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Greenhouse Gas Mitigation Program
- Resource Guide -

The Greenhouse Gas Mitigation Program (GHGMP) is intended to ensure new development is aligned with the City's climate goals and targets to help the community do its part to meet climate commitments by preventing excess greenhouse gas emissions. This Resource Guide includes guidance and resources to help you comply with the Greenhouse Gas Emissions Performance Standard (Sec. 17.13.3 of the Lakewood Zoning Ordinance), as well as an overview of the program. For information on the methodology, values, and calculations used to establish this program, refer to the Article 13 Technical Manual. For questions, contact the Planner of the Day at pod@lakewood.org.

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1. Applicability

New Development: The GHGMP applies to all new development, including new single-family residential construction, and all remodels, alterations, and additions requiring a Major Site Plan application.

Existing Development: The GHGMP applies to major additions, remodels, and alterations to existing developments with a cumulative proposed gross square footage over 2,500 square feet. Major additions, remodels, and alterations are those that require review under section 17.2.7: Major Site Plans, generally a change to 20% or more of the development.

Existing Single-Family Homes: This program does **not** apply to remodels, alterations, and additions to existing single-family residential dwellings (including individually-owned detached, duplex, and attached units, like townhomes and condos, and accessory structures).

2. Program Summary

The GHGMP establishes maximum permitted greenhouse gas emissions for new residential and non-residential development ("Performance Standard"). The Performance Standard is based on a 60.7% reduction from the emissions presented in Lakewood's 2018 GHG Inventory to reach the city's adopted climate commitments by 2030. All new developments must demonstrate that their Baseline Projected Emissions meet the Performance Standard or pay a Fee-In-Lieu of compliance.

Applicants must use the Greenhouse Gas Mitigation Program Worksheet ("GHGMP Worksheet") to determine their project specific Performance Standard, Baseline Projected Emissions, emissions avoidance from any approved mitigation measures, and if applicable, the Fee-In-Lieu amount (see Section 4 "Greenhouse Gas Mitigation Program Worksheet Instructions"). The Article 13 Technical Manual contains the methodology, quantitative values, and calculations used for the GHGMP.

A. Performance Standard

The Performance Standard is calculated by multiplying the projected number of residents (for residential projects) or proposed gross square footage (for non-residential projects) by the following values:

- Residential: 2.47 metric tons of carbon dioxide equivalence (mT CO2e) per capita
- Non-residential: 0.00475 mT CO2e per SF

B. Baseline Projected Emissions

Baseline Projected Emissions are the projected operational emissions from one year's worth of energy, transportation, and waste emissions for residential projects and energy and waste emissions for non-residential projects. If the Baseline Projected Emissions are less than the Performance Standard, no additional action is required. If the Projected Emissions exceed the Performance Standard, the applicant shall mitigate their emissions and/or pay a fee-in-lieu of compliance.

C. Mitigated Emissions

The applicant can mitigate the project's Baseline Projected Emissions to achieve compliance by incorporating enhanced design and sustainability principles. Mitigated Emissions are the projected annual emissions avoidance associated with the following approved mitigation strategies:

- On-site renewable electricity production (including solar photovoltaic and wind)
- Off-site renewable electricity procurement (community solar garden, off-site renewable energy subscriptions)

- Renewable energy systems (including heat pumps, solar thermal, geothermal, biomass, and passive solar design)
- Building Electrification (an all-electric building with no natural gas service)
- Recycling and Composting Services
- Electric vehicle parking spaces above minimum code standards

D. Final Projected Emissions

The Final Projected Emissions are the difference between the Baseline Projected Emissions and the Mitigated Emissions. If an approved energy model is submitted, the projected energy emissions are incorporated into the Final Projected Emissions (see Section 4.C. "Energy Model").

E. Achieving Compliance

The project achieves compliance with the GHGMP if one of the following conditions are met:

1. The Baseline Projected Emissions are less than or equal to the Performance Standard.
2. The Final Projected Emissions are less than or equal to the Performance Standard.
3. A fee-in-lieu is paid for ten years' worth of Final Projected Emissions above the Performance Standard. An electricity grid discount is applied to the fee-in-lieu to account for the anticipated change (an increase in renewable energy) to Xcel Energy's electricity grid mix over time.

Additional details about how the emissions and fee-in-lieu values are calculated are in Section 4 "Greenhouse Gas Mitigation Program Worksheet Instructions".

3. Application Fees and Program Administration

A. Application Fees

Application fees are established in accordance with section 17.13.1.10(A) of the Lakewood Zoning Ordinance to support the review and administration of the standards contained within Article 13. Table 1 presents the Application Fee and Submittal Schedule.

Table 1 Application Fee and Submittal Schedule

APPLICATION TYPE	APPLICABILITY	FEE AMOUNT	WHEN DUE
GHG Worksheet for Single-Family Detached and Duplex Uses	New construction only	$100 per application	GHGMP Worksheet and fee due at submittal of building permit
GHG Worksheet for all other uses	New construction and major additions or remodels (over 20% existing gross floor area)	$300 per application	GHGMP Worksheet and fee due at submittal of Major Site Plan, or Building Permit if MSP not required

B. Documentation and Submittals

All applicants must submit the GHGMP Worksheet in accordance with the schedule shown in Table 1. If additional documentation is required, such as energy model calculations and supporting documents for mitigation measures (see Section 4), it should be submitted with the GHGMP Worksheet.

C. Fee-In-Lieu Payments

Any fees-in-lieu of compliance are due prior to approval of the Major Site Plan for multifamily and nonresidential uses, or prior to building permit issuance for single family detached and duplex uses.

4. Greenhouse Gas Mitigation Program Worksheet Instructions

Applicants must submit the GHGMP Worksheet to demonstrate compliance. The GHGMP Worksheet was developed to streamline the program compliance process. The applicant enters in project specific information and the GHGMP Worksheet calculates emissions and if applicable, the fee-in-lieu of compliance.

Once completed, the applicant must submit a PDF copy of the GHGMP Worksheet with the other permit or project documents through the city's online permit and project tracking system, eTRAKiT. It will be reviewed as part of the usual review process for the building permit or site, as appropriate.

This section provides instructions on how to use the GHGMP Worksheet. The Article 13 Technical Manual contains the methodology, quantitative values, and calculations used for the GHGMP.

A. Required Inputs for Residential Projects

At a minimum, applicants for residential projects are required to enter and/or select the following information:

- Project Name: Type the name of the project.
- Project Address: Type the address of the project.
- Select Building Type: Select the residential building type that most closely aligns with the proposed use from the drop-down list.

Table 2 Residential Building Types

Residential - Mobile / Modular home
Residential - Single-family detached house
Residential - Single-family attached house
Residential - Multifamily in a building with 2 to 4 units
Residential - Multifamily in a building with 5 or more units

Single-family attached homes include townhomes and rowhomes. Multi-family buildings include condos and apartment complexes. If this project includes additional amenity spaces (ie clubhouse, recreation room, etc.) or is part of a mixed-use development that includes non-residential uses, a separate worksheet should be submitted for the non-residential portion of the project.

- Proposed Gross Floor Area: Enter in the total gross floor area of the project in square feet.
  - Proposed gross floor area includes any enclosed finished and unfinished spaces of the primary structure, including attached garages and basements.

- Number of Residential Units: The total number of dwelling units for the proposed project.
  - For example, a single-family home has one (1) residential unit and a duplex gas two (2) residential units.

- Transit Zone or Age restricted development: Select "Yes" if the project is a multifamily project in a Transit zone district (any zone district ending in "T") or an age restricted (55+) community. Otherwise, select "No".
  - If the project is an age restricted (55+) community, it should be noted as the proposed use on the Major Site Plan.
  - Multifamily projects in the transit zone district and age restricted communities receive a reduction in projected transportation emissions due the probability of decreased vehicle use.

The zone district can be determined on the city's GIS map. Search for the project address using standard abbreviations. A panel will appear on the left side of the map with information about the property, including the zoning under the Lakewood Details section.

B. Required Inputs for Non-Residential Projects

At a minimum, applicants for non-residential projects are required to enter and/or select the following information:

- Project Name: Enter in the name of the project.
- Project Address: Enter in the address of the project.
- Select Building Type: Select the non-residential building type that most closely aligns with the proposed use.

Table 3 Non-Residential Building Types

Education
Food sales
Food service
Healthcare - Inpatient
Healthcare - Outpatient
Lodging
Mercantile - Retail (other than mall)
Mercantile - Enclosed and strip malls
Office
Parking structure (standalone, partially enclosed)
Public assembly
Public order and safety
Religious worship
Service
Warehouse and storage
Other

Building type is classified based on the principal activity of the building, as categorized by the Commercial Buildings Energy Consumption Survey. For assistance in choosing the most appropriate building type, visit the CBECS building definition website which contains definitions for each building type, as well as examples and sub-categories:

If there are multiple non-residential uses, additional Worksheets should be submitted for the gross floor area associated with each additional differing non-residential use. If the project is part of a mixed-use development that includes residential uses, a separate Residential Worksheet should be submitted for the residential portion of the project.

- Proposed Gross Floor Area: Enter in the total gross floor area of the project in square feet.
  - Proposed gross floor area includes any enclosed finished and unfinished spaces of the non-residential structure, including fully and partially enclosed parking garages.

C. Energy Model

Applicants can submit a staff approved energy model (including IECC, ASHRAE, and HERS standard models) that projects the building's specific annual electricity and gas usage. The electricity and natural gas conversion factors listed in Table 1 Quantitative Values of the Article 13 Technical Manual should be used to determine the Final projected Emissions for electricity and natural gas. Energy Model results are inputted by staff as Final Projected Emissions for energy. Applicants should still fill out the GHGMP worksheet to determine waste (and transportation if applicable) emissions.

Applicants should contact an energy model consultant or a HERS rater for additional information, including cost and estimated energy savings.

D. Inputs for Mitigated Emissions and Required Documentation

If approved mitigation measures are included in the project, the applicant should enter in the required information in the "Mitigation Measures Input" section of the GHGMP Worksheet, which calculates the emissions reduced for each measure. This section provides guidance and resources on how to determine the inputs for each mitigation measure, as well as required documentation.

a. Mitigation Measure: Renewable Electricity – Onsite (Solar PV, Wind)

Description
Install on-site solar photovoltaic and/or wind power to provide renewable electricity to the building(s). Renewable electricity reduces the demand on the electrical grid, which is generated using fossil fuels, and results in long term utility savings for tenants and owners.

Required Input: Projected onsite renewable electricity generated
Applicants should enter in the projected annual onsite renewable electricity generated in kilowatt-hours. This can be determined by the vendor or estimated using NREL's PVWatts Calculator.

GHGMP Worksheet Output: Proposed electricity CO2e emissions mitigation
This output value is the annual carbon emissions avoided by utilizing on-site renewable electricity instead of electricity from Xcel Energy's utility grid.

Documentation Required with Major Site Plan

- ❒ Show renewable electricity system (solar PV or wind) size and location on relevant sheets.
- ❒ Vendor documentation which shows the estimated DC system size and estimated annual electricity generated from the system OR a PDF of the Results page from the PVWatts Calculator analysis.
- ❒ Include a table calculating the projected electricity usage ("Baseline Electricity Use" from the GHGMP Worksheet) of the proposed development, the anticipated electricity generation of the renewable system, and percentage of projected electricity offset by the on-site system.

Sample Calculation Table

Projected annual electricity usage (kWh)	**A**
Estimated annual electricity production (kWh)	**B**
Percent electricity offset by renewable system	**B / A = C**

Documentation Required with Building Permit

- ❒ Proof of ownership of the renewable electricity system or a signed lease agreement for a period of at least 15 years and structured to survive a partial or full transfer of ownership of property.

❒ Vendor documentation which shows the final DC system size and final estimated annual electricity generated from the system OR a PDF of the Results page from the PVWatts Calculator analysis.

Resources

- Use NREL's PVWatts Calculator to estimate the energy production of photovoltaic (PV) systems.
- Xcel Energy's New Building Programs offer assistance with energy efficient building design, including projecting energy use, construction rebates, and renewable energy options.
- Use the Energy Sage website to find local PV installers

b. Mitigation Measure: Renewable Electricity – Offsite (Solar PV, Wind)

Description
Procure offsite renewable electricity from a community solar garden or wind subscription to provide renewable electricity to the building(s). Renewable electricity reduces the demand on the electrical grid, which is generated using fossil fuels, and results in long term utility savings for tenants and owners.

Required Input: Projected onsite renewable electricity generated
Applicants should enter in the projected annual offsite renewable electricity generated in kilowatt-hours. This estimate should be provided by the manager/operator of the community solar garden or wind farm.

GHGMP Worksheet Output: Proposed electricity CO2e emissions mitigation
This output value is the annual carbon emissions avoided by utilizing off-site renewable electricity instead of electricity from Xcel Energy's utility grid.

Documentation Required with Major Site Plan

❒ Identify the intended renewable electricity subscription or community solar garden.
❒ Vendor documentation which shows the estimated annual electricity generated from the offsite renewable electricity system.
❒ Include a table calculating the projected electricity usage ("Baseline Electricity Use" from the GHGMP Worksheet) of the proposed development, the anticipated electricity generation of the renewable system, and percentage of projected electricity offset by the on-site system.

Sample Calculation Table

Projected annual electricity usage (kWh)	**A**
Estimated annual electricity production (kWh)	**B**
Percent electricity offset by renewable system	**B / A = C**

Documentation Required with Building Permit

❒ Proof of ownership of the off-site renewable electricity shares or a signed lease agreement for a period of at least 15 years and structured to survive a partial or full transfer of ownership of property. Please highlight the relevant sections.
❒ Vendor documentation which shows the final estimated annual electricity generated from the offsite renewable electricity system.

Resources

- Xcel Energy's New Building Programs offer assistance with energy efficient building design, including projecting energy use, construction rebates, and renewable energy options.
- Search for community solar gardens at the Energy Sage website

c. Mitigation Measure: Renewable Energy Systems (not including Solar PV, Wind)

Description
Install an onsite renewable energy system that reduces the natural gas usage for space and/or water heating of the project (not including solar photovoltaic or wind electricity systems). Examples of specific technologies may include solar thermal, geothermal, and passive solar design. The applicant must submit the proposed electricity and natural gas use of the on-site renewable energy system. Projects that choose to reduce emissions using this mitigation measure cannot use Building Electrification as an additional mitigation measure.

Required Input: Projected electricity and natural gas use reduction
Applicants should enter in the estimated net electricity and natural gas use reduction in kwh and therms, respectively, from operation of the renewable energy system. If the electricity usage is expected to increase because of the system, enter in the increase as a negative value. For example, if installation of a system will increase electricity consumption by 1,000 kwh, enter "-1000".

GHGMP Worksheet Output: Proposed electricity and natural gas CO2e emissions mitigation
This output value is the annual carbon emissions reduced by using a renewable energy system.

Documentation Required with Major Site Plan

- ❒ Show on-site renewable energy system location and/or design features on relevant sheets.
- ❒ Calculation demonstrating the projected energy usage per square foot of the proposed development, the anticipated reduction in energy use per square foot due to the renewable system and/or design choices, and percentage of projected energy use per square foot offset by the on-site system or design.

Sample Calculation Table

Baseline Projected annual energy use per square foot	**A**
Estimated reduction in annual energy use per square foot	**B**
Percent energy use offset by renewable system	**B / A = C**

Documentation Required with Building Permit

- ❒ Proof of ownership of the renewable electricity system or a signed lease agreement for a period of at least 15 years and structured to survive a partial or full transfer of ownership of property. Please highlight the relevant sections.
- ❒ Vendor documentation which shows the final estimated annual electricity and natural gas reduction from the system, and product specifications.

Resources

- EPA provides additional information and resources about renewable heating and cooling technologies on their website
- The City and County of Denver provides information on their website about the benefits of all-electric heat pumps
- Xcel Energy Residential and Non-residential programs and rebates website

d. Mitigation Measure: Building Electrification

Description
Use all electric space conditioning, water heating, and appliances to eliminate natural gas usage within the project. Systems set up for natural gas will continue to burn fossil fuel for 20 to 30 years. All-electric systems have the potential to become zero-emissions much sooner due to rapid

increases in renewable energy supplying the electrical grid and greater access to on- and off-site renewable electricity options. Multiple studies have found that building all-electric buildings in the Denver region is more affordable from a first-cost standpoint compared to mixed-fuel (electricity and natural gas) for heating. Projects that choose to reduce emissions using this mitigation measure cannot use Renewable Energy Systems as an additional mitigation measure, but may use the Renewable Electricity mitigation measures.

Required Input: Full building electrification
Select "Yes" if the building is fully electric with no natural gas infrastructure.

GHGMP Worksheet Output: Proposed natural gas carbon emissions mitigation
This output value is the annual carbon emissions avoided by not having any natural gas consumption. It is equivalent to the Baseline Projected Emissions for natural gas, as calculated in the GHGMP Worksheet.

Documentation Required with Major Site Plan

- ❒ Note on cover sheet indicating that the project will be all electric, with no natural gas service.
- ❒ Demonstrate on Utility Plan (part of civil plan set) that no natural gas service will be provided to the site.

Documentation Required with Building Permit

- ❒ Note on cover sheet indicating that the project will be all electric, with no natural gas service. Include a table identifying the type of equipment used for space conditioning, water heating, and cooking and laundry appliances, if applicable, and the location within the construction plan set for details of each item.

Resources

- Rocky Mountain Institute article on savings for All-Electric New Homes
- Group14 Engineering Colorado Building Electrification Report:
- Xcel Energy Residential and Non-residential programs and rebates website

e. Mitigation Measure: Recycling and Composting Contracts

Description
Contract for recycling and composting collection services (or other applicable waste stream) based on the building use and management. Providing recycling and composting service supports waste diversion from landfills, helping the city achieve its community zero waste goals.

Required Input: Full building electrification
Select "Yes" if the project will have a 2-year minimum contract for both recycling AND compost collection services.

GHGMP Worksheet Output: Proposed waste emissions mitigation
This output value is the annual carbon emissions reduced by recycling and composting instead of sending all waste to a landfill.

Documentation Required with Building Permit
Signed 2-year minimum contract(s) for trash, recycling, and compost collection services

Resources

Use the list of licensed commercial waste haulers to find a hauler licensed in Lakewood.

f. Mitigation Measure: EV Parking Above Code

Description
Install EV charging infrastructure with designated spaces. Charging infrastructure must be above electric vehicle charging requirements in Article 8 of the Zoning Ordinance. Each EV parking space should have one designated charging port. EV charging infrastructure supports the use of fossil-fuel free vehicles.

Required Input: Number of parking spaces with EV charging
Enter in the number of parking spaces with a designated EV charging port (above the minimum required by code).

Qualifying parking spaces include those where EV charging stations will be installed but are not required by code, such as single-family home parking garages and EV charging station capable spaces (spaces that require supply infrastructure readiness but not charging equipment).

GHGMP Worksheet Output: Proposed transportation emissions mitigation
This output value is the annual carbon emissions having above code EV charging infrastructure. This is equivalent to replacing one fossil fuel-based vehicle with an EV.

Documentation Required with Building Permit or Major Site Plan

- ❒ Indicate available EV spaces and signage location on plans
- ❒ Demonstrate how the proposed infrastructure is beyond the minimum EV charging station parking requirements in Article 8
- ❒ Include product specs of charging equipment

Resources

- Xcel Energy EV resources, including rebates and incentives for residential and non-residential supply infrastructure
- Refer to this Plug-In Electric Vehicle Handbook for Public Charging Station Hosts for guidance.
- Potential grants and vendor list available through Charge Ahead Colorado.

E. Outputs for Emissions and Fee-In-Lieu

Following input of the required project information and any applicable mitigation measures, the GHGMP Worksheet outputs the following values:

1. Performance Standard
2. Baseline Projected Emissions
3. Mitigated Emissions
4. Final Projected Emissions
5. Emissions Above the Performance Standard
6. Fees-in-lieu

A project in compliance with the GHGMP has a fee-in-lieu of $0. If the Final Projected Emissions are above the Performance Standard, the applicant is charged a fee-in-lieu of compliance. The fee is based on the social cost of carbon and is determined using the GHGMP Worksheet. The fee represents ten (10) years' worth of greenhouse gas emissions above the Performance Standard. An electricity grid discount

is applied to the fee-in-lieu to account for the anticipated change (an increase in renewable energy) to Xcel Energy's electricity grid mix over time.

Upload a PDF of the Worksheet along with other required permit and project documents. It will be reviewed as part of the typical development review process, and any applicable fee-in-lieu must be paid prior to approval of a Major Site Plan. For single-family homes and duplexes, the Worksheet will be reviewed as part of the building permit review process, and any fee-in-lieu must be paid prior to issuance of the permit.

The Worksheet output values 1 through 6 will be entered as part of the building permit application for all new construction. Also upload a PDF of the worksheet output along with permit documents. For those projects which received approval of a Major Site Plan, the Worksheet and values entered must match the approved plans.

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