Management, and Indoor Air Quality were ranked the top priorities. Heat Island Mitigation was ranked a medium priority (meaning that while many people marked it as a high priority many people also marked it as a low priority.) No categories were ranked as "Not recommended" most often, but the topics with the higher instances of "Not recommended" included Renewable Energy, Transportation Impact, Sustainable Products, and Energy Metering, Monitoring and Display.

Figure 9: Commercial Green Code Topic Ranking

	High Priortiy	Low Priority	Not Recommended
Preservation of Natural Resources: require the following: i. i. protection of wetlands, conservation areas, etc.; ii. vegetation and soil management; and iii. stormwater management.	53 60.2%	30 34.1%	5 5.7%
Waste Management: require the reduction of deconstruction and construction waste.	43 49.4%	29 33.3%	15 17.2%
Water Efficiency: require high efficiency indoor water fixtures and efficient irrigation systems.	63 70.8%	19 21.3%	7 7.9%
Renewable Energy: require renewable energy systems to generate on-site energy.	27 30.3%	36 40.4%	26 29.2%
Transportation Impact: Require electric vehicle charging stations and best practices to encourage biking and low emissions vehicles (e.g. bicycle racks, showers, and preferred parking).	29 33.0%	37 42.0%	22 25.0%
Heat Island Mitigation: require best practices to reduce surface temperatures surrounding a building site (e.g. permeable sites, shading).	40 45.5%	30 34.1%	18 20.5%
Sustainable Products: require the use of reused, recycled, bio-based, environmentally certified or locally sourced materials.	26 29.5%	38 43.2%	24 27.3%
Indoor Environmental Quality: require best practices to ensure thermal comfort, indoor air quality, access to daylight and views, etc.	47 52.8%	31 34.8%	11 12.4%
Energy Metering, Monitoring and Display: require on-going energy metering and a real time display of energy use.	31 35.2%	35 39.8%	22 25.0%

E. STAKEHOLDER MEETINGS

In April 2016, the city organized two stakeholder meetings to gather additional feedback about the existing Green Building and Green Points Program and on the Commercial Energy Code process. Attendees were asked to discuss challenges and successes of the existing program and process, as well as discuss potential new ideas moving forward.

During the meeting on commercial code, the two biggest concerns were the compliance process and cost. When asked to prioritize green code topics, Water Efficiency, Waste Management, Transportation Impacts, and Indoor Environmental Quality were viewed as top priorities. Sustainable Products and Energy Metering, Monitoring and Display were viewed as less of a priority.

During the meeting to discuss residential code, the two biggest concerns were square footage requirements and how Green Points applied to renovations and additions.

Commercial

The commercial stakeholder meeting was held on Friday, April 27 and was attended by six industry professionals, five city staff and one consultant/subject matter expert. Two of the biggest challenges identified were the compliance process and cost.

Compliance Process: The biggest challenge discussed was around the compliance process and enforcement of the commercial energy code. There seemed to be a general agreement that the current process needs to be fixed before more stringent code can be put into place.

- Energy code requirements and submittals are inconsistent. Consistent enforcement is needed.
- Information can be hard to find, is scattered throughout the website, and information found on the website and provided by project specialists does not always agree. Information needs to be more centralized and consistent.
- Consistency of feedback between inspectors can be improved, and more guidelines need to be developed.
- Permit process is hard and unclear. Sizing mechanical equipment is challenging, a step-by-step manual would be useful, and it seems more staff might be needed to handle the workload.

Cost: Another concern shared was cost and continued affordability, as the increased cost of building will trickle down and impact rent and building prices.

When the group was asked about the list of commercial green code topics discussed at the open house and in the surveys, Water Efficiency, Waste Management, Transportation Impacts, and Indoor Environmental Quality were viewed as top priorities. Sustainable Products and Energy Metering, Monitoring and Display were viewed as less of a priority or not recommended.

Residential

The residential stakeholder meeting was held on Tuesday, April 24 and was attended by four industry professionals, five city staff and one consultant/subject matter expert. Two of the biggest challenges identified were the square footage thresholds and renovations.

Square Footage Requirements: The biggest challenge discussed was around the thresholds created by square footage and the different ways floor area can be measured. Many at the meeting felt that a more gradual square footage curve would work better as requirements move toward net zero energy (NZE), rather than the current threshold model. A gradual curve would make it easier for contractors to meet the requirements and help discourage individuals from either doing work without a permit or finding ways to circumnavigate the system. Since floor area is defined in different ways, it would also be helpful for the city to develop a standardized definition and approach to floor area.

Renovations and Additions and Green Points: Another concern shared was the "points system" for Green Points and the challenge this poses for renovations and additions. Not only can more points be needed if some aspect of the project changes, but the points system is sometimes difficult for customers to understand. A suggestion was to move away from the "points" systems altogether and just make the most important requirements mandatory.

F. ADDITIONAL DETAILS ON OFF-SITE RENEWABLES

Staff proposes the following off-site renewable requirements be phased in as part of the 2019 code updates:

- Off-site renewable energy options will be required to achieve NZE for all new buildings.
- Staff recommends the allowance of community solar gardens and a local carbon offset fund, but not Renewable Energy Credits (RECS).
- Off-site renewable options are only allowed if all on-site renewable options have been exhausted.

Details

Renewable energy is required to achieve NZE buildings as all occupied buildings consume energy, no matter how efficient they may be. Ideally, onsite renewable energy systems will be able to provide enough energy to offset all of the energy demand of a building. In reality, many buildings face practical limitations related to available roof area, poor solar orientation or shading, which makes this technology infeasible.

Off-site renewable energy options will be required to achieve NZE for all new buildings. Options typically include community solar gardens, carbon offset funds, renewable energy credits (RECs), and others. However, these different options have varying levels of "quality," provide different levels of incentive for the actual construction of new renewable energy systems, and have different levels of transparency. Staff recommends the allowance of community solar gardens and approved local carbon offset funds, but not the use of RECS. Important considerations for both options are included in Table 5.

Table 5: Off-Site Renewable Options

Off-Site Renewable Option	Definition	Key Considerations
Community Solar	A solar facility that allows for multiple parties to purchase shares or otherwise enter into power purchase agreements (PPAs) which entitle them to specified shares of the generated solar power. Community solar systems rely on the utility grid to transport the energy to the buildings of the investors, and must therefore be approved by the utility.	• Only allowed if all on-site options have been exhausted • First options should be for community solar located within city limits • If there are no community solar subscriptions available within the city; systems located in Boulder County are allowed • Include requirements to ensure that the energy from the community solar system is provided to the subject building, and cannot be transferred to another purpose.[1]

[1]An example of this can be found in the Boulder County BuildSmart code: "Given that such shares do not automatically run with the applicant's land, include a mechanism that ensures the share cannot be sold or

Off-Site Renewable Option	Definition	Key Considerations
Carbon Offset Fund	A fund that invests in renewable energy generation projects or projects that capture and remove methane or carbon dioxide from the atmosphere.	• Only use when all other aspects of the building efficiency and solar are exhausted • The carbon fund must include an approved correlation between the amount invested and an electricity consumption to be offset. • Requirements that the investment remain associated with the subject building must be included.
Renewable Energy Credits (RECs)	A renewable energy credit represents proof that 1 megawatt-hour (MWh) of electricity was generated from an eligible renewable energy resource. When a REC is purchased and retired, the buyer can claim that 1 MWh or electricity purchased from the local utility is renewable energy. A corresponding amount of electricity from the renewable energy system can no longer claim to be renewable. Boulder's codes must require that renewable energy systems that are used to meet the code, particularly onsite systems, do not sell the RECs associated with those systems.	Not recommended

The use of RECs, in particular, can be problematic. RECs are sold in units of MWh (1000 kWh) and represent the "green" aspects of the electricity generated from a renewable energy system. If the REC is sold, the actual electricity from the renewable system can no longer be considered renewable energy. Purchase of a REC incentivizes the construction of renewable energy systems, but also may result in double counting of the energy produced by the system as renewable energy. For example, a building owner may install a PV system to meet some renewable requirement. If the building owner is allowed to, he or she might then sell the associated RECs to a neighboring building. This should mean that the electricity used by the building is technically indistinguishable from the electricity purchased from the local utility. However, without a requirement that the RECs be retained with the renewable system, such a system could serve to satisfy renewable requirements of two buildings. A requirement should be

modified in any way without the consent of Boulder County, with the exception of legal transfer to the applicant's successors-in-interest for use on the same property."

included to prevent sale of the RECs from any renewable system used to meet Boulder code requirements. Limits should also be included on the use of purchased RECs.

It is also important, and a goal of most energy codes, that some specified level of energy efficiency is achieved by the building prior to using renewables. Only after efficiency measures have been fully implemented is renewable energy allowed to be used to achieve the required energy targets.

G. SUMMARY OF SCOPES AND OUTCOMES OF COMPLIANCE IMPROVEMENT EFFORT

In addition to the code strategy efforts outlined in this memo, the city has outlined goals to improve compliance with the energy code. Simplifying and streamlining the compliance process will help realize the energy and GHG savings intended by the code. It will also decrease strain on city staff and permit applicants trying to comply. The city has outlined the following tasks related to the compliance improvement effort:

- Develop a special lighting permit application for renovations being done to comply with the lighting requirements of the Building Performance Ordinance. Provide any necessary training and guidance materials for plans' reviewers.
- Review current compliance processes (including how energy is addressed in large projects that go through site review), and make recommendations for changes.
- Develop new website content for the city's energy code webpages, including clear descriptions of all new code changes for 2017.
- Review current report templates and checklists in use by the city and recommend changes to content, format and/or use.
- Develop training and guidance materials for service providers, code officials, plans reviewers and inspectors.
- Train code officials, plans reviewers, inspectors, contractors and design professionals on new process.

NORESCO has been contracted to facilitate this compliance improvement effort with the city and will be conducting this effort through January 2017. The following approach will be used:

1. Interview building department staff to understand the permit process from application intake through final. Observe counter technicians, plans examiners and building inspectors as they interact with the energy code to identify best practices and compliance roadblocks. This needs assessment phase also helps us identify work tasks related to energy code compliance and determine whether those tasks are being completed optimally.
2. Develop performance-based solutions to rectify compliance roadblocks identified during the needs assessment. Performance-based solutions may be training, tools, job aids or customer outreach, depending on the roadblock identified (for example, training may be the appropriate solution for a lack of knowledge/skill, but is not an appropriate solution if the person knows what to do, but simply doesn't have the time or resources to do it).
3. Present performance-based solution ideas to city staff, including building department staff, for prioritization and input. Develop appropriate performance-based solutions for implementation.
4. Implement priority performance-based solutions to increase compliance and energy savings resulting from Boulder's energy code.

INFORMATION PACKET
MEMORANDUM

To: Mayor and Members of Council

From: Jane S. Brautigam, City Manager
Tom Carr, City Attorney
Kathy Haddock, Senior Assistant City Attorney
Chris Meschuk, Senior Planner
Robert Harberg, Principal Engineer, Utilities

Date: July 15, 2016

Subject: Information: **Annexation of City-owned Property and Elmer's Two-Mile Park as an Enclave**

EXECUTIVE SUMMARY

There are several city-owned parcels surrounding and within the city that have never been annexed. The properties were not annexed for a variety of reasons, primarily because they were pieces that were omitted from street construction or were public parcels adjacent to or between other developments that were being annexed. The Boulder Valley Comprehensive Plan (BVCP) annexation policy 1.24 states that the city will actively pursue annexation of enclaves and Area II properties, and may annex city owned properties in Area III when a full range of urban services is not needed. In preparing for potential municipalization, the maps of the city boundaries have been scrutinized very thoroughly. The separation plan requires that the properties be annexed for the city to provide electrical service without building duplicate facilities. Therefore, these annexations have elevated in priority. Ordinances will be presented to council to annex city-owned properties and the Elmer's Two-Mile Park as an enclave with an initial zoning of P-Public on August 2, 2016. The Open Space Board of Trustees and Planning Board are considering recommendations regarding the annexations to council at their meetings on July 27 and July 28, respectively.

FISCAL IMPACT

The properties proposed for annexation are parcels to which the police and fire currently respond when there is an emergency call. The facilities on the properties are maintained by the city. As a result, there is no expected fiscal impact by these annexations.

BACKGROUND

These city-owned properties are being considered for annexation to fill in the holes in the city's boundaries and include city facilities in the city to minimize costs of separation in the event of municipalization. The annexations comply with comprehensive plan policy 1.24 to "actively pursue annexation of county enclaves, Area II properties along the western boundary, and other

fully developed Area II properties." All of the small properties within the core of the city are in Area II. The open space parcels at the south have a water tower and a communications tower. The west open space parcel has the Sunshine hydro-electric plant. Those three parcels are located in Area III-Rural Preservation, and are intended to remain in Area III. The ordinances provide that all properties will be zoned P-Public as their initial zoning.

The map attached shows the 19 city-owned properties to be annexed. The different colors represent which city department is responsible for management of the properties. Red indicates OSMP manage, orange is Transportation, and blue is Parks or Public Works. There is also a 20'x30' privately-owned parcel in the corner of the enclave of Elmer's Two-Mile Park on the south side of Iris between 27th and 28th. It has a gas facility on it and is owned by Xcel Energy. The city-owned parcels are proposed for annexation in one ordinance and the enclave of Elmer's Two-Mile Park owned by the city and the corner of the property owned by Xcel are proposed in a separate ordinance. Under state law, no hearing is required to annex city-owned property or enclaves, but staff anticipates that council will have a public hearing on second reading on August 16, 2016.

For municipalization, by annexing these properties, staff estimates the costs of the separation plan to be proposed in the city's supplemental application to the Public Utilities Commission will be reduced by over $2 million. Also, annexation of these properties will eliminate some of construction through Open Space and through developed areas of the city that would otherwise be required to separate the two utilities. Even if municipalization does not occur, all of the properties, except the open space parcels on the south and west, are parcels the city would eventually want to annex to implement the Comprehensive Plan.

Un-related to municipalization and in addition to implementing policy, annexing of city-owned properties clarifies boundaries and responsibilities for maintenance and land use policies. Eliminating enclaves also prevents confusion in emergency response, and enforcement of laws. For instance, the same laws will apply after annexation to Elmer's Two-Mile as apply to every other park in the city, whereas now, state laws apply.

There are other city owned properties that are being considered for annexation, including the Wastewater Treatment Plant and Valmont Butte. These annexations will be brought forward at a future date.

ANALYSIS

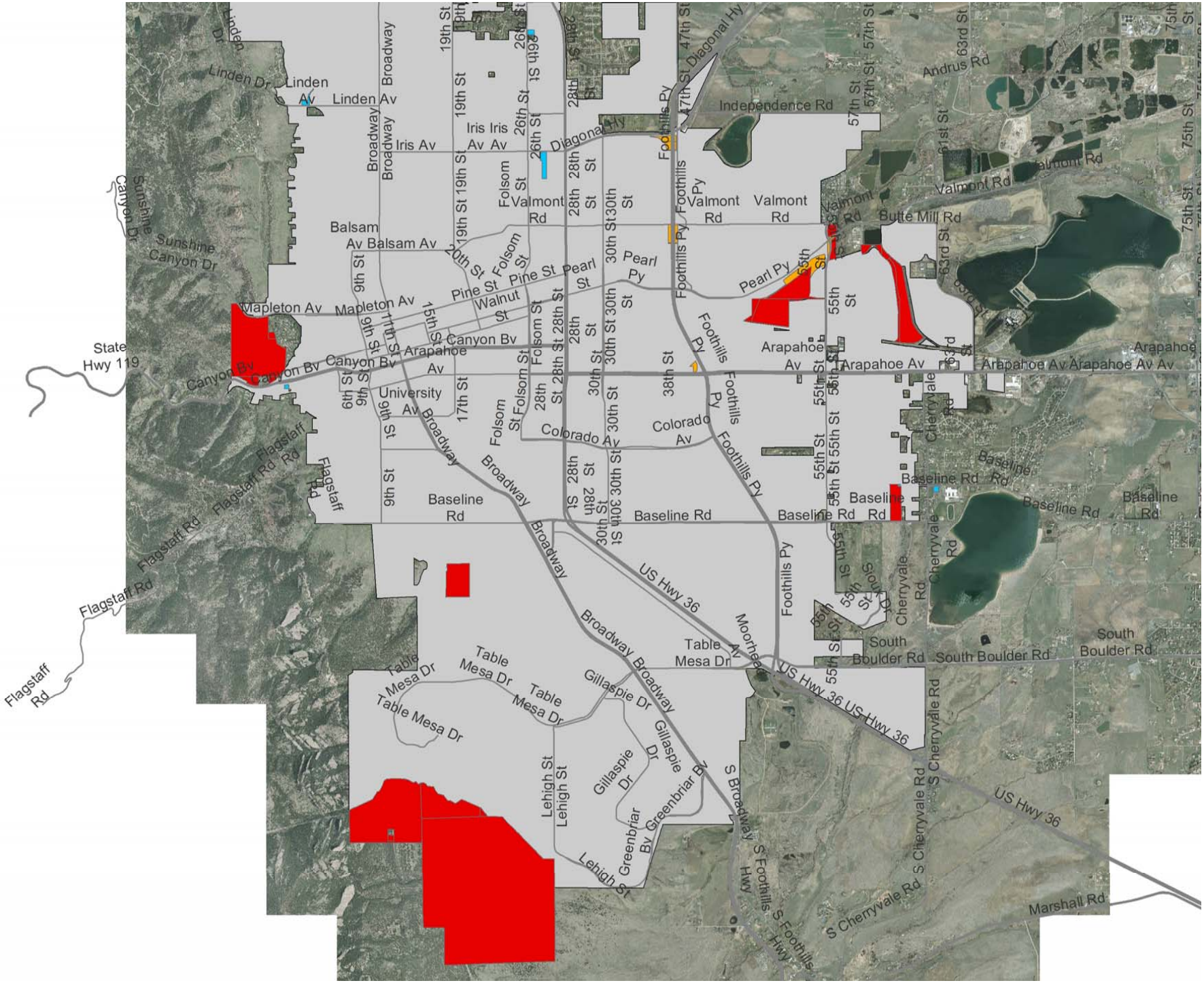
These annexations implement the Comprehensive Plan policy to annex properties along the western boundary and enclaves. Annexing the properties reduces the amount of construction required to create two utilities in the event the city does municipalize. Clarifying jurisdictional boundaries creates efficiencies in the provision of urban services such as emergencies and enforcement of laws.

NEXT STEPS

The annexation ordinances are set for first reading on August 2 and second reading and public hearing on August 16. The Open Space Board of Trustees is set to discuss recommendations on

the annexations to council at its meeting on July 27, and the Planning Board is to discuss its recommendations on July 28.

Attachment A: Map of annexation of city-owned parcels.


Linden Dr
Linden Av
Linden Av
Broadway
Broadway
19th St
19th St
26th St
28th St
Iris Av
Iris Av
Iris Av
Diagonal Hy
Foothills Py
47th St
Independence Rd
57th St
Andrus Rd
63rd St
61st St
Valmont Rd
Valmont Rd
Valmont Rd
Butte Mill Rd
75th St
Sunshine Canyon Dr
Sunshine Canyon Dr
Balsam Av
Balsam Av
Folsom St
Valmont Rd
Valmont Rd
Valmont Rd
30th St
Pearl St
Pearl Py
Pearl Py
55th St
Mapleton Av
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South Boulder Rd
South Boulder Rd
S Broadway
S Foothills Hwy
S Foothills Hwy
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