

**FULL COMMISSION SPECIAL MEETING
OF THE
LAKWOOD ADVISORY COMMISSION**

**May 20, 2020
@ 5:30 p.m.
VIRTUAL MEETING**

Lakewood Advisory Commission meetings are public virtual meetings where members are encouraged to participate. In order to ensure productive meetings, Lakewood Advisory Commission members, as well as visiting guests, are respectfully asked to avoid grandstanding or repeating a point that has already been made, challenge ideas – not people, and to stay on task and topic.

AGENDA

1. CALL TO ORDER – Chair Laurence Leiber
2. ROLL CALL – Secretary Peggy Ralph
3. CORRESPONDENCE – Peggy Ralph
4. PUBLIC COMMENT – Laurence Leiber
5. NEW BUSINESS: - Laurence Leiber
 - [Assignment 2018-05: Renewable Energy Mitigation Program Proposal](#) – Casey Hensley
 - COVID-19 Update and Moving Forward – Laurence Leiber
 - Full Commission Brainstorm Planning – Laurence Leiber
6. ADJOURN

Agenda Attachments:

- 2018-05: Renewable Energy Mitigation Program Proposal

LAC Assignments waiting to be completed

- 2018-02: Municipal Broadband
- 2018-05: Renewal Energy Mitigation Program
- 2019-01: Community Gardens 2.0
- 2019-02: Safe Driving Campaign
- 2019-03: Kids Visiting Seniors
- 2019-04: Vehicle Anti-Idling

Lakewood Advisory Commission

Renewable Energy Mitigation Program

Sustainability Committee

March 9, 2020

ASSIGNMENT: *Research renewable energy mitigation programs throughout the state and make recommendations to City Council regarding the viability of a program for Lakewood. In addition, if such a program is deemed viable, recommend best practices and program inclusions.*

BACKGROUND – WHERE LAKEWOOD STANDS NOW

In June 2018, an independent group of citizens known as the Lakewood Clean Energy Team (Team) presented to the Council a detailed description of programs adopted by communities around the state, known as Renewable Energy Mitigation Programs (REMPs). The term “REMP” broadly applies to a variety of programs designed to promote energy conservation, renewable energy development, and overall sustainability of buildings in a community. After the June 2018 presentation by the Team, the Lakewood City Council (Council) directed the LAC to perform the above-stated research and recommendation project.

The LAC assignment was specific to the REMP program. However, a number of related developments have occurred since the June 2018 assignment. Most importantly, in June of 2019 the Council approved an initial, pilot-level proposal, known as the Enhanced Development Menu (EDM), to enhance sustainability of future developments of a certain size (over 20,000 sq. ft.) in Lakewood. This menu requires a City building permit applicant to achieve a certain number of sustainability “points” before a building permit can be granted. This same point system is a key feature of many REMP programs. Therefore, the development of the EDM became an important component of the LAC’s research and recommendations.

In addition, since this assignment was issued, the Council has now identified sustainability as the City’s second highest priority. The City’s comprehensive Sustainability Plan (Plan) is designed to advance this goal. Promoting the efficient use of water and energy for both our existing stock of buildings and those yet to be constructed is a key aspect of the Plan. The Lakewood Sustainability Department has been working closely with numerous stakeholders to advance Plan goals for our buildings.

Further, there have been important changes to the Building Code (discussed below) since the LAC began its research. The recent passage of the growth ordinance also has ramifications for the proper design of a REMP program. In short, there has been a great deal of change on the development front in Lakewood since June 2018. The LAC has been working with the Lakewood Sustainability and Building Departments and many other involved parties to ensure that the REMP proposal incorporates the City’s existing sustainability efforts, while investigating options from other community programs.

SUMMARY OF RESEARCH AND KEY FINDINGS

As directed, the LAC performed a detailed survey of REMPs throughout Colorado, as well as selected national models. We also studied current building trends. Below are our findings:

1) *Current Building Data in Lakewood*

Before considering how best to apply these programs to Lakewood, we gathered basic information on Lakewood development trends. Table 1 includes the number of building permits issued by the City Engineer’s office for each year from 2010 to 2018. The number of building projects undertaken in Lakewood, measured by building permits issued, was considered for each year from 2010 to 2018 for new residential. single-family homes, duplexes, small multi-family (3-4 unit) buildings, and multi-family (5+ units) buildings. The table also includes permits issued for commercial buildings and residential remodels.

TABLE 1¹

Number of Permits	2010	2011	2012	2013	2014	2015	2016	2017	2018
Single-Family Homes	118	109	162	226	204	242	191	236	202
Duplexes (2 units)	2	2	18	10	0	1	1	1	3
Small Multi-family (3-4 units)	0	0	3	0	0	15	0	0	0
Large Multi-family (5+ units)	1	1	2	6	19	2	17	5	17
Commercial Building	44	37	36	51	52	36	60	29	37
Residential Remodel	750	717	740	732	743	749	796	945	926

Several trends emerge from this data. The most obvious is the increase in the number of high occupancy buildings (5+ units) in recent years. Secondly, the number of remodels of existing residential single-family homes far exceeds new construction.

These trends are expected to continue but may be impacted by the recent passage of Question 200 on July 2, 2019. The Council is fully aware of the details of the measure and subsequent deliberations, which are not covered here, but the basic thrust is to limit the growth of housing stock to 1% per year. Any building project with 40 or more units will require Council approval. Based on data published by the American Community Survey² there are between 65,000 and 67,000 units in Lakewood. This suggests a significant reduction in growth to less than 675

¹ Heine, Anne - City Engineer, City of Lakewood; “RE: Census Data;” Message to Josh Stamps. 9 Aug 2019. E-Mail.

² US Census Bureau; “American FactFinder;” “Generated by Josh Stamps;” Using American FactFinder; <<https://factfinder.census.gov>>; 26 October 2019

units per year. It is unclear whether this will affect all home types equally, or primarily reduce the number of high occupancy buildings. Either way, growth will be severely curtailed, suggesting that the trend towards more remodels will only increase in upcoming years.

2) *Status of the Sustainability Plan, the Enhanced Development Menu, and Building Code Changes*

As noted, this REMP study has proceeded over the last two years in parallel with the Lakewood Sustainability Plan (the Plan), the adoption of the EDM for new construction, and advancements in our building code.

The Plan, first adopted in 2015, contains an array of goals and benchmarks relating to energy efficiency, building upgrades and inventory, and promoting renewable energy. For instance, the Plan includes a specific goal and Chapter devoted to resource efficient and green buildings (Goals BE 2 and BE3, pages 42-52). These and other Plan initiatives identify a number of strategies that overlap with the potential elements of a robust REMP program.

Another important element of the Plan involves “benchmarking” existing energy usage in commercial and other buildings. The City’s Sustainability Office has been working on creating baseline information on typical energy use for facilities for comparison with other buildings in that sector. This will be an important element of the phase-in of the REMP program. The Sustainability Office is also beginning to research how benchmarking ordinances are being enacted, designed, and implemented in communities including Denver and Fort Collins. The evolution of benchmarking programs also helped shape our recommendations for phase-in of the REMP process.

In 2019, City Council adopted an Enhanced Development Menu (EDM) developed by the Lakewood Sustainability Office, as part of the building permit process for construction of new developments over 20,000 sq. feet. The Menu established a point system for energy and water efficiency and will serve as a valuable tool for promoting sustainability of new developments. Because EDM offers developers a menu of sustainability options, EDM will provide a testing ground for new ideas, building designs, integration of technologies, methods of incentivizing efficiency and renewable energy, and will provide critical information regarding the economic impacts of such a program.

Our research also included changes in Lakewood building codes and construction best practices. In 2018 the City adopted updates to its overall building code including the 2015 International Energy Efficiency Code (IECC) update, along with some additional amendments that support various sustainability goals - including electric vehicle and solar readiness, construction and demolition waste diversion requirements, and prohibitions on single-pass cooling systems.

The decision to adopt the 2015 version of the IECC code - instead of the 2018 version that had just become available at the time - was based on the fact that the City was still operating at the time under the 2009 code. It would have been a huge leap to accelerate efficiency levels to meet the 2018 IECC standards, both for staff (training/enforcement) and for builders (increased costs, design and materials changes).

The Lakewood Building Department has indicated that going forward the City will adopt new codes on a three-year cycle; in 2020 the City will begin the process of reviewing the 2018 codes. The Lakewood Board of Adjustments (BOA) provides citizen oversight/vetting for new Code language and any additions/exceptions. There are also usually a series of stakeholder meetings for advocates, builders, the sustainability community and other interested

parties. Once this process is complete, the BOA will make a recommendation to Council for approval of specific Code changes, which will trigger additional public input.

Finally, beyond those evolving Lakewood programs, we briefly surveyed emerging best practices and construction standards that are setting the bar in Lakewood for new construction and remodels. While a full survey of these practices was beyond the scope of this assignment, we did reach out to various construction groups, and found that other builders and entities are already implementing portions of the 2018 version of the IECC. For instance, Metro West Housing utilizes extensive principles of sustainability that consider both environmental and economic aspects. Passive solar homes are an example of such a best practice.

Utilizing increased R-Value standards in structural and foundation applications is another best practice utilized in some Lakewood developments. A home's "envelope" is responsible for the primary energy savings. (An "envelope" is an interlocking, structural system of insulated panels as building materials that create an R- value of 42.) A tighter "envelope" minimizes air exchange and improves efficiency. This measure is increasingly being used as a standard for new construction and some remodels.

3) *Review of Other Community Models*

Our principal work was to research other REMP-like programs in communities throughout Colorado. REMP programs implemented in various communities throughout Colorado are summarized and compared in the REMP Comparison Matrix (Exhibit 1). Communities researched include:

- Eagle County, Colorado
- Summit County, Colorado
- Pitkin County, Colorado
- Fort Collins, Colorado
- Boulder, Colorado
- Denver, Colorado
- Jackson Hole, Wyoming
- California
- Golden, Colorado

Our research focused on what other communities are doing to enhance energy efficiency of new buildings and retrofits of existing buildings. These programs include approaches used by the City of Boulder, the City of Denver's Green Building Ordinance, and the City of Golden Residential Sustainability Standards, as well as California's Solar Rule. Beyond the information captured in the Matrix, further background on many of these approaches is contained in Exhibit 2.

To assist the Council and other involved parties in comparing the elements of various approaches to energy efficiency, the Matrix identifies key provisions of each program, including the type of *building* to which each program applies (*i.e.*, Residential, Commercial, and/or Industrial) as well as the type of *construction* (New Construction, Additions, Renovations), and the regulatory trigger for compliance (for example, based on the size of the new building/addition, or on the construction valuation of the building/addition). The Matrix also identifies which programs are menu-based, *i.e.*, the building owner can choose from a menu of energy efficiency options, or compliance-based: *i.e.*, the builder must comply with specific requirements.

The Matrix also specifies whether a program provides for the payment of a fee in lieu of compliance, and includes detailed fee information for applicable programs, including the fee amount, the fee trigger, (for

example, payment in lieu of providing green space), the fee’s funding source, the uses for fee revenues (open space, purchase of community solar) and the fee administrator (*i.e.*, the City, the State). Where available, the Matrix provides cost savings data related to adoption of energy efficiency options.

In general, the Matrix and the summaries describe various alternatives for increasing energy efficiency, including (1) a menu approach like that adopted by Golden and Lakewood’s current EDM rule; (2) a mix of mandatory, performance-based, or prescriptive measures like that adopted by the City of Boulder Energy Conservation Code; or (3) requirements for “green roofs” found in the Denver Green Building Ordinance.

Our neighboring City of Golden was deemed the most relevant model for the City of Lakewood. Golden’s program, which is further described in Exhibit 3, offers separate sustainability standards and menus of options to increase energy efficiency and water conservation for residential and for multi-family commercial structures. It also applies to “significant remodels” (defined as “the addition of new habitable space that is equal to or greater than 25% of the existing habitable space”). Standards are most stringent for multi-family/commercial structures; applicants are required to provide a solar energy system, but there is an opt-out provision to allow a developer to pay a fee to the City in lieu of installing solar.

However, it is crucial to note that the consensus of the LAC is that Lakewood should not adopt one single approach to building a viable REMP program. Rather than advocating for the adoption of one approach over another, the Matrix offers Council, and the recommended Task Force, an opportunity to consider a variety of options for next steps in improving the energy efficiency of Lakewood’s building stock, and to continue to work with the community, staff, and outside experts to craft the best program for Lakewood.

RECOMMENDATIONS

Recommendation 1: Adopt a REMP Program That Includes New Construction and Remodels

We have carefully considered various REMP programs in light of Lakewood’s unique circumstances, including:

- (1) Existing rates for new residential, industrial and commercial construction;
- (2) The impact of the recent ballot initiative that will further limit growth;
- (3) The water and energy efficiency of Lakewood’s existing building stock, as compared to that of new buildings; and
- (4) The proportion of Lakewood building permits issued for remodels and renovations as compared to new construction.

Our research led us to some firm conclusions. First, we believe that a point-based REMP program similar to that adopted in other Colorado communities would complement and enhance the current Lakewood initiatives underway in this area. However, for the program to be “viable” in Lakewood, as the assignment reflects, it needs to be all-inclusive – covering not only new residential construction, but the industrial and commercial sectors as well. Moreover, the program cannot be truly impactful without including “significant” remodels (*i.e.* using the Golden definition, which we recommend, remodels involving the addition of new habitable space that is equal to or greater than 25% of the existing habitable space).

In addition, we strongly recommend that those who choose not to implement sufficient efficiency improvements to meet the point scoring system be offered an option to pay into an energy-efficiency fund.

This fund would be used to retrofit existing buildings, with a high priority placed on low income and affordable housing complexes. Our goal is to take advantage of the public's desire to make a difference in our community by upgrading water and energy efficiency for new construction. As discussed below, we recommend that and independently funded, city-run agency administer this program and generally focus on tackling the inefficiency of, and the need to retrofit and upgrade, our existing buildings.

The LAC is mindful of the importance of providing adequate staff resources and the overall economic ramifications of implementing a REMP program. Because REMP programs are relatively new, and costs vary across jurisdictions, we were unable to find detailed economic information on the impact of REMP programs, but there are a variety of options available to implement energy efficiency initiatives that provide communities with overall cost-savings and other benefits. Moreover, the definition of "cost" is rapidly changing as community values shift to incorporate climate change, sustainability, and livable neighborhoods. To account for these new considerations, , we recommend that the Task Force (explained below) develop a framework for cost-analysis that accounts for environmental impacts and cost-savings to consumers resulting from increased energy efficiency as well as upfront developer costs in measuring the economic benefits of adopting the final REMP plan.

Recommendation 2: Establish a Task Force to Refine the Details of the new REMP Program, Building from the Existing EDM Point Scoring System

The LAC studied other programs in Colorado to assess how best to improve Lakewood's existing EDM point system. We also carefully considered other communities' approaches to allow parties who can't meet the point requirements to contribute to a fund for retrofitting buildings. We took into close consideration efforts to create a specific set of criteria for higher water and energy efficiency standards in our City already underway through the EDM pilot project.

We recommend taking advantage of the current trajectory on all these related fronts by establishing a Task Force, appointed by the Council, to help refine the current scoring system passed under the EDM program for Council approval and apply it all new construction and remodels. The Task Force would consist of representatives from the following entities, at minimum:

- (1) Lakewood Office of Sustainability
- (2) Lakewood Building Department
- (3) At least two representatives from private construction companies or builders from the commercial and residential sector
- (4) A representative of the Team which first introduced this REMP program to the Council in May 2018
- (5) At least three local residents with an interest and background in this area

Once Council appoints the Task Force members, we suggest that the group meet at least monthly to review the current EDM scoring system (and research presented here) and to establish a fair, cost-effective fee payment option. The Task Force would review each EDM criterion and apply them to all future construction, as well as to all qualifying remodels. Specifically, the Task Force would be charged with refining the criteria that are currently contained in the EDM and reporting to the Council within six months on:

- (1) Items that might be added or deleted to the current EDM menu; and

(2) The relative point values that should be assigned to residential and commercial new construction, and significant remodels.

The Task Force would also consider elements of all existing programs captured in the Matrix and this research project. However, we recommend that the key elements of the City of Golden's system be given particular emphasis. Golden's program is best adapted to Lakewood, most in line with the current EDM criteria, and applies equally to both residential and commercial remodeling programs.

The Task Force would first propose improvements to the EDM scoring system, then present them to Council for approval. Next, the Task Force would turn to the process of determining what options would be presented to those permit applicants who do not meet the scoring criteria to pay into the new LORE fund. We have two specific recommendations regarding the manner in which the City would require such building owners to contribute to the LORE fund:

(1) Such contribution should be directly proportionate to either the size or the cost of the new development, or a combination of both. This is most aligned with Lakewood's current EDM system (based on lot size), as well as the other City models that we reviewed. Larger developments better able to assimilate the cost of failing the point system would contribute more to the LORE fund.

(2) The system must not create disproportionate upfront costs that are not recoverable over time in energy and water efficiency savings and other economic gain - but the costs of externalities such as carbon emissions should be integrated into this economic equation.

Recommendation 3: Establish the Lakewood Office of Resource Efficiency (LORE) to Administer the REMP Program

Pitkin County and other model programs were first described to the Council in June, 2018 when this assignment was issued. Like these templates, we recommend that Lakewood utilize the services of a new, separate entity to administer REMP programs. The Plan currently anticipates the establishment of a separate entity, identified as the "Sustainable Energy and Water Resource Center", to support residents and businesses on energy and water conservation, and renewable energy procurement (See Plan, page 39). This Center has not yet been established, and we propose that this new agency be called the LORE to reflect its broader mission, while designed to fulfill all Plan goals as well.

The funding plan for LORE is based on a similar program developed and implemented in Pitkin County, Colorado. A flow chart for its operation is presented in Exhibit 4, which is an excerpt from the original presentation to the Council in June 2018. The current program in Pitkin County has been in operation since 2000 and has collected an estimated \$8.2 million, which has been redistributed to the community through grants and rebates for energy efficiency and renewable energy projects. Continuing oversight is provided by the city and county. The LORE mission will be similar: to improve energy efficiency and renewable energy programs within the city of Lakewood.

LORE's initial mission would be to provide an administrative and financial framework to accomplish the program goals of the REMP program. Clear, community-based administrative goals, coupled with the financial resources to maintain and sustain the program, will best serve Lakewood and provide an example to neighboring communities.

Specifically, LORE’s first task would be to set up guidelines for the use, allocation, and granting of funds for specific categories of projects. These would include at a minimum, set allocations to low income or other affordable housing stock, and development of working protocols to ensure that allocated funds are used to provide the best water and energy upgrades for that particular facility. We believe that this is the opportune time to use this program as the starting point for not only REMP, but a number of related programs that the City may not be currently equipped to pursue, including those addressed in Recommendation 4 below.

Reducing our city’s carbon footprint not only benefits the environment, but would reduce energy costs for Lakewood citizens. For example, the Pitkin County program has estimated a realized energy savings of almost \$3 million with an avoided 20,000 metric tons of CO2. Like Pitkin County, Lakewood wants to advance values surrounding clean air, stable climate, strong economy, healthy communities and sustainable energy. Establishing a new LORE is a key step not only to successful REMP implementation, but to achieving an array of Plan goals.

Recommendation 4: Set Milestones and Benchmarks for a longer-term public engagement program administered by LORE.

Our research showed that communities which have successfully adopted sustainability programs did so in response to a simple set of milestones established to meet ambitious goals related to energy efficiency and/or improved resource utilization. Public engagement has been a key common denominator for these success stories.

It is the recommendation of LAC that Lakewood employ LORE to convert Plan goals relating to improving existing buildings to tangible milestones, to be achieved by specified dates. LORE would ensure that realistic goals are set and achieved so the City can gauge the long-term effectiveness of Lakewood’s sustainability efforts

Current efforts to establish baseline markers for different building sectors, known as benchmarking, should be emphasized in this process, and a specific staff official within the Office of Sustainability should spearhead this process, while the recommendations above are being implemented and LORE is established.

Once the scoring system addressed by the Task Force is created, the program should aim to establish a baseline score for the residential, commercial, and industrial buildings in the city. The program should seek to incentivize community stakeholders to improve their benchmark scores through a grant system, fee/credit system, or other funding options.

EXHIBITS

- 1- REMP COMPARISION MATRIX**
- 2- SUMMARY OF OTHER REMP PROGRAMS**
- 3- SUMMARY OF GOLDEN REMP PROGRAM**
- 4- MODEL STRUCTURE FOR LAKEWOOD OFFICE FOR RESOURCE EFFICIENCY -
ADMINISTRATION AGENCY**

EXHIBIT 2 SUMMARY OF OTHER REMP PROGRAMS

FORT COLLINS

In December 2018, the Fort Collins City Council adopted ordinance number 144¹, authorizing the Building Energy and Water Scoring (BEWS) Program². The purpose of this program is to establish a framework by which energy and water usage of all public, commercial, and multi-family buildings is quantified, updated, and made transparent to the public. Once fully implemented, the BEWS Program will result in a database of energy and water usage that includes up-to-date energy efficiency and water usage ratings for every public, commercial, and multi-family building in the city that is at least 5,000 square feet in size.

The establishment of this data collection framework is an essential step in being able to evaluate the city's progress in meeting energy efficiency, water usage efficiency, and renewable energy usage goals adopted by the city in recent years. The 2015 Climate Action Plan (CAP), for example, aims to reduce greenhouse gas emissions by 20% of 2005 levels by 2020, reduce further to 80% of 2005 levels by 2030, and to become carbon neutral by 2050. Similarly, the 2015 Water Efficiency Plan aspires to reduce water usage to 130 gallons per capita per day by 2030. Additionally, in 2018, the city adopted a resolution (2018-094) to set a goal of achieving 100% renewable energy usage by 2030.

The ordinance mandates that building owners submit annual reports to the city that include an ENERGY STAR score rating, Energy Use Intensity (energy per square foot per year), and Water Use Intensity (gallons per square foot per year) for their building(s). This effectively standardizes how the buildings measure their energy and water usage efficiency. Once a year, the city manager is required to present a report to City Council evaluating the program's output and outcomes.

Compliance with the new ordinance is phased in over a four-year span based on building type and size. Large public/government buildings of at least 20,000 square feet must comply by 2020 while medium sized (> 10,000 square feet) have until 2021, and small (>5,000 sq. ft) have until 2022. Multi-family buildings (at least three stories above grade) have similar compliance phases of 2021, 2022, and 2023 for large (>20,000 sq ft), medium (>10,000 sq ft), and small (5,000 sq. ft) buildings, respectively. Violations can result in a fee of \$1,000 per violation.

According to Katharine McClintock of City Energy Project³, Fort Collins is one of 27 'benchmarking communities' and is one of three from Colorado, including Boulder and Denver. Fort Collins is the fifth smallest participating community based on covered floor space (47 million square feet). Only Berkley (CA), Reno (NV), Boulder (CO), and Evanston (IL) cover less square footage.

¹ Reference City Ordinance 144

² Reference www.buidlingrating.com/jurisdiction/fortcollins

³ Reference blog from Katherine McClintock, January 2019, NRDA

The 2015 City of Boulder Building Performance Ordinance, 2016 Boulder Climate Commitment Goals, and 2017 City of Boulder Energy Conservation Code

I. 2015 Boulder Building Performance Ordinance⁴

In 2015 Boulder adopted the Boulder Building Performance Ordinance: energy efficiency requirements that apply to owners or tenants of commercial and industrial buildings.⁵ Each affected commercial and industrial building owner/tenant must rate a building's whole-building energy use based upon City-approved tools, and report this energy use to the city annually.⁶ The reporting requirements were phased in over time based on building size. The reported data will be released to the public, and the City uses the data to create a Building Performance Rating Map which shows the compliance status of affected buildings.⁷ Exemptions are available for buildings that have minimal energy use because the building is unlit and has no heating or cooling systems, or based upon proof of financial hardship.

The Building Performance Ordinance also requires each affected commercial and industrial building owner to implement efficiency actions over a phased timeline. These actions are:

1. Perform Energy Assessments Every 10 Years;
2. Implement One-time Lighting Upgrades;
3. Perform Retro-commissioning (RCx) Every 10 Years;⁸
4. Implement Cost Effective RCx Measures.

Energy Assessments and retro-commissioning must be performed by qualified service providers approved by the City. Exemptions are available from the energy assessment, required lighting upgrades, and retro-commissioning requirements based on Energy Star or LEED certification, or if the building owner demonstrates to the City Manager "a pattern of significant and consistent improvements in the building's energy efficiency or greenhouse gas emissions." Note that the required lighting and retro-commissioning requirements can also be waived based on cost-effectiveness. Finally, buildings on a large industrial campus are subject to separate rating/reporting requirements.

⁴ See Boulder Municipal Code Title 10 Chapter 7.7: Commercial and Industrial Energy Efficiency, https://library.municode.com/co/boulder/codes/municipal_code?nodeId=TIT10ST_CH7.7COINENEF_10-7.7-6DI&showChanges=true

⁵ Note that while the Boulder Building Performance Ordinance applies to commercial and industrial buildings, the City of Boulder Energy Conservation Code (COBECC) applies to residential and commercial buildings; in COBECC, commercial buildings are defined as: "All buildings not included in the definition of "Residential buildings."

⁶ <https://bouldercolorado.gov/sustainability/boulder-building-performance-home>

⁷ <https://bouldercolorado.gov/sustainability/boulder-building-performance-efficiency-requirements>
https://buildingperformancemap.bouldercolorado.gov/?type=website&utm_source=website&utm_medium=website&utm_campaign=map&_ga=2.268997425.1915233001.1569858012-1073518710.1568836718

⁸ Retro-commissioning is a process to improve the efficiency of an existing building's equipment and systems. It can often resolve problems that occurred during design or construction, or address problems that have developed throughout the building's life as equipment has aged, or as building usage has changed. Retro-commissioning involves a systemic evaluation of opportunities to improve energy-using systems. If the same process were applied to a car, mechanics would adjust the settings, controls, components and design of the engine based on how the owner actually drives. See <https://buildingefficiencyinitiative.org/articles/retro-commissioning-significant-savings-minimal-cost>

II. 2016 City of Boulder Energy Climate Commitment Goals⁹

In 2016, Boulder City Council adopted the following climate commitment goals:

- 80 percent reduction of the community's greenhouse gas emissions below 2005 levels by 2050,
- 100 percent renewable electricity by 2030, and
- 80 percent reduction in organizational greenhouse gas emissions below 2008 levels by 2030
- Net zero energy (NZE) construction through building and energy codes by 2031.

III. The 2017 City of Boulder Energy Conservation Code¹⁰

To make progress toward its climate commitment goals, in 2017 Boulder adopted an Energy Conservation Code (COBECC) to provide minimum energy efficiency and conservation standards for new commercial and residential buildings, and additions and alterations to existing residential and commercial buildings. The 2017 COBECC is based on the 2012 edition of the International Energy Conservation Code (IECC) and includes local amendments that are more stringent than the IECC.

In 2020, Boulder proposes to adopt the 2018 IECC and to update the 2017 COBECC to the 2020 COBECC.^{11, 12} A significant change to COBECC is that in 2018, Boulder's City Council adopted a city-approved and managed "Energy Offset Fund" that provides: "a payment option in lieu of complying with city program renewable energy and/or offset requirements"¹³ for both commercial and residential buildings. Although the fund provision was adopted in 2018, there is no provision in the 2017 COBECC for such a fund. Because the 2020 COBECC has yet to be adopted, detailed information regarding the 2017 Commercial and Residential codes is addressed below.

⁹ https://www-static.bouldercolorado.gov/docs/City_of_Boulder_Climate_Commitment_5.9.2017-1-201705091634.pdf?_ga=2.200699566.1202501283.1570035257-1073518710.1568836718

¹⁰ https://www-static.bouldercolorado.gov/docs/2017_City_of_Boulder_Energy_Conservation_Code_2nd-1-201711151002.pdf?_ga=2.59970542.279129798.1569441243-1073518710.1568836718

¹¹ https://www-static.bouldercolorado.gov/docs/2020_City_of_Boulder_Energy_Conservation_Code_FM2-1-201909111327.pdf?_ga=2.49047462.1202501283.1570035257-1073518710.1568836718

¹² The Draft 2020 COBECC significantly increases the stringency of Boulder's energy efficiency requirements. Proposed changes to the commercial code include the creation of an "energy impact offset fund," "new support for electric vehicles (EVs), required testing of a building's envelope, detailed provisions for solar-ready zones, and more stringent requirements for lighting and for building alterations. 2020 changes to the residential provisions

include an energy impact offset fund, support for EVs, mandatory use of a renewable energy offset for snow/ice milting systems, more stringent requirements for lighting and for building alterations, and solar-ready provisions for detached one-and two-family dwellings and townhouses.

¹³ Energy Impact Offset Fund: A city-approved and city-managed offset fund providing a payment option in lieu of complying with city program renewable energy and/or offset requirements. The fund was approved by City Council on March 7, 2018.

The 2017 COBECC has separate sets of provisions for commercial¹⁴ and residential¹⁵ buildings. The two sets of provisions have a similar structure: Neither has a menu of options or a point system, and requirements are a mix of performance-based¹⁶, prescriptive¹⁷ and mandatory provisions. Both the commercial and residential provisions impose design standards to promote energy efficiency in a building's envelope¹⁸, heating and cooling system, and service water heating system (hot water for purposes other than comfort heating). In addition, while the 2017 COBECC did not offer a fee in lieu of compliance; for residential buildings only, there is an option to apply for a subscription to a community solar garden in lieu of meeting the Energy Rating Index standard.¹⁹

2017 Commercial Energy Efficiency Code (CCEC)

Boulder's CCEC regulates the design and construction of new buildings and additions²⁰, alterations²¹, or repairs²² to existing buildings, but the code doesn't apply to the portion(s) of an existing building that were not added, altered, or repaired. The degree of regulation is based on the construction valuation of the building: New buildings and additions valued at \$500,000 or more must comply with a performance-based standard based on energy costs. New buildings and additions valued at less than \$500,000 must comply with detailed prescriptive (*i.e.*, each building component is built to a specific standard) requirements for the energy efficiency of the building envelope, including efficiency of a building's insulation, windows, air vents and exhaust pipes. There are also detailed prescriptive requirements for the building's mechanical systems (for heating, cooling and ventilation), service water heating, and electrical power and lighting systems. In addition, there are mandatory requirements that new commercial buildings be solar-ready: a certain portion of the roof must be unshaded and free of obstructions to allow the installation of solar panels at a future date. Finally, prior to granting of the final building permit, the building owner must verify and document that the building's mechanical systems and electrical power and lighting systems comply with minimum code requirements.

A change in occupancy or use that increases energy use can also trigger Code requirements. The CCEC applies to historic buildings, but the City Manager can approve waivers. And there is a partial exemption for "low energy"²³ buildings. Receipt of the building permit is conditioned upon a final inspection by the City Manager.

¹⁴ Commercial Building: All buildings not included in the definition of "Residential buildings."

¹⁵ Residential Building: Includes detached one-and two-family dwelling units, attached multiple single-family dwelling units with separate means of egress from each dwelling unit and no common area in the building, and...residential buildings three stories or less in height, and accessory structures to such residential buildings.

¹⁶ A **performance code** requires that **the building performs to a certain standard**, *e.g.* uses less energy than the same building built to prescriptive code. <https://ekotrope.com/prescriptive-vs-performance-building-energy-codes/>

¹⁷ A **prescriptive code** requires **that each component** is built to a certain standard, e.g. Wall R-value at least 20. <https://ekotrope.com/prescriptive-vs-performance-building-energy-codes/>

¹⁸ Walls, floor, roof and other enclosed space that is either heated or cooled.

¹⁹ The Energy Rating Index (ERI) is an alternative way to meet IECC standards – buildings are rated on a 100-point scale: 0 represents net zero energy use, while 100 represents the approximate energy efficiency of a home built using IECC requirements from 2006. Each point higher is 1% less efficient and each point lower is 1% more efficient. The ERI is designed to be more stringent than prescriptive or performance-based requirements.

²⁰ An addition or increase in the heated or cooled *floor area* or *height* of a building.

²¹ An alteration is any construction, renovation or change in a mechanical system that requires a permit.

²² A repair is the reconstruction or renewal to any part of an existing building.

2017 Residential Energy Efficiency Code (RCEC)

Like the CCEC, the RCEC regulates the design and construction of new buildings and additions²⁴, alterations²⁵, or repairs²⁶ to existing buildings, and the code doesn't apply to the portion(s) of an existing building that were not added, altered, or repaired. However, while the regulatory trigger for the CCEC is the construction valuation of the building/addition, for the RCEC, there is a mandatory requirement to use an alternative IECC performance-based standard (the Energy Rating Index, or ERI) based on the new building/addition's floor area. As the floor area increases, the energy efficiency requirement becomes more stringent; for new residential buildings over 5000 sq. ft, the building must achieve "net zero" energy efficiency: "the building is so air-tight, well insulated, and energy efficient that it produces as much renewable energy as it consumes over the course of a year, leaving the occupants with a **net zero** energy bill, and a carbon-free **home**."²⁷

Additions are also required to meet ERI requirements based on the percentage increase in the addition's finished floor area, with increasing floor area triggering more stringent requirements, but the requirements for additions are less strict than for new houses.

Where a new residential building/addition cannot meet the required ERI (*i.e.*, meeting the ERI is "practically infeasible,") the RCEC allows the City Manager to approve the purchase of a community solar garden subscription. The subscription must have a contract term of at least 20 years and provide for an ERI equivalent to that required under the RCEC.

Alterations and repairs are also subject to the RCEC, but the energy efficiency requirements for alterations and repairs are based upon the construction valuation of the alternation/repair; the higher the construction value, the more stringent the requirement.

Like the CCEC, the RCEC specifies energy efficiency requirements for a building's thermal envelope, and for heating and cooling systems including mandatory use of a programmable thermostat, an energy efficient hot water system, heating systems for outdoor spas and pools, insulation of ducts and pipes, and high-efficiency lighting.

Finally, like the CCEC, a change in occupancy or use that increases energy use can also trigger RCEC requirements. The RCEC applies to historic buildings, but the City Manager can approve waivers, and there is a partial exemption for "low energy" buildings. Receipt of the building permit is conditioned upon a final inspection by the City Manager.

²³ Low energy buildings are those with a peak design rate of energy usage less than 3.4 Btu/h · ft² (10.7 W/m²) or 1.0 watt/ft² (10.7 W/m²) of floor area for space conditioning purposes. 2. Those that do not contain conditioned space.

²⁴ An addition or increase in the heated or cooled *floor area* or *height* of a building.

²⁵ An alteration is any construction, renovation or change in a mechanical system that requires a permit.

²⁶ A repair is the reconstruction or renewal to any part of an existing building.

²⁷ <https://zeroenergyproject.org/buy/zero-energy-homes/>

City of Denver Green Building Ordinance

Background

In 2017, Denver voters passed Initiated Ordinance 300 (IO300), which imposed green roof requirements on *new* buildings of 25,000 sq. ft. or more of gross floor area (GFA), and green roof/solar combination requirements for roof replacements on *existing* buildings of the same size. In 2018, Denver City Council amended IO300 and adopted the Denver Green Building Ordinance (DGBO).²⁸ DGBO applies to all (residential, industrial, and commercial) buildings of 25,000 square feet or more. There are separate requirements for: (1) new buildings and larger additions of 50,000 sq. ft and up, and (2) existing buildings (but requirements apply only if the owner is recovering or replacing the roof) and smaller additions of between 25,000 and 49,000 sq. ft.²⁹

Although there are exemptions and partial exemptions, in general, owners of new buildings, owners seeking additions of over 25,000 sq. ft., and those seeking roof permits for existing buildings must provide a cool roof³⁰ in addition to selecting one compliance option from one of two applicable menus. On both menus, there's an option to pay a fee in lieu of providing "green space."³¹

Requirements Applicable to New Buildings (25,000 sq. ft +) and (Larger) Additions of 50,000 sq. ft. +

For new buildings and larger additions, owners must install a "cool roof" and either choose one of five menu options or adopt a "combination approach," but there are complicated exemptions for each option. For example, neither a cool roof nor items from the menu are required for single family homes and duplexes constructed under the provisions of the International Residential Code, three or more attached dwelling units not more than three stories high, temporary structures, parking structures, air-supported structures, and greenhouses.³² And a cool roof isn't required for portions of the roof space already occupied by PV systems or components, solar, air or water heating systems, vegetated roofs, or where there are above-roof decks or walkways or HVAC systems, or for shaded roofs or for roofs/roofing materials meeting specific conditions.

The New Building/Large Additions six menu options are very detailed, and include:

- (1) Requirements to install green space or green roofs covering an area consisting of either: 10%

- (2) of the building or addition's GFA; 60% of the total roof area; or all the available roof area.
- (3) In lieu of providing green space, building owners may pay into a Green Building Fund; the fee is \$50 per sq. ft. for green space required, but not provided. The fee must be used for green space acquisition, improvement and infrastructure, urban forest protection and

²⁸ <https://www.denvergov.org/content/denverov/en/denver-development-services/commercial-projects/green-roof-initiative.html>

²⁹ For a helpful summary of the DGBO requirements, see:

<https://www.denvergov.org/content/dam/denvergov/Portals/696/documents/Green-buildings-handout.pdf>

³⁰ "Cool roof" means a roof, or portion of a roof, containing roof covering materials meeting certain solar reflectance values that mitigate or assist in reducing urban heat island effect.

³¹ "Green space" means any area that is proposed to contain trees, groundcover, shrubs, urban agriculture, natural grass/turf, or vegetated roofs.

³²

expansion, green roof creation, or for solar and energy efficiency projects in low-income and affordable housing areas.

- (4) On-site solar panels or other renewable energy devices that provide similar generation capacity that either cover 70% of the total roof area or generate 100% of the building/addition's annual energy use;
- (5) The purchase of off-site renewable energy from Xcel Energy, or from a community solar project that provides 100% of the building/additions' energy use, or energy savings or 6% above code requirements;
- (6) Energy conservation savings of at least 12% above building code requirements;
- (7) Green Building Certification (LEED Gold, Enterprise Green Communities, etc.).

Combination Approach:

As an alternative to choosing a "cool roof" and one of the six options above, owners can adopt a "combination approach," which requires a cool roof and various combinations of green space, on-site solar panels or other renewable energy devices, and/or the purchase of off-site renewable energy, either in a solar community project or through the purchase of a share in a voluntary renewable energy project owned by Xcel Energy, or an estimated energy cost savings of at least 5% above building codes. Like Under the combination approach, in lieu of providing green space, an owner may pay to the Green Building Fund \$50.00 per foot of green space required but not provided.

Requirements Applicable to Roof Permits for Existing Buildings of 25,000 Sq. Ft.+ and (Smaller) Additions of 25,000 – 49,000 sq. ft.

In general, applicants for *roof permits* for existing buildings larger than 25,000 sq. ft, and for smaller additions of 25,000 – 49,000 sq. ft. must install a cool roof and choose one of the six options detailed below.³³ However, there is no "Combination Approach" for these structures, and there are separate requirements for total or partial roof replacements.

The six menu options for Existing Buildings/Smaller Additions are:

- (1) Install green space or green roofs:
 - (a) For total roof *replacement* and *smaller additions*, green space/green roof must cover:

(b) 2% of the building or additions' GFA, or
18% of the roof area, or
All available roof area.

(c) For *replacing roof sections*, the greenspace/green roof area must cover a percentage
of the roof area based on a formula, or cover
18% of the roof sections(s) or
All available area on the roof sections.

³³There are exemptions, "the following project types only need to do a cool roof and are exempt from choosing a compliance option above: residential buildings 5 stories or less or under 62.5 feet in height; roof recovers only; emergency roof replacements; hail-damaged roofs with insufficient insurance coverage to meet this ordinance (exemption only valid through November 2, 2019); and buildings that have already met the ordinance as a new building or campus." <https://www.denvergov.org/content/dam/denvergov/Portals/696/documents/Green-buildings-handout.pdf>

- (2) Payment to the Green Building Fund of \$50 per sq. ft. in lieu of providing "green space required, but not provided."
- (3) On-site solar panels or other renewable energy devices that provide similar generation capacity; for Total Roof Replacement/Additions, the solar panels/renewable energy devices must cover:
 - (a) 5% of the building or additions' GFA
or 42% of the total roof area, or
Generate 100% of the buildings' average annual electricity.
 - (b) For replacing roof sections(s) the panels/devices must
be A percentage of the building area or
42% of the roof sections(s) or
Generate 100% of the buildings' average annual electricity.
- (4) Energy conservation savings – *additions only*: Energy conservation cost savings of at least 4% above building code requirements.
- (5) Green Building Certification (LEED, Enterprise Green Communities, etc.) at lower levels than New Building/Large Additions. *i.e.*, a rating of Silver, vs. Gold.
- (6) For *Roof Replacements only*, there's an option to purchase off-site solar, and to enroll in Denver's Energy Program, which requires compliance within 5 years.

CALIFORNIA SOLAR RULE

As of 2020, all new home builds in California will require solar panel installations beginning in 2020. They must be sized to offset 100% of the home's electricity usage. It applies to both single family homes and multi-family homes under three stories (large high-rise apartments are exempt). The size of the solar panel arrays may be reduced if other energy efficiency improvements are made, such as energy battery storage and the use of green building materials³⁴. Homes that are mostly exposed to shade are exempt.

The California Energy Commission estimates the solar panels will add about \$9,500 to the cost of a new home while saving homeowners \$19,000 over 30 years. This equates to an increase of \$40 a month to the cost of a mortgage and offsets \$80 a month in utility bill savings.

The provision was initially endorsed by the California Energy Commission in May of 2018. It was approved and added to the state building code by the Building Standards Commission by December of the same year. The initiative is part of California's objective of producing 50% of the state's energy with clean energy sources by 2030 and 100% by 2045. There is additional value in that it results in a distributed power grid, which is inherently more resilient to natural disasters and to establish the sort of infrastructure that would result in individuals transitioning to electric vehicles.

Add references

<https://www.npr.org/2018/12/06/674075032/california-gives-final-ok-to-requiring-solar-panels-on-new-houses>

³⁴ Pyper, Julia 2018, "Everything You Need to Know About California's Solar Roof Mandate," Greentech Media, Accessed 28 October 2019, <<https://www.greentechmedia.com/articles/read/everything-you-need-to-know-about-californias-new-solar-roof-mandate>>

EXHIBIT 3

SUMMARY OF GOLDEN REMP PROGRAM

City of Golden Residential Sustainability Standards – UPDATED a/o/ 10/7/19

In 2012, Golden adopted two major sustainability provisions into their Municipal Code: “Residential Sustainability Standards” which apply to one-and two-household dwellings, and more stringent “Sustainability Standards” which apply to multi-family (more than three-household dwellings) and commercial buildings.

Golden Residential Sustainability Standards: [Golden Municipal Code § 18.24.010-020]

Residential housing consists of new construction and significant additions¹ of one and two-household dwellings. No building permit for new construction can be issued unless applicants achieve a minimum of 25 points from the “Residential Sustainability Menu”; applicants for significant additions must achieve a minimum of 15 Menu points. **There is no option for applicants to pay a fee in lieu of meeting the Residential Sustainability Menu requirements.**

Golden Residential Sustainability Menu: [Golden Municipal Code § 18.24.040]

This menu assigns points in four categories: Indoor and Outdoor Water Conservation, Energy Conservation, [Construction] Materials and Resources, and Innovation. Applicants must achieve at least one point from three out of the four menu categories.

Water conservation options include xeric landscaping, high-efficiency irrigation, low-flow toilets, and trees and reflective roof materials to reduce the heat island effect.

Energy Conservation options including achieving Energy Star certification for new homes; under this option, the remaining ten points must come from the non-energy categories. Other energy options include energy efficient heating, cooling, and hot water systems, enhanced insulation, efficient windows, and a renewable energy system.

Materials and Resource options include use of energy efficient framing, use of recycled materials, and reduced construction waste.

Innovation points may be awarded for sustainable design and use of passive solar.

Golden Sustainability Standards: [Golden Municipal Code § 18.40.340]

Golden’s Sustainability Standards mandate stringent standards for multi-family (more than three household units) and commercial buildings, with one exception, regardless of size². Sustainability Standard mandates include programmable thermostats and separate electric meters for each unit, electric charging stations for 15% of on-site parking spaces, and recycling receptacles adjacent to trash receptables. In addition, an applicant must demonstrate that the project exceeds the minimum IECC energy efficiency standards³ by 4%.

¹ A “significant addition” is the addition of new habitable space that is equal to or greater than 25% of the existing habitable space.

² An applicant must provide separate meters for commercial tenant spaces of 10,000 feet or more using natural gas.

³ Golden adopted the 2018 International Energy Conservation Code (IECC); starting July 9, 2019, all building plans will be reviewed in accordance with the 2018 International Building Code.

Most stringently, Golden mandates on-site photovoltaic (PV) energy generation that offsets 10% of a new structure’s modeled annual energy use, but **that requirement can be waived in lieu of a cash payment to the City of “an amount equal to the fair market value” of an equivalent PV system; the fee is used for the purchase and maintenance of solar or other renewable energy facilities.**

Golden Sustainability Menu: [Golden Municipal Code § 18.40.350]

In addition to complying with Golden’s Sustainability Standards, applicants for multi-family/commercial construction permits must either achieve 25 points from at least three of the five categories in the Sustainability Standards menu or propose their own sustainable design elements for all or a portion of the 25 points needed. The five categories are: Water, Transportation, Energy Efficiency, Community Preservation/Revitalization, and Miscellaneous. Projects using excessive energy, such as large gas fire pits, heated pools, and snow melt systems must achieve additional sustainability points from the menu.

Menu requirements are waived for projects that achieve LEED Gold or Passive House Standards.

The Sustainability Menu’s *Water* category includes storm water reduction, green roof, additional open space, and indoor and outdoor water conservation measures.

Transportation menu options include additional bicycle parking, a transit-oriented location, electric plug-in stations, restricted car parking, and car-share parking spaces.

Energy efficiency options include exceeding the mandated IECC energy efficiency standards, energy efficiency monitoring, on-site renewable energy production beyond the mandated solar standard, tree cover to reduce the heat island effect, aligning the structure(s) to reduce energy use, efficiency windows and roofing, passive lighting, and balanced ventilation.

Community Preservation/Revitalization options preservation of existing structures while increasing their energy efficiency, providing affordable dwelling units, community gardens, and compost bins, and use of infill and brownfield sites.

Miscellaneous options include sustainable design features, including participation in a bike share system and use of recycled materials.

Summary:

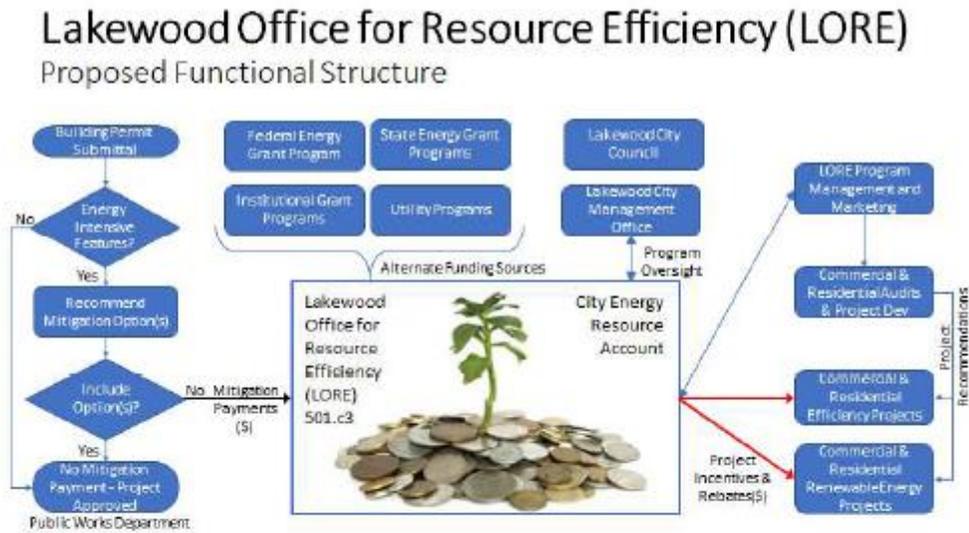
Golden offers separate sustainability standards and menus of options to increase energy efficiency and water conservation for residential and for multi-family commercial structures.

For multi-family/commercial structures the standards are more stringent, and applicants are

required to provide a PV energy system, but there is an opt-out provision to allow a developer to pay a fee to the City in lieu of installing a PV system.

EXHIBIT 4

MODEL STRUCTURE FOR LAKEWOOD OFFICE FOR RESOURCE EFFICIENCY - ADMINISTRATION AGENCY



A community energy program would directly benefit Lakewood’s local economy!

- Low income families spend 17% of their annual income on energy
- Every \$1 invested in an energy program results in a \$2.53 of non-energy community benefits (US DoE)
- Shifting \$1m in energy purchases away from a utility will support 17 jobs in the community verses the 10 jobs following BAU
- One dollar of avoided utility bill costs has 2.24 times the effect on domestic employment and wages compared to one dollar spent on utility bills

Source: American Council for an Energy-Efficient Economy (ACEEE)