CITY OF BOULDER
ENVIRONMENTAL ADVISORY BOARD MEETING AGENDA
DATE: September 7, 2016
TIME: 6 pm
PLACE: 1777 Broadway, West Conference Room

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1. **CALL TO ORDER**

2. **APPROVAL OF MINUTES**
   - **A.** The August 3, 2016 Environmental Advisory Board meeting minutes are scheduled for approval.

3. **PUBLIC PARTICIPATION**

4. **PUBLIC HEARING ITEMS**
   - **A.** Energy Codes (Kendra Tupper – 6-7)

5. **DISCUSSION ITEMS**
   - **A.** Climate Action Campaign (Brett KenCairn – 7-7:45)

6. **OLD BUSINESS/UPDATES**
   - **A.** Debrief BVCP Joint Meeting (Attendees – 7:45-8)

7. **MATTERS FROM THE ENVIRONMENTAL ADVISORY BOARD, CITY MANAGER AND CITY ATTORNEY**

8. **DEBRIEF MEETING/CALENDAR CHECK**

9. **ADJOURNMENT**

For more information call (303) 441-1931. Board packets are available after 4 pm Wednesday prior to the meeting, online at www.bouldercolorado.gov.

CITY OF BOULDER ENVIRONMENTAL ADVISORY BOARD
MEETING GUIDELINES

CALL TO ORDER
The board must have a quorum (three members present) before the meeting can be called to order.

AGENDA
The board may rearrange the order of the agenda or delete items for good cause. The board may not add items requiring public notice.

PUBLIC PARTICIPATION
The public is welcome to address the board (three minutes* maximum per speaker) during the Public Participation portion of the meeting regarding any item not scheduled for a public hearing. The only items scheduled for a public hearing are those listed under the category PUBLIC HEARING ITEMS on the agenda. Any exhibits introduced into the record at this time must be provided in quantities of eight to the Board Secretary for distribution to the board and admission into the record.

DISCUSSION AND STUDY SESSION ITEMS
Discussion and study session items do not require motions of approval or recommendation.

PUBLIC HEARING ITEMS
A Public Hearing item requires a motion and a vote. The general format for hearing of an action item is as follows:

1. Presentations

- Staff presentation (15 minutes maximum*) Any exhibits introduced into the record at this time must be provided in quantities of eight to the Board Secretary for distribution to the board and admission into the record.
- Environmental Advisory Board questioning of staff for information only.

2. Public Hearing

Each speaker will be allowed an oral presentation (three minutes maximum*). All speakers wishing to pool their time must be present, and time allotted will be determined by the Chair. Two minutes will be added to the pooled speaker for each such speaker's allotted time up to a maximum of 10 minutes total.

- Time remaining is presented by a green blinking light that means one minute remains, a yellow light means 30 seconds remain, and a red light and beep means time has expired.
- Speakers should introduce themselves, giving name and address. If officially representing a group please state that for the record as well.
- Speakers are requested not to repeat items addressed by previous speakers other than to express points of agreement or disagreement. Refrain from reading long documents, and summarize comments wherever possible. Long documents may be submitted and will become a part of the official record.
- Any exhibits introduced into the record at the hearing must be provided in quantities of eight to the Board Secretary for distribution to the board and admission into the record.
- Interested persons can send a letter to the Community Planning and Sustainability staff at 1739 Broadway, Boulder, CO 80302, two weeks before the Environmental Advisory Board meeting, to be included in the board packet. Correspondence received after this time will be distributed at the board meeting.

3. Board Action

Board motion. Motions may take any number of forms. Motions are generally used to approve (with or without conditions), deny, or continue agenda item to a later date (generally in order to obtain additional information).

- Board discussion. This is undertaken entirely by members of the board. Members of the public or city staff participate only if called upon by the Chair.
- Board action (the vote). An affirmative vote of at least three members of the board is required to pass a motion approving any action.

MATTERS FROM THE ENVIRONMENTAL ADVISORYBOARD, CITY MANAGER, AND CITY ATTORNEY
Any Environmental Advisory Board member, City Manager, or the City Attorney may introduce before the board matters which are not included in the formal agenda.

ADJOURNMENT
The board's goal is that regular meetings adjourn by 8 p.m. Agenda items will not be commenced after 8 p.m. except by majority vote of board members present.

*The Chair may lengthen or shorten the time allotted as appropriate. If the allotted time is exceeded, the Chair may request that the speaker conclude his or her comments.

CITY OF BOULDER, COLORADO
BOARDS AND COMMISSIONS MEETING SUMMARY

NAME OF BOARD/COMMISSION: Environmental Advisory Board

DATE OF MEETING: August 3, 2016

NAME/TELEPHONE OF PERSON PREPARING SUMMARY: Sandy Briggs, 303-441-1931.

NAMES OF MEMBERS, STAFF AND INVITED GUESTS PRESENT:
Environmental Advisory Board Members Present: Morgan Lommele, Brad Queen, Karen Crofton and Christina Gosnell.
Environmental Advisory Board Member Absent: Tim Hillman
City Council Member Present: Jan Burton
Planning Board Member Present: Leonard May
Staff Members Present: Brett KenCairn and Sandy Briggs

MEETING SUMMARY:

- **City Council Boards & Commissions Subcommittee Member Attendance**
  - The board provided clarification about the process and purpose of April's joint board meeting and agreed it was a beneficial use of everyone's time.
  - **L. May's** invitation to speak to the EAB was a direct result of the joint meeting.
  - **B. KenCairn's** invitation to speak to the Open Space Board of Trustees was another direct result of this meeting.
  - The board reiterated that much of the EAB's purview affects other areas of city planning and would like to see climate initiatives be taken into account with decision-making processes across all relevant topics.
  - The board explained that the responses of the attending board members were positive and similar in their desire to be more explicitly allowed to make decisions as relate to climate issues. They would like to get on paper what considerations each board should address as overlap with EAB issues.
  - **L. May** noted that nothing in the current Planning Board design criteria, aside from solar panels, allows latitude for members to factor in environmental concerns.
  - **B. Queen** added that Landmarks Board members had also voiced similar concerns for some time.
  - **C. Gosnell** suggested the end goal of the EAB's collaboration efforts is for council to more explicitly include climate issues in the mandates, and therefore decision making processes, of the other boards.
  - The board agreed that there has not yet been visible improvement with communication and public engagement, but the programs in the pipeline are moving in the right direction.
  - **J. Burton** agreed that too often the public sees the city as one-sided and strategy

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changes are necessary.

- ➢ **B. Queen** pointed out that there is a difference between showing interest in a project and being supportive of it and the city should remain cognizant of this.
- ➢ The board agreed that misinformation is disseminated via editorials and other sources that aren't wholly factual and that even those who follow the progress of certain projects and programs can get overwhelmed by these opinions.
- ➢ **J. Burton** suggested the climate focus group results be shared out to the community.
- ➢ **K. Crofton** offered the EAB's assistance to council in order to help streamline and narrow their focus. **B. Queen** offered to participate in community outreach.
- ➢ **C. Gosnell** recognized that City Council already brings an environmental focus and suggested the EAB could more effectively advise and offer informed feedback if given more notice of environmentally relevant agenda items.
- ➢ **J. Burton** suggested one or more EAB members be at the table with staff and council when climate related issues are presented.

- ❖ **"Planning Board 101"**
  - ➢ **B. KenCairn** reminded the board that one of the larger challenges for staff/board interaction is finding a way for boards to participate in the policy process outside of the topics brought directly to them.
  - ➢ **L. May** suggested the EAB write and submit policy proposals to council as a proactive way to provide feedback and advice separately from reacting to staff presentations.
  - ➢ **C. Gosnell** suggested the EAB discuss programs, and include Planning Board in these discussions, for incentivizing developers to factor environmental concerns into their plans.
  - ➢ **L. May** reminded the board that density measurement is one method among many that helps with the ultimate goal of carbon reduction.
  - ➢ Everyone recognized and agreed that these policy issues are interconnected and effecting one effects all.

1. CALL TO ORDER
Environmental Advisory Board Vice-Chair **M. Lommele** declared a quorum called the meeting to order at 6:05 pm.

2. APPROVAL OF MINUTES
On a motion by **B. Queen**, seconded by **K. Crofton**, the Environmental Advisory Board voted 4-0 (**T. Hillman** absent) to approve the July 6, 2016 meeting minutes.

3. PUBLIC PARTICIPATION
None.

4. PUBLIC HEARING ITEMS
None.

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5. DISCUSSION ITEMS

A. City Council Boards & Commissions Subcommittee Member Attendance (Burton)

City Council Member **J. Burton** attended to liaise with the EAB as one of the two members of City Council's Boards & Commissions Subcommittee.

She thanked the board members for their service and explained her purpose for attending was to listen to ideas, create actions and identify ways to improve communication.

A wide range of topics was discussed, including April's joint board meeting, other board's desires to see their own written mandates include climate considerations, flagging the CAC to add the EAB to council agendas for climate-related topics, providing specific feedback and recommendations to council and forming small subcommittees to assist with identifying overlapping purviews.

The pending GHG inventory and citywide/Climate + Sustainability dashboards were discussed and updates provided. Both are changing in timeline and process from their originally planned rollouts and in what metrics are tracked.

The topic of community communication was also discussed. **B. KenCairn** described some of the new tools to be utilized by the forming Public Engagement Working Group and mentioned that the city recognizes the need to shift away from the old paradigm of asking the community to come to us.

B. KenCairn also shared results from the recently conducted climate focus groups and the city's plans for a Climate Summit in November**.**

Open discussion with questions and answers ensued throughout. Comments are captured in the Meeting Summary.

B. "Planning Board 101" (May)

Planning Board Member, **L.May**, informed the board of pending Planning Board topics relevant for EAB input. Most immediately, Planning Board will be discussing the Draft Boulder Valley Comprehensive Plan Update during their study session on August 11 and requested feedback from the EAB since environmental issues are key to the proposed policy changes.

He explained there is very explicit language defining how the EAB can interact with Planning Board processes, but that discussing policy issues is wide open for collaboration.

The areas of interest he sees as most relevant for EAB involvement are the inclusion of more explicit environmental guidelines into site review criteria, assisting with the development of a building entitlements point system to inform what the public betterment would be, identification of codes that can improve environmental outcomes and developing policy that is proactive toward environmental concerns.

In addition to suggesting the EAB provide comment on the BVCP update, **L. May** also suggested the EAB's input regarding the Middle Income Housing Policy and density discussions would be valuable.

In addition to watching the council agenda, he suggested keeping an eye on Planning Board's agenda. And also offered to prompt the board when he knows a topic of interest and overlap with the EAB is coming up.

Comments are captured in the Meeting Summary.

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6. OLD BUSINESS/UPDATES

A. Report Back on Planning Board Attendance (Queen & Gosnell)

B. Queen and **C. Gosnell** attended the July 28, 2016 Planning Board meeting and spoke briefly during Public Comment. There was not much new to report beyond the Discussion Item with **L. May** summarized in these minutes.

Some specific, actionable items to bring forward to the Planning Board were suggested:

- Compile some reasonable and attainable environmental considerations to include in Planning Board criteria,
- Determine what codes can do to improve environmental outcomes, and
- Develop criteria to award "brownie points" to developers for environmental conscientiousness.

EAB members will submit individual comments regarding the draft Energy & Climate section of the BVCP update to Planning Board before next Thursday's meeting.

S. Briggs will confirm with the Planning Board Secretary that the posted packet for the August 11, 2016 meeting is current, and the draft BVCP update therein is the most recent version. She will inform the board and provide an accurate link to the packet for EAB review as soon as possible so comments can be made prior to Thursday's Planning Board meeting.

S. Briggs will obtain a copy of the Planning Board's 2015-2016 letter to council for review through the "EAB lens" for discussion during the September meeting.

B. Continue Joint Board Meeting Logistics Planning (Board)

S. Briggs reminded the board that some planning was needed in order to choose a date and engage numerous board members to attend a joint board meeting. **K. Crofton** added that the question of which board will facilitate and host is still unanswered. The board agreed they should continue to host and facilitate the meeting(s) in order to set the environmental tone and drive the conversations, and that a date should be selected sooner rather than later.

Creating a joint meeting proposal and looking towards a March 2017 timeframe was suggested. **B. KenCairn** will consult with Planning, Housing + Sustainability Executive Director, **D. Driskell** about this.

B. KenCairn informed the board about three planned broad community convenings around climate and energy, climate and ecosystems, and climate and resources, each around a year apart, that may fit well with a joint board meeting schedule.

7. MATTERS FROM THE ENVIRONMENTAL ADVISORY BOARD, CITY MANAGER AND CITY ATTORNEY

B. KenCairn informed the board about the new Climate Action Campaign that will follow adoption of the Climate Commitment document later this year.

The need to catalyze the community around what this is, and bring some clarity to the launch using very specific, measurable targets will be addressed through community convenings around climate and energy.

The next stage is recruitment of a steering group and advisory group, as well as some short term working groups around solar, transportation and natural gas replacement strategies.

A series of outreach meetings are also beginning to take place in order to focus thoughts

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around what stakeholders are willing to do, what they would like to do and what they can support others in doing to achieve the targets outlined in the Climate Commitment document.

He requests any feedback and participation in the steering and advisory groups EAB members are able to provide.

There will also be a Climate Summit in November, with the business community as a main focus. It will be structured to ensure diverse representation and a different type of engagement than the historical "city meeting". Success will be gauged by actions and follow-ups, not by the engagements themselves.

The board agreed there is the need to dispel the image of the city as an entity in itself and replace it with the city as a group of citizens and the administrator of the community. As a result of the current image, there tends to be disassociation and a disconnect between the community and itself. The board suggested the city "loosening the reins" somewhat will be beneficial for more effective engagement.

K23 Media has been contracted to create a hip, interactive platform for the community to be involved with the Climate Action Campaign.

B. KenCairn requested suggestions for high-profile speakers to retain for the campaign and will poll board members offline for their level of interest, capability and desired focus for being involved going forward.

8. DEBRIEF MEETING/CALENDAR CHECK

C. Gosnell will not be present for the September 7, 2016 meeting. She might call in, and will confirm with **S. Briggs** prior to the meeting date.

9. ADJOURNMENT

The Environmental Advisory Board adjourned at 7:57 pm.

Approved:

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Chair Date

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MEMORANDUM

To: Environmental Advisory Board

From: Maureen Rait, Executive Director of Public Works
David Driskell, Executive Director of Planning, Housing + Sustainability
Dave Thacker, Building Services Manager/Chief Building Official
Kendra Tupper, Energy Services Manager
Elizabeth Vasatka, Business Sustainability Coordinator

Date: September 7, 2016

Subject: Proposed Updates to Energy Codes

EXECUTIVE SUMMARY

This memo outlines the long-term strategy for Boulder's energy codes and proposed amendments for the next building and energy code update (late 2016). Staff has provided an outline of the long-term strategy (**Attachment A)** for context, and is seeking feedback from the Environmental Advisory Board on the proposed near term energy code amendments.

Proposed Near-Term Updates

Staff has developed proposed updates to the building and energy code, which will likely be presented to City Council for consideration and adoption in late 2016. The proposed effective date of these changes are proposed for early 2017.

Proposed near-team building and energy code updates include:

1. Restructuring and updates of 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 prescriptive pathway for alterations and new construction/additions with a construction cost less than $500,000.
3. Other miscellaneous updates including: revising how multi-family units are addressed and allowing off-site renewable energy for energy code compliance.

Long-Term Strategy (**Attachment B**)

The City of Boulder has set an aggressive goal of adopting net zero energy (NZE) codes by 2031, and has developed a strategy and pathway to achieve that target. Staff recognizes that in order to support the city's Climate Commitment and sustainability goals, energy codes must begin to address sustainability beyond just energy use such as transportation, water, indoor environmental quality and waste. 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 EnergySmart, SmartRegs and the Building Performance Program.

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

1. Pathways for achieving high performance NZE codes including: a 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

BACKGROUND

Please refer to **Attachment B** for an overview of energy and green codes. This Attachment provides background information on national energy and green codes, definitions of key terms that are used throughout this memo, and brief history of Boulder's energy codes.

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, NZE residential and commercial buildings. The objectives below are designed to support this overarching goal:

Supporting the Climate Commitment

- To achieve and sustain significant greenhouse gas (GHG) 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 percent renewable electricity, as well as economic vitality and community resilience

Promoting 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)

Creating 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

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, 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.

ANALYSIS: NEAR-TERM CODE UPDATES

As the city evaluates and updates its energy codes every three years, staff has gathered stakeholder feedback on some of the challenges related to compliance with current codes. Staff has drafted updates based on the feedback received which will be presented to council for adoption in late 2016 with an effective date in early 2017. Specifically, staff is proposing the following near-term energy code amendments:

- Restructuring and updates to the current residential energy code, Green Building and Green Points (GBGP), including amendments to the International Residential Code (IRC) to require electric vehicle charging infrastructure
- New prescriptive requirements for commercial buildings, including amendments to the International Building Code (IBC) to require solar photovoltaic (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 the July 19, 2016 Information Packet Memo (**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 consistently measure square footage in gaining compliance with the Green Points program.

Near-Term Residential Energy Code Updates

Planned amendments to the current residential building and energy code are as follows:

1) Eliminate the point structure in the Green Building and Green Points program, and prioritize and update key measures as mandatory (see Table 1).

2) Implement a sliding Energy Rating Index (ERI) scale based on floor area which will require residential buildings larger than 5,000 square feet (sf) to be NZE (see Figure 1).

3) Revise the ERI requirements for additions to impose more efficient requirements for larger homes and additions. ERI requirements for additions will only apply if the addition is 1,000 sf or larger – smaller additions will be required to meet the prescriptive requirements of the 2012 International Energy Conservation Code (IECC).

4) Revise alterations requirements as follows:

   a) Eliminate the Green Points program "point" options and the 500 sf threshold, to provide clarity and streamline the building permit process.

   b) Change the trigger for alteration requirements from measured floor area, to the percentage of the project cost[1] compared to the assessed or appraised value of the existing structure (see Table 2).

   c) Mandatory efficiency measures will be required for all alterations; these include, energy advising, energy audits and new construction regulations (see Table 2).

Table 1: Proposed Changes to the Point Structure of GBGP

Requirements	Current Requirements	Proposed Requirements
Energy Performance[1]	ERI/HERs	ERI/HERs
Waste Management[2]	Mandatory	Mandatory
Preservation of Natural Resources: Require shading from existing and new trees; organic, low water landscaping practices; and storm water management[3]	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 both 120-Volt and 240-Volt charging outlets in any dedicated off-street parking space for single family homes and townhomes. For multi-family units, require charging infrastructure (120 and 240 V outlets) for 7.5% of the parking spaces, and require Level 2 dual port charging stations for 2.5% of the spaces.[5]	NA	Mandatory (NEW)
Water Efficiency: High efficiency kitchen and bathroom fixtures	Optional point	Covered in IRC[4]

[1] Project cost will be either the customer's construction cost or the city's project cost evaluation, whichever is higher.

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[6]
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	

[1] *Updated for both new construction (Figure 1) and additions.*

[2] *These requirements may be revised to increase the diversion rates (based on the current recycling markets).*

[3] *A landscaping plan is required for new construction must be submittal with the permit. A landscape rehabilitation plan will be required for additions and alterations.*

[4] *Staff will increase the current requirements in the International Residential Code (IRC) to match the current national EPA's WaterSense Standards*

[5] *This requirement is only triggered when there are at least 25 parking spaces.*

[6] *An updated HERS rating software will be released in the 2017, which will incorporate these sustainability attributes. The design manual will remain a requirement.*

Figure 1: Proposed Changes to Efficiency Requirements for New Homes

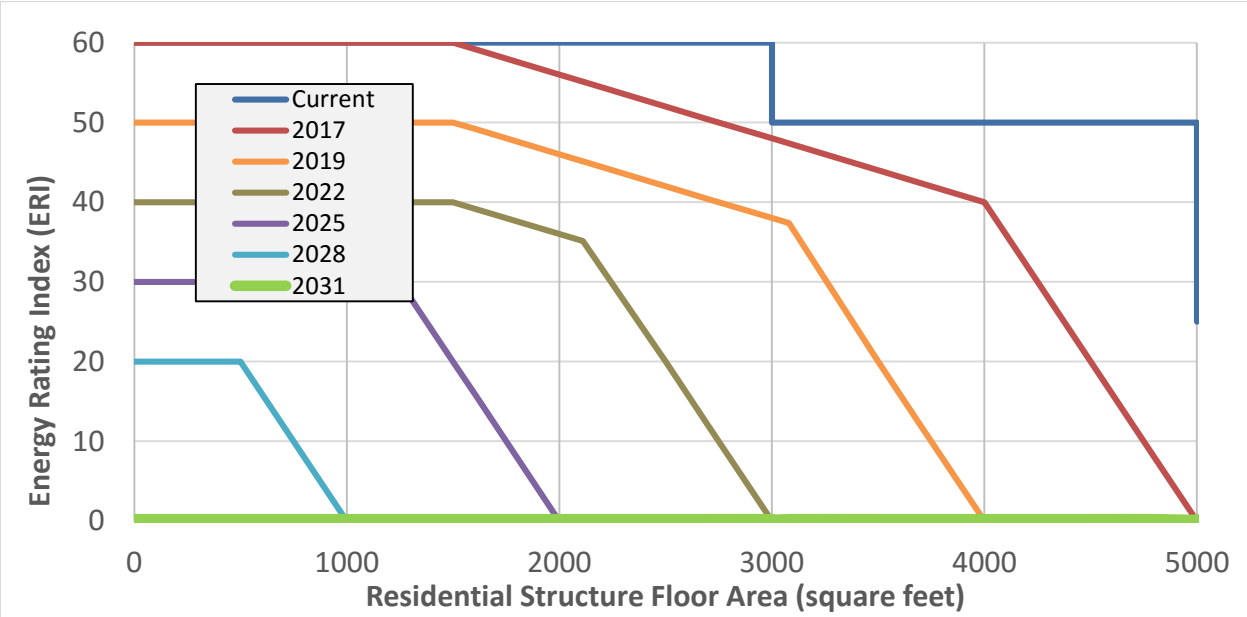


Table 2: Alterations Requirements

<table>
<tr><th>Thresholds for requirements</th><th>Project cost is ≤20% of assessed value of existing property</th><th>Project cost is 21-50% of assessed value of existing property</th><th>Project cost is ≥51% of assessed value of existing property</th></tr>
<tr><td rowspan="4">Measures</td><td colspan="3">All energy and building code requirements (for the scope of the alteration)</td></tr>
<tr><td rowspan="3">EnergySmart Advising[1]</td><td>EnergySmart Audit[2] and Advising</td><td rowspan="3">Triggers new construction requirements</td></tr>
<tr><td>Air sealing and insulation in ceiling and walls[3]</td></tr>
<tr><td>Crawl space conditioning[3]</td></tr>
<tr><td colspan="4">[1] Homeowner must contact EnergySmart and discuss the construction project with an energy advisor to ensure efficiency opportunities are maximized.
[2] Homeowner must enroll in EnergySmart and receive an energy audit that includes a blower door test that measures infiltration of the existing building.
[3] When applicable</td></tr>
</table>

Near-Term Commercial Energy Code Updates

Revisions to the prescriptive path of Boulder's commercial energy code are being proposed with the primary goal of improving usability and compliance while maintaining or increasing energy efficiency. While the performance pathway for new construction and major alterations must have an energy performance which is 30 percent better than IECC 2012, the prescriptive path is limited by market availability and construction and cost feasibility per individual requirement.

The changes are described below, along with rationale for the changes.

Table 3: Proposed Changes to Commercial Energy Code

Proposed Change	Rationale
When the Performance (Modeling) Approach is Required or Allowed: For new buildings, additions, and major alterations (more than 50 percent of the exterior wall area is being demolished) with a project cost greater than or equal to $500,000[2], compliance using the modeling based performance approach will be required. Compliance using the prescriptive approach for these projects will no longer be allowed. Alterations which are not considered "major alterations" are required to comply using the prescriptive approach.	Performance approach compliance is designed for new construction and major alterations that must achieve the city's energy requirement of 30 percent better than IECC 2012. This requirement is so efficient that it requires the whole building tradeoffs allowed via the performance pathway. For smaller scope alterations, the prescriptive pathway is much better suited.
Revision of Prescriptive Requirements: The custom prescriptive pathway is being replaced with amendments to the IECC 2012 prescriptive path. These amendments will increase the stringency of IECC 2012 requirements up to what is allowed by federal regulations, or what is being proposed for the 2018 version of the International Green Conservation Code (IgCC). These changes address insulation levels, fenestration performance, lighting power, and equipment efficiency.	Current prescriptive requirements in the commercial energy code are extremely stringent, without the tradeoffs allowed through the modeling-based performance path. Overwhelming stakeholder feedback indicates that the requirements are confusing and extremely difficult, if not impossible, to achieve. These new prescriptive requirements will replace a complicated set of custom requirements. Simplification of prescriptive requirements that are based on nationally developed standards will improve compliance and simplify enforcement.
Operable Window/Door Shut Off: New mandatory requirement for operable windows and doors to have switches which will control heating and cooling equipment to shut off when doors or windows are left open.	This change prevents wasted operation of heating and cooling equipment when doors or windows remain opened. These requirements are based on requirements already present in other energy codes.

[2] 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.

Proposed Change	Rationale
Removal of the Building Area Method: For determining prescriptive interior lighting power, the Space by Space Method is now the only allowed approach.	The Space by Space Method is based on the details of the proposed design. The Building Area Method is an approximation based on "typical" space allocations for a building type.
Appliance Requirements: New mandatory requirement that appliances installed in multifamily buildings be EnergyStar rated.	Requiring EnergyStar appliances in new residential occupancies will ensure that this end use is addressed even when multi-family buildings are covered under the commercial energy code.
Solar "Ready" Requirements: Mandatory requirement that buildings identify roof locations for installation of future solar systems, and keep these areas clear of obstructions. Locations for conduit and other electrical equipment that would be required for the solar system must also be identified. This equipment need not be installed.	Identification and reservation of space for future solar systems will greatly facilitate future installation of solar systems where solar systems are not currently required or where larger systems may be required in the future.
Requirements for Electric Vehicle (EV) Charging Infrastructure: The following will be required for offices, industrial buildings, and multi-family buildings[3]: • 7.5% of parking spaces must have (1) 240-V and (1) 120-V charging outlet • 2.5% of parking spaces must have a Level 2, dual port charging station installed Lodging facilities will be required to install charging stations (Level 2, dual port) for 1% of parking spots (a minimum of 1).	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.

[3] There must be at least 25 parking spaces to trigger these requirements.

Other Miscellaneous Energy Code Updates

Table 4: Summary of Other Miscellaneous Energy Code Updates Impacting Both Residential and Commercial Buildings

Topic	Description of Update
Multi-family Units	1) Townhomes and duplexes will be covered under residential energy code. If there are any shared commercial spaces, they must comply with the prescriptive requirements for the commercial energy code. 2) All other multi-family buildings are covered under the commercial energy code, regardless of the number of stories.
Water Fixture Use Rates	The water fixture use requirements covered under the International Plumbing Code (IPC) and the International Residential Code (IRC) will be amended to be as efficient as current national WaterSense standards put out by the Environmental Protection Agency (EPA).
Allow Off-Site Renewables	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 some residential and commercial buildings to achieve NZE. Off-site renewable options will only be allowed if all on-site renewable options have been exhausted. Community solar gardens, but not Renewable Energy Credits (RECS), will be allowed to meet required overall energy performance for new buildings and major alterations.

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, 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

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

ATTACHMENT A: 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 the July 19, 2016 Information Packet Memo for more information).
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 the July 19, 2016 Information Packet Memo for more information).

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 2: Long-Term Strategy Key Component Timeline

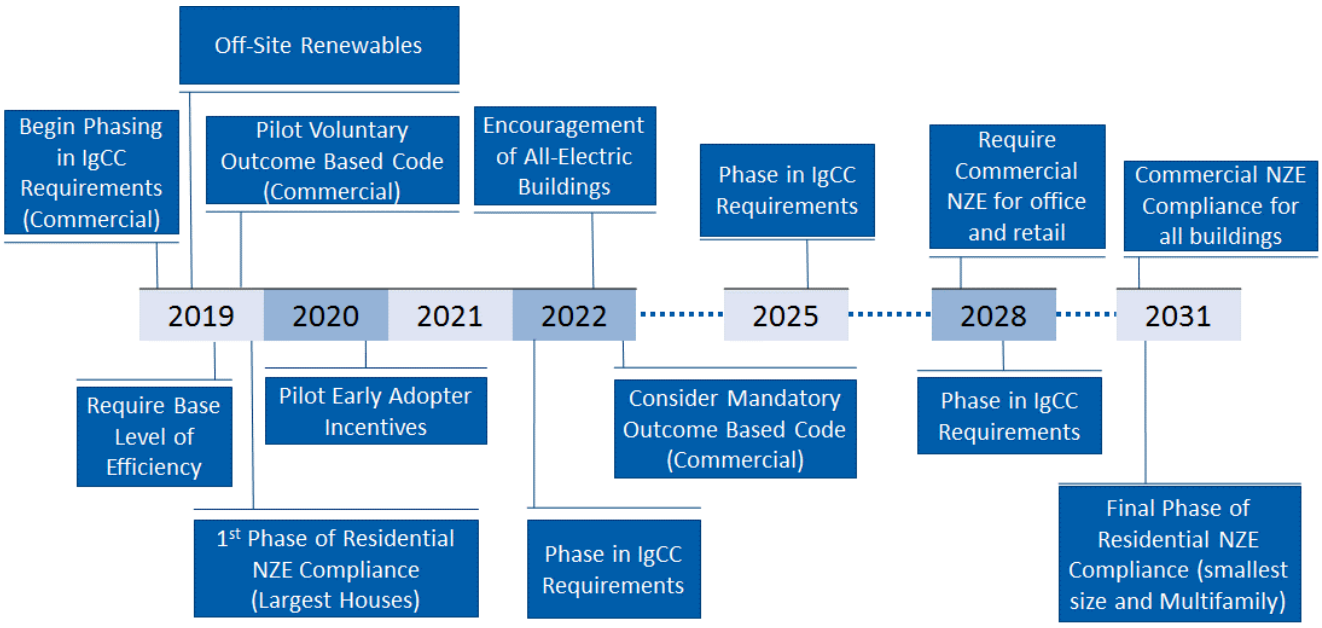


Table 5: Long-Term Strategy Key Components (Post 2016/2017 Updates)

Key Component of Long-Term Strategy	Description	Scope	Phasing
Off-Site Renewables	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, but not Renewable Energy Credits (RECS), will be allowed to meet required overall zEPI scores for new buildings and major renovations.	Commercial and Residential	2017
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
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)
Schedule for NZE Compliance	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

Key Component of Long-Term Strategy	Description	Scope	Phasing
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

ATTACHMENT B: 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 6: 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[4], 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[5] will be merged with the ASHRAE Standard 189.1-2017, reducing confusion and pulling the best aspects from both codes.

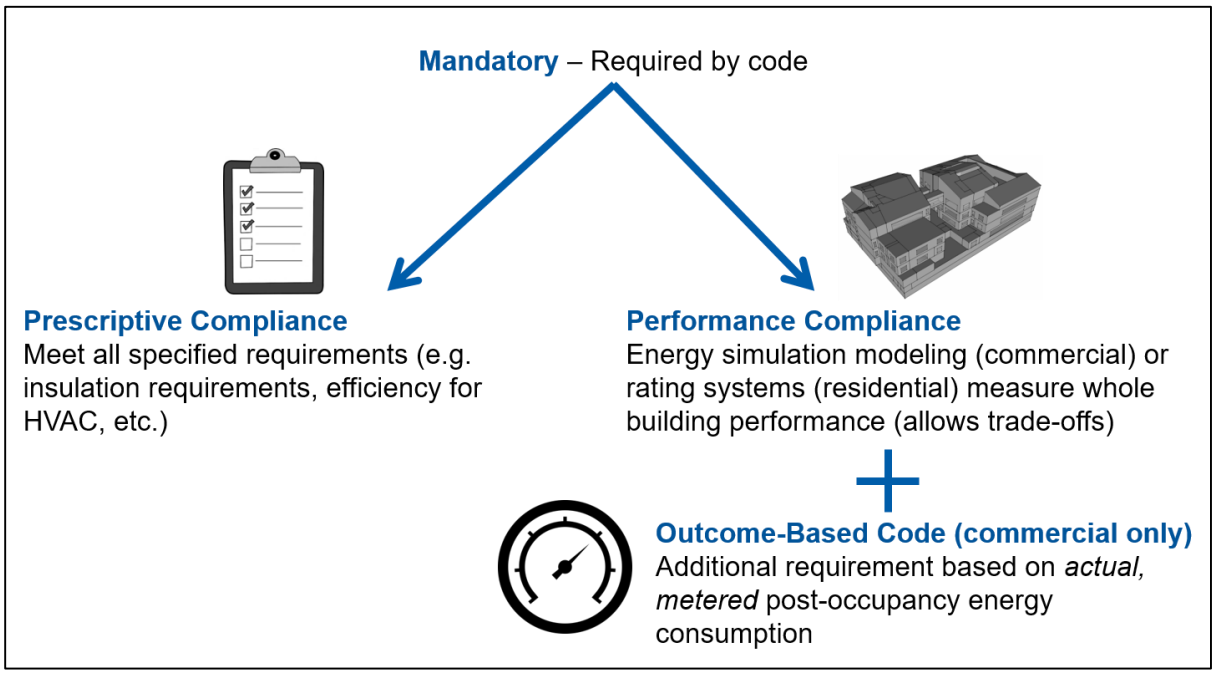
[4] IECC 2015 compared to IECC 2012: 8.7% more stringent for commercial buildings and 0.73% more stringent for residential buildings (according to Department of Energy)
[5] Planned for release in late 2017

While the IgCC is now available to provide green code language for commercial buildings, there is still no suitable national model code[6] 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 below). More recently, an additional option of outcome-based energy codes has emerged. Mandatory requirements must be met regardless of which path is chosen.

Figure 3: 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

[6] 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.

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.

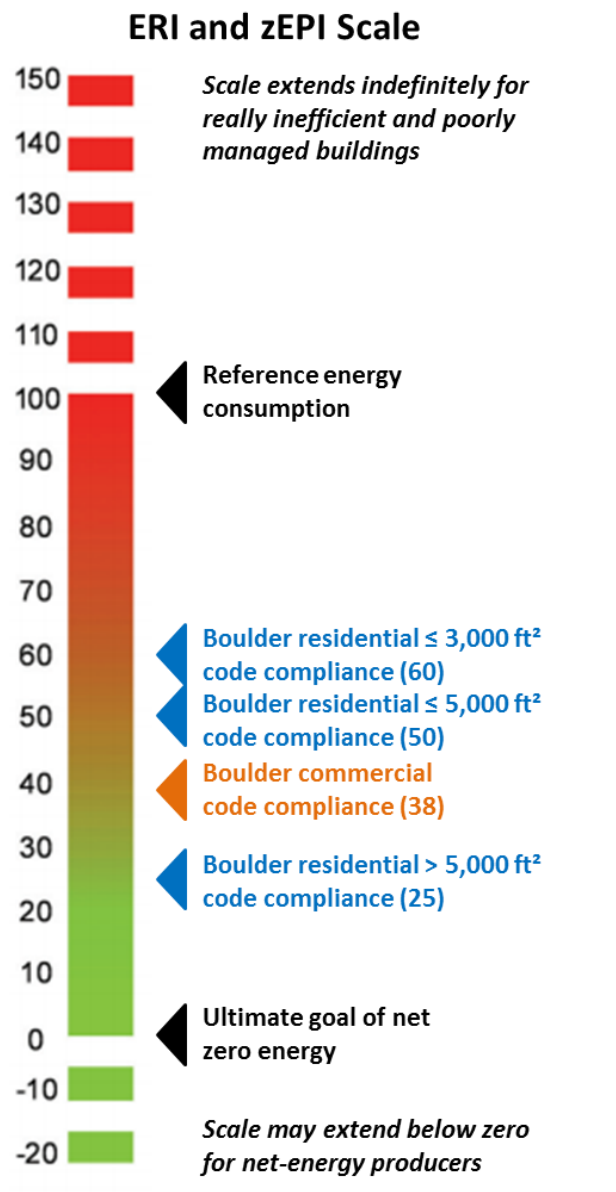
Table 7: Metrics and Energy Rating Scales

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)[7]: 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[8] data. The current Boulder energy code is equivalent to a zEPI score of 38.



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

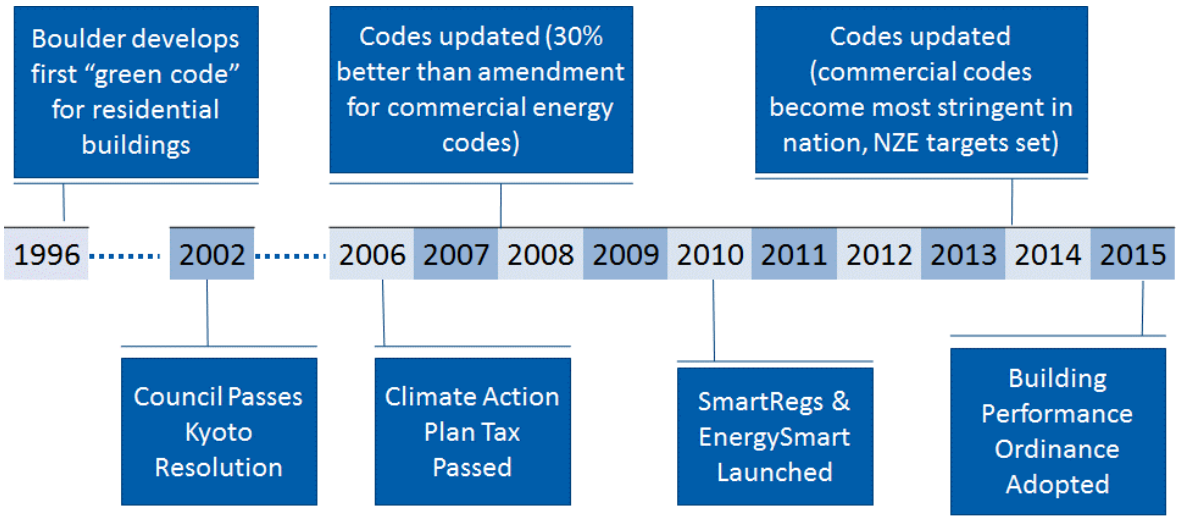
[7] Because ERI is the metric used in national energy codes, the city will use this term in place of HERS.
[8] Commercial Building Energy Consumption Survey – The Energy Information Administration (EIA) conducts a survey of existing building energy use by building type and climate zone to form this dataset.

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.

Table 8: 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 in the July 19, 2016 Information Packet Memo for a more complete history of the city's residential and commercial energy codes, including a comparison of their stringency to other energy codes.

2016 Environmental Advisory Board Staff Calendar

January 6 Meeting

Public Hearings	Staff

Discussion Items	Staff
Energy Future Update: Municipalization	Jonathan Koehn
Climate Commitment Community Engagement Process	Brett KenCairn

Materials due by **noon on Wed, Dec 30**, emailed to EAB by 4 pm.
PPTs for meeting due to Sandy Briggs **by 4 pm Wed, Jan 6.**

February 3 – Retreat

March 9 Meeting

Public Hearings	Staff

Discussion Items/Matters for the Board	Staff
Sustainability Dashboard Memo	
Black Bear Protection Ordinance Update Memo	
Discussion of April's Open House Outline & Expectations of Board Members as Hosts	

Materials due by **noon on Wed, March 2**, emailed to EAB by 4 pm.
PPTs for meeting due to Sandy Briggs **by 4 pm Wed, March 9.**

April 6 Meeting

Public Hearings	Staff
Sustainability Dashboard Memo	Elyse Hottel

Discussion Items/Matters for the Board	Staff
Black Bear Protection Ordinance Update	Valerie Matheson
Finalize Joint Board Open House Agenda and Facilitation Strategy	Board

Materials due by **noon on Wed, March 30**, emailed to EAB by 4 pm.
PPTs for meeting due to Sandy Briggs **by 4 pm Wed, April 6.**

April 27 – Joint Board Open House – Details TBD

May 4 Meeting

Public Hearings	Staff
Draft Resilient Strategic Plan	Casey Earp

Discussion Items/Matters for the Board	Staff/Board Member
Fourmile Canyon Creek CEAP Draft Document	All

Flood & Greenways Capital Improvement Program	All
Portland/Eugene Trip Report Back	Brad Queen
Joint Board Open House Debrief	All

Materials due by **noon on Wed, April 27**, emailed to EAB by 4 pm.
PPTs for meeting due to Sandy Briggs **by 4 pm Wed, May 4.**

June 1 Meeting

Public Hearings	**Staff**

Discussion Items/Updates/Matters for the Board	**Staff**
BVCP Update	Lesli Ellis
UZWO Update/6400 Arapahoe Development Update	Kara Mertz
Continued Joint Board Open House Discussion	All

Materials due by **noon on Wed, May 25**, emailed to EAB by 4 pm.
PPTs for meeting due to Sandy Briggs **by 4 pm Wed, June 1.**

July 6 Meeting

Public Hearings	**Staff**

Discussion Items/Updates/Matters for the Board	**Staff**
Community Engagement Strategies	Amanda Nagl
Report Back on Planning Board Collaboration	Brad Queen & Christina Gosnell
Determine When/How to Establish Regular Annual Joint Board Meeting and Other Next Steps	All
Boulder's Soundscape Problems	All

Materials due by **noon on Wed, June 29**, emailed to EAB by 4 pm.
PPTs for meeting due to Sandy Briggs **by 4 pm Wed, July 6.**

August 3 Meeting

Public Hearings	**Staff**

Discussion Items/Updates/Matters for the Board	**Staff**
City Council B & C Subcommittee Member Visit	Jan Burton
"Planning Board 101"	Leonard May
Report Back on Planning Board Attendance	Brad Queen & Christina Gosnell
Continue Joint Board Meeting Logistics Planning	All

Materials due by **noon on Wed, July 27**, emailed to EAB by 4 pm.
PPTs for meeting due to Sandy Briggs **by 4 pm Wed, Aug 3.**

September 7 Meeting	
Public Hearings	**Staff**
Energy Codes	Kendra Tupper

Discussion Items/Updates/Matters for the Board	**Staff**
Climate Action Campaign	Brett KenCairn
Debrief BVCP Joint Meeting	Board

Materials due by **noon on Wed, Aug 31**, emailed to EAB by 4 pm.
PPTs for meeting due to Sandy Briggs **by 4 pm Wed, Sept 7.**

October 5 Meeting	
Public Hearings	**Staff**

Discussion Items/Updates/Matters for the Board	**Staff**
UZWO – Feedback Mechanisms	Kara Mertz - tentative
6400 Arapahoe Development – Formulate Analysis	Kara Mertz - tentative
PB Site Review Criteria and Annual Letter to Council	Board
Incentivizing Developers	Board
Joint Board Meeting Proposal	Board

Materials due by **noon on Wed, Sept 28**, emailed to EAB by 4 pm.
PPTs for meeting due to Sandy Briggs **by 4 pm Wed, Oct 5.**

November 2 Meeting	
Public Hearings	**Staff**

Discussion Items/Updates/Matters for the Board	**Staff**

Materials due by **noon on Wed, Oct 26**, emailed to EAB by 4 pm.
PPTs for meeting due to Sandy Briggs **by 4 pm Wed, Nov 2.**

December 7 Meeting	
Public Hearings	**Staff**

Discussion Items/Updates/Matters for the Board	**Staff**

Materials due by **noon on Wed, Nov 30**, emailed to EAB by 4 pm.
PPTs for meeting due to Sandy Briggs **by 4 pm Wed, Dec 7.**