Every building represents an opportunity to address climate change, enhance community, and improve health. Denver’s Green Buildings Ordinance (GBO) is designed to help building owners in Denver build healthier buildings with happier occupants. Energy efficiency and solar panels on buildings are good for the bottom line and affordability because they lower operating expenses, improve net operating income (NOI), and can help attract tenants. Cool roofs and green spaces reduce the urban heat island. Green spaces on and around buildings improve the human experience as well as water quality and storm water management.

Importantly, the GBO looks at buildings holistically. The ordinance was first enacted by Denver voters in 2017 as a way to achieve the environmental benefits of adding green roofs to Denver’s built environment. In 2018, a task force of individuals from academia, industry, government, and the public collaborated with the authors of the green roof ordinance to strengthen the law and increase its viability for sustainable development. The additions to the law focused on incorporating lower-cost and high-impact solutions for all buildings, with new options suitable for buildings that had been unable to support the weight of a green roof.

Today, the GBO reflects strategies to increase green space, improve water and storm water management, increase use of solar and other renewable energies, foster the design of far more energy-efficient buildings, and embrace national standards of green building, like LEED and Enterprise Green Communities Certifications. In its first full year of implementation, the GBO has proven to be an effective tool for city agencies to use when considering approvals for construction projects. The ordinance has already resulted in approximately 65 permitted projects, which are collectively using less energy, adding more green space, and contributing less to the urban heat island effect, among other environmental benefits, than they would have been without this crucial law.
The Green Buildings Ordinance (GBO) applies to new buildings 25,000 square feet or larger, roof permits for existing buildings 25,000 square feet or larger, and additions of 25,000 square feet or larger.

The ordinance does NOT apply to the following:

- Buildings less than 25,000 gross square feet
- Parking garages
- Temporary or air-supported structures
- Greenhouses
- Single-family homes, duplexes
- Multifamily residential buildings that are three stories or less
- Roof recovers where condensation is a concern and has been quantified in a dewpoint analysis

Partial exemptions from the ordinance’s requirements apply to qualifying buildings with character-defining features, an existing green roof or renewable energy system, that are multifamily residential (under 5 stories and 62.5 feet high) or that have specific technical feasibility concerns. These include:

**Partially Exempt: Cool roof required, Additional Green Building Option not required**

- Roof recovers
- Multifamily residential buildings (apartment and condo buildings) 25,000 square feet or larger that have 5 stories or fewer and are less than 62.5 feet in height
- Buildings requiring immediate roof repair due to a wind or fire emergency
- Buildings with an existing vegetated roof or renewable energy generation system meeting requirements of the GBO

**Partially Exempt: Cool roof not required, Additional Green Building Option required**

- Buildings with character-defining roof features
- Ballasted roofs
- Roof areas that are fully shaded or covered by rooftop equipment or structures

**No Exemptions: Cool roof required, Additional Green Building Option required**

- Multifamily residential buildings (apartment or condo buildings) 25,000 square feet or larger that have 6 stories or more
- All new commercial buildings that are 25,000 square feet or larger
- Additions of 25,000 square feet or larger
- Any existing building 25,000 square feet or larger that is replacing at least 5% of its roof or roof section

**Overview of Compliance Options**

Denver’s Green Buildings Ordinance (GBO) requires all buildings 25,000 square feet or larger to install a cool roof as well as choose an additional Green Building Compliance Option. The compliance options for new and existing buildings are shown in Figure 1.
New Buildings and Additions over 50,000 square feet

New buildings must install a cool roof and select one of nine additional compliance options (shown in Figure 2):

1. A green roof or green space anywhere on the site
2. Renewable energy generation on-site
3. Purchase of off-site renewable energy equivalent to what would be produced to meet on-site renewable energy requirements plus increased energy efficiency in the building design
4. Increased energy efficiency in building design
5. LEED Gold, National Green Building Standard (NGBS) Gold, Enterprise Green Communities, or approved LEED Gold-equivalent certification
6. A combination of green space and renewable energy generation on-site
7. A combination of green space, renewable energy generation off-site and energy efficiency
8. A combination of green space and increased energy efficiency in building design
9. A financial contribution for off-site green space

Existing Buildings and Additions between 25,000 – 50,000 square feet

Roof replacements on existing buildings must install a cool roof and select one of five additional compliance options (shown in Figure 3):

1. A green roof or green space anywhere on the site
2. Renewable energy generation on-site
3. LEED Silver, NGBS Silver, Enterprise Green Communities, or LEED Silver equivalent certification
4. Enrollment in the Energy Program to achieve emission reductions similar to those achieved by the on-site solar option. The program includes options to buy community solar or to improve the building’s energy efficiency in a way that makes the most sense for that building.
5. A financial contribution for off-site green space

Green Buildings Ordinance: Compliance Options for NEW BUILDINGS

Cool Roof Required* Plus ONE of the Following Options:

- Green Roof / Green Space
  - Pay for Offsite Green: Payment to GreenBuilding Fan of: $30.00 per square foot of green space coverage required but not provided
- Green Plus Solar or Energy Efficiency
  - Solar or Energy Efficiency
    - Pay for Offsite Green: Payment to GreenBuilding Fan of: $15.00 per square foot of green space coverage required but not provided

* If the proposed roof is a character-defining roof, alternate roof materials may be allowed

Green Buildings Ordinance: Compliance Options for EXISTING BUILDINGS

At Roof Replacement: Cool Roof Required* Plus ONE of the Following Options:

- Green Roof / Green Space
- Solar
  - Certification

* If the proposed roof is a character-defining roof, alternate roof materials may be allowed

Figure 2 – Green Buildings Ordinance Compliance Option Details for New Buildings

Figure 3 – Green Buildings Ordinance Compliance Option Details for Existing Buildings

ORDINANCE REQUIREMENTS
One key feature of the Green Buildings Ordinance is flexibility; however, that also results in a number of options for design teams, owners, and managers. To assist with this complexity, the flow charts in Figure 4 and Figure 5 summarize the requirements, options, and exemptions within the Green Buildings Ordinance.


Denver's Green Buildings Ordinance (GBO): Existing Buildings Flow Chart

Please verify any exemptions by calling or emailing prior to submittal.
What Counts as Green Space?

Green space is defined as any new area containing trees, groundcover, shrubs, urban agriculture, or natural grass/turf, or a vegetated roof area.

What is the Financial Contribution for Off-Site Green Space? (“Fee in lieu”)

Building owners may choose to pay a fee of $50 per square foot of green space coverage required by the ordinance, but not provided by the project. This amount was determined by a rate study that sought to account for the overall cost to the city for providing equivalent amounts of green space off site.

The rate study showed that the fee in lieu should be $50 to $90 per square foot for the city to have enough money to supply equivalent benefit.

The fee in lieu money goes into a Green Building Fund managed by Denver’s Department of Public Health and Environment (DDPHE) / Office of Climate Action, Sustainability and Resiliency (CASR). The fund must be spent on the following purposes, with priority given to low-income areas, high-impact projects and green spaces located near the buildings owned by those who paid into the fund:

- Green space acquisition and improvement (ecosystem protection and restoration, such as native plantings or native plantings as part of invasive species control)
- Water quality improvements and green infrastructure
- Urban forest protection and expansion
- Installation of green roofs in partnership with land owners/developers
- Rooftop solar or community solar adoption among low-income and affordable housing developments

Historic Buildings

There are several ways for historic buildings to meet the Green Buildings Ordinance without compromising their unique character. This includes purchasing renewable energy from the local investor-owned utility, Xcel Energy, instead of electricity generated from nonrenewable sources, and enrolling in the new Energy Program. Notably, historic buildings are as, if not more, energy efficient than many other existing buildings.
RESULTS

From November 2, 2018 through December 31, 2019, the City and County of Denver’s Community Planning and Development department issued permits for an estimated 65 construction projects subject to the Green Buildings Ordinance (GBO). Design teams working on 51 projects received permits between late May 2019 and the end of December 2019. An additional 10-15 projects received permits between November 2, 2018 and late May 2019, prior to when formal data collection started.

The types of projects meeting the requirements of the GBO have included new cool roofs on existing buildings, additions to existing buildings, and new construction. Project teams have pursued all of the allowed green building options except the purchase of off-site renewable energy. Installing renewable energy power sources onsite (e.g., solar panels) has been used, however. Figure 6 and Figure 7 provide a detailed breakdown of which green building options were selected by the 51 projects that were issued permits between late May 2019 and December 31, 2019. Figure 6 lists the options selected by new construction projects (“new buildings”) and Figure 7 lists the options selected by construction projects on existing buildings.

Another way to view the options is on a map. Figure 8 and Figure 9 show the compliance options selected for new and existing buildings on a map.

1 The revised and strengthened Green Buildings Ordinance became effective on November 2, 2018.
In 2019, projects with both low-slope and steep-slope roofs were able to successfully meet the ordinance’s cool roof requirements. Some included amenity decks with decorative, “cool” pavers that also successfully met cool roof requirements. One project was exempt from cool roof requirements due to a need to protect historic or character-defining roof features that would have been lost by installing a cool roof.

Thirty-four of the 51 projects listed in Figure 8 and Figure 9 were required to select a green building option in addition to installing a cool roof. Of these, the data show that roughly half of projects in new buildings and a majority of projects in existing buildings elected to pursue energy-efficiency strategies.

This underscores our community’s prioritization of energy efficiency, as well as attainability of higher levels of energy performance across new as well as existing buildings.
The GBO is a new ordinance requiring a significant level of change in building design and construction. City staff with both Community Planning and Development and the Office of Climate Action, Sustainability and Resiliency (the two departments tasked with implementing the GBO) have served as a resource to the public, helping educate customers about the ordinance’s requirements in addition to reviewing project plans for compliance with the new law.

On average, customers applying for permits for new buildings were able to complete the green building review within 2.11 review cycles. A review cycle entails a customer submitting plans and city staff returning comments on the plans to the customer. Each time a customer must resubmit their plans, it is counted as a new review cycle. Applications for cool roofs on existing buildings averaged 2.39 review cycles.

Some projects were approved in a single review cycle, which city staff expect to see occur more often as customers become familiar with the GBO requirements. Based on evaluating the customers who experienced the fewest concerns or complications related to design, cost, or schedule and who most efficiently achieved GBO approval, city staff were able to identify common factors contributing to easier, faster permitting:

- Consider all green building options early – optimally, starting during the concept design phase for new buildings as soon as a roof replacement project in an existing building is anticipated
- Engage the property owner in the discussion early to ensure the green building option selected reflects the priorities of all parties involved
- Read and review both the GBO and the associated Rules and Regulations, available at www.denvergov.org/GreenRoofs
- For new building projects, pay careful attention to guidance offered in the city’s Site Development Plan review process preceding building permitting to support smooth foundation and superstructure permit review
- Communicate carefully within the project team to ensure all involved understand and have addressed the facets affecting their work
- Communicate actively with city staff to seek clarification when needed regarding GBO requirements, including what information to submit for plan review or the Energy Program
- Actively engage with an open mind to become familiar with the GBO, empowering the project team to successfully navigate requirements on behalf of property owners

Green Buildings Ordinance Technical Advisory Committee

In 2019, Mayor Michael B. Hancock appointed a 13-member Green Buildings Ordinance Technical Advisory Committee. This committee conducts monthly meetings that are open to the public. The committee consists of local industry experts who offer their time to support the city in providing interpretation of and clarification to the GBO. This work includes recommending updates to the GBO and associated Rules and Regulations, policies, and guides to ensure smooth and consistent implementation across projects in line with the intent of the ordinance.

In 2019, the Technical Advisory Committee focused most on evaluating proposed alternative certification programs for compliance as well as technical questions and opportunities for interpretation provided by the language of the ordinance. Between meetings, members pursued independent research to support informed discussions and decisions. During some meetings, the committee welcomed input from members of the public who requested to enter the conversation to offer analyses and opinions. The collaboration and support from this committee has proven extremely valuable as questions arise from project teams.
The Energy Program is a unique compliance path within the Green Buildings Ordinance for existing buildings that includes flexible energy efficiency and renewable energy options. The options in the Energy Program include maintaining an ENERGY STAR score above 85, improving the energy use intensity (EUI) by 10% (for buildings 25,000 to 49,999 square feet) or by 15% (for buildings over 50,000 square feet), adding on-site or off-site solar, or maintaining a third-party Green Building Certification. The Energy Program options are shown in Figure 10.

Many properties enroll in the Energy Program at the time of roof replacement, although building owners and managers can opt to enroll in the program earlier. The Energy Program allows property owners up to five years from June 1 of their enrollment year to demonstrate they have met the program’s requirements. Enrollment applies to a building for 20 years or through one roof replacement, whichever is longer.

Customers enrolling in the Energy Program can choose a "baseline year" from the previous five years in order to obtain credit for recent energy-efficiency improvements. As an example, if a customer enrolled a building in the Energy Program in 2019 and wanted to take advantage of the "EUI improvement" option, the customer could effectively receive credit for all energy-efficient upgrades for the building dating back to 2014 and would have until 2024 to reach the target EUI for the building. Data for the baseline year is submitted to the city via ENERGY STAR Portfolio Manager.

Customers report their Energy Program data by June 1 each year by submitting an annual Energize Denver benchmarking report for the building via ENERGY STAR Portfolio Manager. When building owners or managers provide their benchmarking report to the city, it simultaneously reports the annual energy data needed for the Energy Program.

If a building falls out of compliance with the Energy Program, as shown by an annual report, the building owner has two years to remedy the issue and must come back into compliance by June 1 of the second year. There are a variety of solutions available, such as making operational or system improvements, selecting a different Energy Program compliance pathway, or through additional third-party verification on specific projects within the building. Figure 11 shows an example compliance timeline for the Energy Program.

### Energy Program: Compliance Options for Existing Buildings

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENERGY STAR Score</td>
<td>Score of 85 or higher, maintained annually, ENERpulse Benchmarking Map for recent data at energizedenver.org</td>
</tr>
<tr>
<td>Annual weather normalized site EUI</td>
<td>Buildings 25,000 - 49,999 square feet (GFSF): 10% EUI improvement, Buildings 50,000 GFSF or larger: 15% EUI improvement</td>
</tr>
<tr>
<td>EUI Improvement</td>
<td>Buildings 25,000 - 49,999 GSF: 10% EUI improvement, Buildings 50,000 GSF or larger: 15% EUI improvement</td>
</tr>
<tr>
<td>On-site / Off-site Solar</td>
<td>Anywhere on building or zone lot, or offshore. On-site solar or other renewable energy. In your choice of: 5% of the floor area, 42% of the total roof area, 100% of annual average electricity used at the building or Off-site solar equals to 10% of building energy use.</td>
</tr>
<tr>
<td>Green Building Certification</td>
<td>One of the following: LEED Certification, minimum silver, Enterprise Green Communities Certification, National Green Buildings Standard ICC/ASHRAE 700, Equivalent certification approved by the building official</td>
</tr>
</tbody>
</table>

At Roof Replacement: Cool Roof Required*

*If the proposed roof is a character-defining roof, alternate roof materials may be allowed.

### Energy Program Timeline

![Energy Program Timeline](image)

**Figure 11 – Energy Program Timeline**

### Figure 10 – Existing Building Energy Program Options

![Existing Building Energy Program Options](image)
**Energy Program Results**

The Energy Program is only available to existing buildings under the Green Buildings Ordinance. From late May 2019 through December 2019, 33 projects in existing buildings were subject to the requirements of the Green Buildings Ordinance. Of these, 13 projects only required a cool roof. Of the remaining 20 projects, 14 chose the Energy Program as the compliance option as shown in Figure 12.

**Energy Program Early Enrollment**

Enrolling a building in the Energy Program before it is time for a roof replacement allows a building to receive credit for recent energy-efficient improvements and receive credit for ongoing energy-efficient improvements. As a result, only a cool roof is needed at the time of roof replacement.

- To enroll at the time of roof replacement, fill out the standard existing building Green Building Declaration form found at www.denvergov.org/GreenRoofs and select the Energy Program box.
- To enroll early in the Energy Program, simply complete an early enrollment Energy Program Form online, which can be found on the Energy Program Website.

495 existing buildings in Denver already meet the energy savings required for the Energy Program based on the 2018 Energize Denver benchmarking data reported to the city in 2019. To determine if a building already complies with the Energy Program, building owners and managers can look up their building’s energy savings online using the Energize Denver Benchmarking Map.

A building already complies if:

- It has an Energy Star score of 85 or greater.
- The annual weather adjusted EUI has improved by 10% or 15% (based on building size) compared to previous reporting years.
- It meets any of the five Energy Program options.

Since so many buildings already qualify, the City and County of Denver has proactively reached out to the owners/managers of each of the buildings that already meet the energy savings needed for the Energy Program. The outreach consisted of emails followed by phone calls to encourage these building owners and managers to lock in savings and make roof replacement easier in the future. As of December 31, 2019, there are 9 buildings that have enrolled early in the Energy Program.
In its first year of implementation, the Green Buildings Ordinance has demonstrated its feasibility, with approximately 65 construction projects meeting the terms of the ordinance now complete or underway. Collectively, these projects will consume less energy, contribute less to Denver’s urban heat island, and provide more access to local green space than they would have in the absence of this law. This progress would not have been possible without the passion and commitment brought by the multidisciplinary, bipartisan task force members who collaborated in 2018 to refine the ordinance into a collection of sustainable strategies that could be implemented by the vast majority of Denver’s buildings and at a reasonable cost to the property owner.

Moreover, adopting the Green Buildings Ordinance has accelerated a citywide conversation about the role of our built environment at combating climate change. Developers, property owners and project teams are participating in important conversations around the value of higher-performing buildings, both to the environment and for the people who live, work, and visit these places. The ordinance continues to amplify Denver voters’ messages of the importance of immediate climate action and leverages this message into clear requirements for development projects.

Going forward, the City and County of Denver will continue to apply the ordinance to buildings over 25,000 square feet in size and will continue collecting data on the implementation of this law. New codes and programs, including the Denver Green Code adopted in December 2019 and the Benchmarking Ordinance adopted in 2016, will serve to further advance the city’s climate action goals as city agencies, voters, and Denver’s design and development community work together to secure a more sustainable future for Denver.
**ENERGY STAR® Score:** The Environmental Protection Agency’s 1-100 ENERGY STAR® score is an external benchmark for assessing the performance of commercial buildings. The ENERGY STAR score, expressed as a number on a simple 1-100 scale, rates performance on a percentile basis: buildings with a score of 50 perform better than 50 percent of their peers; buildings earning a score of 75 or higher are in the top quartile of energy performance. Additional information can be found at [www.energystar.gov](http://www.energystar.gov).

**EPA:** U.S. Environmental Protection Agency

**GBO:** Green Buildings Ordinance

**GHG:** Greenhouse gas emission

**kBtu:** Btu is the British thermal unit; “k” stands for kilo, and thus 1 kBtu equals 1,000 Btu, or the amount of heat it takes to raise the temperature of 1,000 pounds of water by 1-degree Fahrenheit.

**C-PACE:** Property Assessed Clean Energy, a simple and effective way to finance energy efficiency, renewable energy, and water conservation upgrades to buildings.

**Portfolio Manager:** An online tool developed by the U.S. EPA that is used nationwide to measure and track energy and water consumption, as well as greenhouse gas emissions.

**Weather Normalized Site Energy Use Intensity (EUI):** The total amount of energy used per square foot in a building, normalized for weather. The energy is a sum of all the fuel types used in the building, including electricity, natural gas, fuel oil and steam, which are converted to kBtu, summed together, and then divided by the total square footage of the building. The higher the EUI, the more energy is used per square foot of space. The data is then weather normalized so that EUIs can be compared year over year — even if a very cool summer is followed by a very warm one.