Denver’s Green Building Ordinance
Agenda

I. About the new ordinance
II. Applicability and exemptions
III. Compliance options
   - New buildings
   - Existing buildings
IV. Cool roofs
V. Campuses
VI. Licensing, permitting, and inspections
VII. Rules and Regulations
VIII. Q&A

November 15, 2018
New Green Building Ordinance

- Replaces the voter-led green roof ordinance
- Provides greater design flexibility
- Significantly more cost effective for developers/owners
- Includes localized strategies to...
  - Reduce urban heat island effects and greenhouse gas emissions
  - Create more green space
  - Improve water quality and storm water management
Ordinance, rules and regulations, and permitting instructions are available at denvergov.org/greenroofs
Applicability

Buildings of 25,000 square feet or more:

1. New buildings
2. Additions
   - Additions of 25,000–49,999 sq. ft. have different requirements than additions ≥ 50,000 sq. ft. or more
3. Existing buildings – only if recovering/replacing roof
   - Roof recovers have different requirements than roof replacements

Most projects must do a cool roof and select one compliance option
Exemptions – Ordinance does not apply

- Buildings or additions under 25,000 square feet
- Parking structures
- Temporary buildings, air-supported structures, greenhouses
- Single-family homes or duplexes
- Groups of 3 or more attached dwelling units in which each unit extends from the foundation to roof and is not more than 3 stories above grade plane
- Roof replacements of less than 5% of the roof or roof section area (annually)
Partially Exempt – Must still do a Cool Roof

Exempt from the compliance options:

- Residential buildings 4-5 stories, or under 62.5 feet in height
- Roof recover only
- Existing green roof or the building/campus has already met the ordinance
- Emergency roof replacement (wind or fire damage, not hail)
- Hail damage with insufficient insurance coverage (ONLY until Nov. 2, 2019)
Gross Floor Area (GFA)

• Building/addition square footage = GFA

• Calculate GFA the same as under the building code, minus any area used exclusively to park or store vehicles
Compliance Options
## Compliance Options for New Buildings

**Green Space:**
- Green space on the roof, terraces, podiums, or at grade*
- Payment for same amount of off-site green space

**Energy Conservation:**
- Solar production equal to 70% of roof area – onsite, community solar, or purchased from Xcel*
- A minimum of **12%** energy savings above current codes

**Combination Approaches:**
- Green space and solar*
- Green space and **5%** energy savings above codes

**Certifications:**
- Third-party green building certifications

*Campus option
# Options Proposed for Existing Buildings

<table>
<thead>
<tr>
<th>Green Space:</th>
<th>Green space on the roof, terraces, podiums, or at grade*</th>
<th>$ Payment for same amount of off-site green space</th>
</tr>
</thead>
<tbody>
<tr>
<td>Onsite Solar:</td>
<td>Install solar to cover 42% of the roof, 5% of GFA, or an area sufficient to meet 100% of the building’s annual electricity consumption*</td>
<td></td>
</tr>
<tr>
<td>Energy Program:</td>
<td>Enroll in a flexible energy program to achieve similar greenhouse gas emission reductions as onsite solar</td>
<td></td>
</tr>
<tr>
<td>Certifications:</td>
<td>Third-party green building certifications</td>
<td></td>
</tr>
</tbody>
</table>

*Campus option
# Green Space Options for New Buildings

<table>
<thead>
<tr>
<th>Green Space:</th>
<th>Payment for same amount of offsite green space at $50/sq. ft.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Green space on the roof, terraces, podiums, or at grade</td>
<td></td>
</tr>
</tbody>
</table>

Amount required is the lesser of the following:

1. 10% of the gross floor area of the building;  
2. 60% of the total roof area of the building; or  
3. Available roof space of the building.
Green Space Options for Existing Buildings

- Green space on the roof, terraces, podiums, or at grade
- $50/sq. ft. payment for offsite space

For a **total roof replacement**, required amount is lesser of:
1. 2% of the gross floor area,
2. 18% of the total roof area, or
3. All available roof space

To replace a **roof section**, required amount is lesser of:
1. 2% of the GFA multiplied by the area of the roof section(s) being replaced, divided by the total roof area of the building,
2. 18% of the individual roof section(s) being replaced, or
3. All available roof space
Calculating “Available Roof Space”

Start with the total roof area and **deduct** the following:

- Private terraces equal to or smaller than the GFA of the abutting unit at the roof level
- Outdoor amenity spaces, including areas for recreational or social use
- Rooftop equipment, including cell towers and other equipment leasing space on the roof, and all required clearances around these areas
- Skylights
- Glass-covered atriums
- Glazing (windows)
- Areas covered by renewable energy devices
Green Space on the Roof (Vegetated or green roofs)

- Must comply with the Denver Building and Fire Code and the standards in the Rules and Regulations
- Must include vegetation, growing medium, filter fabric, drainage layer, root barrier, waterproofing membrane and other elements as required by code
  - Growing media must be a minimum 4-inch depth unless demonstrated to meet the vegetated roof performance criteria and approved by the Building Official
- Maintenance plan
- Irrigation system
Green Space not on Roof

- May be located anywhere on the site except the roof
- Document on a site development plan
  - Submittal requirements are listed online
- May include trees, groundcover, shrubs, urban agriculture, turfgrass (not artificial), and xeric grasses
- Rules and regulations outline minimum planting area sizes, climate-appropriate vegetation, and soil and irrigation requirements
What About Existing Green Space?

✔ New buildings may count zoning-required open space and vegetated storm water treatment areas, if it meets green space/bioretention standards

✔ Existing trees may count if protected and approved by the City Forester as a desirable species, healthy, in a location capable of supporting the mature size of the tree, etc.

❌ Existing green space will not count for existing buildings, unless it is improved with new trees or a new above-grade, vegetated, water quality facility
Energy Conservation Options for New Buildings

Onsite (or offsite) solar production equal to 70% of roof area or 100% of the average estimated annual electricity used

A minimum of 12% energy savings above current codes

* Additions 25,000 – 49,999 sq. ft. can do a minimum 4% energy savings above current codes
Onsite Solar Options for Existing Buildings

For a total roof replacement, the lesser of:
• Install solar to cover 42% of the roof, 5% of the gross floor area, or sufficient to meet 100% of the building’s annual electricity consumption

To replace individual roof sections, the lesser of:
• 42% of the roof section(s) being replaced,
• 5% of the GFA multiplied by the area of the roof section(s) being replaced, divided by the total roof area of the building, or
• An amount sufficient to meet 100% of the building’s annual electricity consumption
Off-site Solar for Existing Buildings

- This is not a compliance option on its own for existing buildings
- Enroll in the Energy Program to purchase offsite solar
Onsite Solar / Energy Conservation

• Can be located anywhere on the building or zone lot

• Can use other renewable energy devices that generate similar capacity

• Can be a net-zero-energy building

• Can count existing solar panels if they have a minimum efficiency rating of 16%
Off-site Solar Energy

• 5-year contract minimum
• Must be renewed and submitted to DDPHE every 5 years for the life of the building
• Must cover the equivalent energy production of either
  o the estimated 100% of electricity the building will use or
  o the amount that would have been provided with on-site solar panels and you must demonstrate a decreased energy consumption measured as an estimated cost savings of at least 6% above requirements in the applicable Denver Building & Fire Code
Combination Approaches for New Buildings

- Green space and onsite solar
- Green space and purchase offsite solar
- Green space and 5% energy savings above codes
- Green space and payment into Green Building Fund (must install at least 75% of the required green space and can pay for the other 25%)
Energy Program for Existing Buildings

- Enroll *before* it’s time for a roof replacement

Why??

- Choose a “baseline year” from the last five years
- Get credit for energy-efficient improvements made before it’s time for a roof replacement
- Get specialized guidance on the optimal path for your building
- Enrollment is valid for 20 years or through one roof replacement, whichever is longer

Enroll now:
**Energy Program for Existing Buildings**

Enroll in a flexible energy program to achieve greenhouse gas emission reductions over the course of 5 years

- ENERGY STAR score of 85 or higher
- 10%-15% improvement in energy use intensity (EUI)
- Green building certification
- On-site solar
- Off-site solar

**Enroll now:**
www.denvergov.org/EnergizeDenver > Energy Program
Green Building Certifications for New Buildings

• At plan review:
  o Demonstrate the points needed to meet certification

• Before C/O:
  o Pre-certify or submit design review with a plan for how any requested changes will be made

• 18 months after C/O:
  o Submit proof of certification to DDPHE

Minimums:
* LEED v4 BD+C Gold
* National Green Building Standard ICC/ASHRAE 700 Gold
* Enterprise Green Communities
* Other
Green Building Certifications for Existing Buildings

- At plan review:
  - Project must provide the building certification indicating that the building has the appropriate certification level

Minimms:
- LEED BD+C or O&M Silver
- National Green Building Standard ICC/ASHRAE 700 Silver
- Enterprise Green Communities
- Other
Overview

• Cool roof and choose a compliance option:

New Buildings
• Green space/roof
• Solar onsite or purchase
• Energy efficiency
• Green building certification
• Payment to fund
• Combination approaches

Existing Buildings
• Green space/roof
• Solar onsite
• Energy efficiency (additions only)
• Green building certification
• Payment to fund
• Energy program (roof permits only)

Campuses

Additions 50,000+ sf follow new building req’s
Additions 25,000-49,999 sf follow existing bldg. req’s
Cool Roofs
Cool Roofs

• Most buildings will need a cool roof unless the roof is a character-defining architectural feature

• A good way to reduce urban heat island effects

• Table 1 of the rules and regulations (next slide) outlines solar reflectivity requirements for various roofing materials
## Low-sloped Roofs (Slope less than 2:12)

<table>
<thead>
<tr>
<th>Material Description</th>
<th>Initial Minimum Reflectance</th>
<th>3-Year Minimum Reflectance</th>
<th>Initial SRI Minimum</th>
<th>3-Year SRI Minimum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low-slope roofs (except materials specified below)</td>
<td>0.70</td>
<td>0.55</td>
<td>78</td>
<td>64</td>
</tr>
<tr>
<td>Low-slope metal roofs</td>
<td>0.50</td>
<td>not available</td>
<td>not available</td>
<td>not available</td>
</tr>
<tr>
<td>Low-slope concrete pavers or a concrete surface or stone roofs</td>
<td>0.20</td>
<td>not available</td>
<td>not available</td>
<td>not available</td>
</tr>
<tr>
<td>Character-defining roof</td>
<td></td>
<td></td>
<td>Per section 3.02(a) of the Rules and Regulations</td>
<td></td>
</tr>
</tbody>
</table>

## Steep-sloped Roofs (Slope 2:12 or steeper)

<table>
<thead>
<tr>
<th>Material Description</th>
<th>Initial Minimum Reflectance</th>
<th>3-Year Minimum Reflectance</th>
<th>Initial SRI Minimum</th>
<th>3-Year SRI Minimum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Steep-slope roofs (except materials specified below)</td>
<td>0.25</td>
<td>0.15</td>
<td>39</td>
<td>32</td>
</tr>
<tr>
<td>Clay or concrete roof tile installed on elevated battens</td>
<td>None required</td>
<td>not available</td>
<td>not available</td>
<td>not available</td>
</tr>
<tr>
<td>Character-defining roof</td>
<td></td>
<td></td>
<td>Per section 3.02(a) of the Rules and Regulations</td>
<td></td>
</tr>
</tbody>
</table>
Additional Cool Roof Requirements

• Submit a roof section drawing

• For steep-slope roofs, design to meet IBC 1203.2 (ventilation)

• For low-slope roofs, provide at least Class III vapor retarder and air barrier at deck (can be one product) & above-deck insulation exceeding any below-deck insulation by at least R-18 (IECC insulation minimums still apply)

• If not meeting the code requirements above, also submit an analysis* indicating dew point, location of barriers, etc. to demonstrate how condensation issues will be mitigated
  ○ *By a professional roofing consultant, architect, or engineer
Roof Sections

- **Roof section** = bounded on all sides by a wall, parapet, edge, expansion joint, or roof divider.

- Only the roof section(s) being replaced need to comply with the cool roof and the compliance option (for green roof/solar)

- 5% RULE: If less than 5% of a roof section is being repaired then it is considered a roof repair. This still requires a permit.
5% of a roof section can be repaired without complying with the Green Bldg. Ordinance... Work still requires a permit!
Cool Roof Exemptions

• Roof recovers where the roof would need to be replaced to control condensation
• Portions of the roof covered by...
  o Solar or solar air or water-heating components
  o Green roofs
  o Above-roof decks or walkways
  o HVAC and other opaque objects
  o Swimming pools, sport surfaces, and glazing
  o Shade during the peak sun angle on the summer solstice
Cool Roof Exemptions (continued)

• Portions of roof ballasted with a minimum stone ballast of 15 pounds/sq. ft. or the weight of ballast for which an existing ballasted roof was designed

• Roof sections visible from a public vantage point (like a publicly accessible street, park, or campus).
  o This portion cannot exceed 10% of the total roof area

• The remainder of a roof section where at least 75% of the section is exempt, is a character-defining roof, or is a cool roof
Character-Defining Roofs

• Must be at least partially visible from a public vantage point, like a publicly accessible street, park, or campus

• If the materials, color, or shape of the roof were to change, it would impact the visual character of the building

• Will be reviewed by Landmark, Urban Design, and Architectural/Structural staff

• Decisions can be appealed to the Board of Appeals
Campuses
Campus Approach

- Campuses with both new and existing buildings have to meet the ordinance according to each building type.
  - New buildings - green space or solar aggregated across a campus, or through the combination of green space and solar/renewable energy.
  - Existing buildings – green space or solar aggregated across a campus.
Campus Approach

• Use of solar or other renewable energy devices requires submittal of an energy master plan

• Compliance documented via a site development plan, infrastructure master plan or similar document – if compliance will be phased, then a development agreement will be required that outlines the timing as to when green space and/or solar/renewable energy devices will be provided

• Cool roofs must still be provided for each individual building
Licensing Requirements
Permit Procedures
Inspections
Specialty Class D Supervisor Certificates for Green Roofs *(Contractor Licensing)*

- **Lawn irrigation**
  - Landscape irrigation for graywater systems and rooftop vegetation (not for backflow preventers or inside taps)

- **Green roof**
  - To install landscaped rooftop vegetation systems

- **Roof covering/waterproofing**
  (not specific to green roofs)
Permits

• All projects subject to the green building ordinance must log in for a review
  o No online roof permits for buildings over 25,000 sq. ft.
  o Projects currently in review under the old green roofs ordinance can continue under those rules or chose to comply with the Green Buildings Ordinance

• Log in by email

• Check your electronic signatures & seals against our tutorial
Permits to be Issued

• Commercial construction permit ("COMMCON") for the new building/addition
  o Other trade permits for the superstructure
• Roofing permit ("ROOFSIDE")
• Green roof permit (also a COMMCON)
  o Irrigation permit ("PLUMB")
  o Electrical permit ("ELEC")

*We need contractor licenses and job valuations for any trade permits and the ROOFSIDE permit before these subcontractors can pay/print their permits online.*
Inspections

• Pre-construction roof inspection (standard)
• Final inspection for vegetated roof irrigation, check system function and backflow preventer
• Final roof inspection check
  o Clearances, railings where required, etc.
• Final green roof inspection
  o Check coverage
Keep in mind:

• The cool roof requirement and the compliance option you choose stays with the building for the life of the building.

• Cannot value engineer out something required for your compliance option.

• Penalties could include revoking occupancy/permits, civil fines, liens on the property, and legal action.

• So...the property owner must sign the Green Buildings Declaration Form! It is binding.
Next Steps
Rules and Regulations

• Released for public comment on October 30th

• Please review and provide comments by November 30th

• Download it from www.denvergov.org/GreenRoofs

• Final rules expected in February 2019
Questions?

denvergov.org/greenroofs
Ordinance, declaration forms, submittal requirements, and rules and regulations

denvergov.org/DS
Sign up for the “Code and Policy Alert” email list for updates on the rules and regulations, and other news that impacts building/zoning permits in Denver (~1-2 emails/month)