ARTICLE 13 TECHNICAL MANUAL

Fees, Quantitative Values, and Methods

Revised July 2024

Approved by: _____

Planning Director

CONTENTS

INTRODUCTION

This Article 13 Technical Manual provides a list of the fees, methods, and quantitative values associated with Article 13 of the Lakewood Zoning Ordinance. Those values which are set in the Zoning Ordinance are included here for reference. Other values are set by or determined from data provided by other organizations. This Technical Manual will be updated periodically in accordance with section 17.13.12 to reflect the latest available data. Details on process and submittal requirements can be found in the Applicant Resource Guides for each section, available at Lakewood.org/SustainableDevelopment. Contact the Planner of the Day at pod@lakewood.org with questions regarding these standards.

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.

APPLICATION TYPE	APPLICABILITY	FEE AMOUNT	WHEN DUE
Enhanced Development Menu (EDM)			
Major Site Plan Applications	New construction over 2,500 sf and major additions/remodels (over 20% existing gross floor area *and* over 2,500 sf)	$250 per acre, up to 5 acres, PLUS $100 per additional acre from 5 to 15 acres, PLUS $50 per additional acre over 15 acres.	Submittal of Major Site Plan
Greenhouse Gas Mitigation Program			
GHG Worksheet for Single-Family Detached and Duplex Uses	New construction only	$100 per application	GHG Worksheet and application fee due at submittal of building permit
GHG Worksheet for all other uses	New construction and major additions/remodels (over 20% existing gross floor area)	$300 per application	GHG Worksheet and application fee due at submittal of Major Site Plan, or Building Permit if MSP not required
Construction and Demolition			
Comprehensive Waste Management Plan	Permits for demolition or construction associated with projects which are also subject to the EDM	$200 per application	Comp. Waste Mgmt. Plan and fee due at submittal of building permit

ENHANCED DEVELOPMENT MENU APPLICABILITY AND FEES-IN-LIEU

The Enhanced Development Menu (EDM) is intended to reduce negative impacts of new development on the community by minimizing the use of limited resources while providing enhancements that ensure integration of the project into the surrounding neighborhood. It is a point-based system that offers a menu of sustainability-related development features that count towards the minimum number of points required for a particular project. **One (1) point is required for every 1,000 sf of gross floor area** in the proposed development, with a minimum of 10 points and a maximum of 150 points, as shown in the table below. Projects with a cumulative gross floor area of less than 2,500 sf are exempt from EDM requirements.

Project Cumulative Gross Floor Area (rounded to nearest 1,000 sf)	**Required Points**
< 2,500 sf	N/A (0 points)
2,500 sf – 10,000 sf	10 points
11,000 sf – 150,000sf	11 – 150 points (1 point per 1,000 sf)
Over 150,000 sf	150 points *and* select one option in section 17.13.2.3

Developments up to 150,000 sf can use any of the menu items listed in Lakewood Zoning Ordinance section 17.13.2.4 to satisfy the minimum number of required points and are encouraged to select items that are relevant to the specific context of the proposed use, project design and physical site. Developments over 150,000 sf must earn a minimum of 40 of their 150 required points from the high-impact prerequisite items identified in section 17.13.2.3. These prerequisites include either Green Building Certification (LEED or NGBS), or a combination of renewable energy, building electrification, enhanced streetscapes, and social connection amenities. See the Enhanced Development Menu Applicant Resource Guide for more details on each menu item.

Fees-in-lieu provide an alternative path to comply with the standards. Proposed developments over 50,000 square feet have the option to pay a fee-in-lieu for each point required over 50 that is chosen not to be implemented through the menu items. A minimum of 50 points must be implemented through menu items. The per-point fee-in-lieu rates in the table below were established by City Council Resolution 2022-49.

Development Size	**Fee Amount per Point**
Developments less than 50,000 sf	Not eligible to pay fee-in-lieu
Developments 50,000 to 150,000 sf	$4,000 per point
Developments over 150,000 sf	$4,000 *plus* $10 per 1,000 sf over 150,000 sf, per point

In addition, developments over 150,000 SF which seek to pay a fee-in-lieu for any of the 40 prerequisite points must pay a per-point rate of 1.5 times the rate determined in the table above for those prerequisite points. All fees collected will be expended on programs and projects relevant to sustainable built environment goals as described in section 17.13.6.

The following table demonstrates the total required points and how to calculate per-point fees-in-lieu for an example proposed development with gross floor area of 200,000 square feet.

Example for 200,000 sf Development	**Requirement**
Total EDM points required	150 points, 40 of which must be from prerequisite items
Minimum points that must be achieved through menu items	50 points
Maximum points that may be satisfied through optional fee-in-lieu	100 points
Fee-in-lieu rate for non-prerequisite points	$4,000 *plus* $10 per 1,000 sf over 150,000 sf, per point = $4,000 + ($10 * ((200,000 sf – 150,000 sf)/1,000 sf)) = $4,000 + ($10 * 50) = $4,500 per point
Fee-in-lieu rate for prerequisite points (max 40)	1.5 * $4,500 = $6,750 per prerequisite point

CONSTRUCTION & DEMOLITION RECYCLING SUPPLEMENTAL STANDARDS

Proposed developments that are required to comply with the EDM standards must also comply with the C&D supplemental standards in section 17.13.4. Please see the 2024 Construction & Demolition Administrative Regulation document for specific details.

GREENHOUSE GAS MITIGATION PROGRAM & PERFORMANCE STANDARD

PART 1 – GHG MITIGATION PROGRAM SUMMARY

The Greenhouse Gas Mitigation Program (GHGMP) is intended to ensure new development is aligned with the City's climate goals and targets by establishing a performance standard for the maximum permitted annual greenhouse gas emissions. The GHGMP Residential and Non-Residential Worksheets were developed so applicants can easily determine whether projects are in compliance with the performance standards. The worksheets must be submitted with all Major Site Plan applications and Building Permit applications for new construction. The worksheets incorporate the methodology and calculations presented in this section.

APPLICABILITY

All new residential and non-residential development (including all remodels, alterations, and additions requiring a Major Site Plan application) must meet the Performance Standard or pay a fee-in-lieu of compliance. These standards **do not** apply to remodels, alterations, and additions to existing single-family residential dwellings, including individually-owned detached, duplex, and attached/townhome units.

QUANTITATIVE VALUES TABLES

The Quantitative Values Tables located in Part 7 of the manual present the quantitative values used in the GHGMP methodology. These values are periodically updated administratively as new data becomes available. Changes to the Emissions Reduction Factor require approval from City Council.

ACHIEVING GHGMP COMPLIANCE

All applicable developments must demonstrate that their projected annual greenhouse gas emissions do not exceed the Performance Standard by submitting the appropriate GHGMP Worksheet. In some instances, a building's Baseline Projected Emissions (see *Part 2 – Calculating the Baseline Projected Emissions*) will already meet the Performance Standard (see *Part 3 – Calculating the Performance Standard*):

Baseline Projected Emissions <= Performance Standard: Project is compliant; no further action needed

If the development is not already compliant with the Performance Standard, then the Final Projected Emissions must be calculated (see *Part 5 – Calculating Final Projected Emissions*). The applicant may elect to incorporate mitigation strategies into the project at this point to reduce the Final Projected Emissions (see *Part 4 – Calculating Mitigated Emissions*).

Baseline Projected Emissions > Performance Standard: Project not compliant; applicant must determine Final Projected Emissions

Compliance is achieved either when the Final Projected Emissions meets the Performance Standard or when a fee-in-lieu is paid for the difference between the Final Projected Emissions and the Performance Standard (see *Part 6 – Calculating the Fee-In-Lieu*).

PART 2 – CALCULATING THE BASELINE PROJECTED EMISSIONS

The baseline projected emissions for a development are determined based on the project's size and principal use. Projected emissions for residential developments are also dependent on the number of dwelling units and whether the project is a planned age restricted community or located in a transit zone district.

RESIDENTIAL BASELINE PROJECTED EMISSIONS

Projected residential emissions include emissions associated with the energy, transportation, and waste sectors.

Eq. 1: $$\boldsymbol{Projected\ Residential\ Emissions = Projected\ Energy + Transportation + Waste\ Emissions}$$

Projected Energy Emissions

Projected energy emissions are calculated as follows:

Eq. 2: $$\boldsymbol{Projected\ Energy\ Emissions = Electricity\ Emissions + Natural\ Gas\ Emissions}$$

Eq. 2a: $$\boldsymbol{Electricity\ Emissions = (Electricity\ energy\ intensity\ x\ Electricity\ Carbon\ Emissions\ Factor)\ x\ (Proposed\ Gross\ Floor\ Area)}$$

Eq. 2b: $$\boldsymbol{Natural\ Gas\ Emissions = (Natural\ gas\ energy\ intensity\ x\ Natural\ Gas\ Carbon\ Emissions\ Factor)\ x\ (Proposed\ Gross\ Floor\ Area)}$$

Eq. 2c: $\boldsymbol{Natural\ gas\ intensity\ in\ therms/SF = (Natural\ gas\ intensity\ in\ CF/SF)\ x\ (Average\ Heat\ Content\ of\ Natural\ Gas\ in\ BTU/CF)\ x\ (1\ therm\ /\ 100,000\ BTU)}$

Where,

Electricity energy and *natural gas energy intensity* is determined based on principal building activity using the data listed in Quantitative Values Table 5;

Annual Electricity Carbon Emissions Factor is listed in Quantitative Values Table 1;

Natural Gas Carbon Emissions Factor is listed in Quantitative Values Table 1; and

Proposed Gross Floor Area is the proposed gross floor area (including enclosed unfinished spaces such as parking garages, basements, etc.) of the development project.

If a staff-approved energy model is submitted by the applicant (including IECC, ASHRAE, and HERS standard models), Electricity Emissions = (Modeled Electricity Use x Electricity Carbon Emissions Factor), and Natural Gas Emissions = (Modeled Natural Gas Use x Natural Gas Carbon Emissions Factor).

Projected Transportation Emissions

Projected transportation emissions are calculated as follows:

Eq. 3: $\boldsymbol{Transportation\ Emissions = (Transportation\ emissions\ per\ capita)\ x\ (Number\ of\ Projected\ Residents)x(Transportation\ Development\ Factor)}$

Where,

Transportation emissions per capita values are listed in Quantitative Values Table 6; and

Transportation Development Factor = 0.8 for residential projects within Transit context zone districts and age-restricted communities or 1 for all other residential projects.

Projected Waste Emissions

Projected waste emissions are calculated as follows:

Eq. 4: $\boldsymbol{Residential\ Waste\ Emissions = (Residential\ waste\ emissions\ per\ capita)\ x\ (Number\ of\ Projected\ Residents)}$

Where,

Waste emissions per capita value is presented in Quantitative Values Table 7;

Number of Projected Residents is calculated using Equation 8b (Part 3); and

Proposed Gross Floor Area is the proposed gross floor area (including enclosed unfinished spaces such as parking garages, basements, etc.) of the development project.

NON-RESIDENTIAL BASELINE PROJECTED EMISSIONS

Projected non-residential emissions include emissions associated with the energy and waste sectors.

Eq. 5: $$\boldsymbol{Projected\ Non\text{-}Residential\ Emissions = Projected\ Energy + Waste\ Emissions}$$

Projected Energy Emissions

Projected energy emissions are calculated as follows.

Eq. 61: $$\boldsymbol{Projected\ Energy\ Emissions = Electricity\ Emissions + Natural\ Gas\ Emissions}$$

Eq. 6a: $$\boldsymbol{Electricity\ Emissions = (Electricity\ energy\ intensity\ x\ Electricity\ Carbon\ Emissions\ Factor)\ x\ (Proposed\ Gross\ Floor\ Area)}$$

Eq. 6b: $$\boldsymbol{Natural\ Gas\ Emissions = (Natural\ gas\ energy\ intensity\ x\ Natural\ Gas\ Carbon\ Emissions\ Factor)\ x\ (Proposed\ Gross\ Floor\ Area)}$$

Eq. 6c: $$\boldsymbol{Natural\ gas\ intensity\ in\ therms/SF = (Natural\ gas\ intensity\ in\ CF/SF)\ x\ (Average\ Heat\ Content\ of\ Natural\ Gas\ in\ BTU/CF)\ x\ (1\ therm\ /\ 100{,}000\ BTU)}$$

Where,

Electricity energy and *natural gas energy intensity* is determined based on principal building activity using the data listed in Quantitative Values Table 5;

Annual *Electricity Carbon Emissions Factor* is listed in Quantitative Values Table 1;

Natural Gas Carbon Emissions Factor is listed in Quantitative Values Table 1; and

Proposed Gross Floor Area is the proposed gross floor area (including enclosed unfinished spaces such as parking garages, basements, etc.) of the development project.

If a staff-approved energy model is submitted by the applicant (including IECC, ASHRAE, and HERS standard models), Electricity Emissions = (Modeled Electricity Use x Electricity Carbon Emissions Factor), and Natural Gas Emissions = (Modeled Natural Gas Use x Natural Gas Carbon Emissions Factor).

Projected Waste Emissions

Projected Waste emissions are calculated as follows:

Eq. 7: $$\boldsymbol{Non\ Residential\ Waste\ Emissions = (Non\ Residential\ waste\ emissions\ per\ SF)\ x\ (Proposed\ Gross\ Floor\ Area)}$$

Where,

Waste emissions per square foot value is presented in Quantitative Values Table 7; and

Proposed Gross Floor Area is the proposed gross floor area (including enclosed unfinished spaces such as parking garages, basements, etc.) of the development project.

PART 3 – CALCULATING THE PERFORMANCE STANDARD

The Performance Standard is the maximum permitted annual greenhouse gas emissions for the proposed development's anticipated operations, reported in terms of metric tons of carbon dioxide-equivalent emissions (mT CO2e). The Performance Standard is based on the target emissions to meet the city's climate goals.

RESIDENTIAL PERFORMANCE STANDARD

The Residential Performance Standard is calculated using a per capita emissions target for emissions from energy, transportation, and waste. Quantitative Values Table 2 presents the values used to determine the Residential Performance Standard. The annual Residential Target Emissions per capita is **2.47 mT CO2e**.

Eq. 8: $$\boldsymbol{Residential\ Performance\ Standard} = (\boldsymbol{Residential\ Target\ Emissions\ Per\ Capita})\ \boldsymbol{x}\ (\boldsymbol{Projected\ Residents})$$

Eq. 8a: $$\boldsymbol{Residential\ Target\ Emissions\ Per\ Capita} = (\boldsymbol{Residential\ Energy} + \boldsymbol{Transportation} + \boldsymbol{Residential\ Waste\ Emissions})/ \boldsymbol{Population}\ \boldsymbol{x}\ (\boldsymbol{Emissions\ Reduction\ Factor})$$

Eq. 8b: $$\boldsymbol{Projected\ Residents} = (\boldsymbol{Dwelling\ Units})\ \boldsymbol{x}\ (\boldsymbol{Average\ Household\ Size})$$

Where,

Dwelling Units is the number of dwelling units in the project, and

Average Household Size is the average number of individuals per dwelling unit by the number of units in a residential building, as shown in Quantitative Values Table 3.

NON-RESIDENTIAL PERFORMANCE STANDARD

Quantitative Values Table 4 presents the values used to determine the Non-Residential Performance Standard on a per square foot basis. The annual Non-Residential Target Emissions per square foot is **0.00508 mT CO2e**.

Eq. 9: $$\boldsymbol{Non\ Residential\ Performance\ Standard} = (\boldsymbol{Non\ Residential\ Target\ Emissions\ Per\ Square\ Foot})\ \boldsymbol{x}\ (\boldsymbol{Proposed\ Gross\ Floor\ Area})$$

Eq. 9a: $$\boldsymbol{Non\ Residential\ Target\ Emissions\ Per\ Capita} = (\boldsymbol{Non\ Residential\ Energy} + \boldsymbol{Non\ Residential\ Waste\ Emissions})\ /\ (\boldsymbol{Non\ Residential\ Building\ Square\ Footage})\ \boldsymbol{x}\ (\boldsymbol{Emissions\ Reduction\ Factor})$$

Where,

Proposed Gross Floor Area is the proposed gross floor area of the development project.

MIXED-USE PERFORMANCE STANDARD

Developments with a mix of residential and non-residential uses are calculated using the methodology described in the previous section for the respective square footages of the residential and non-residential portions of the building(s).

OPTIONS FOR COMPLIANCE WITH THE PERFORMANCE STANDARD

If the Baseline Projected Emissions is above the Performance Standard, the project must achieve compliance by incorporating approved mitigation strategies (see *Part 4 – Calculating Mitigated Emissions*), paying a fee-in-lieu of compliance (see *Part 5 – Determining Final Compliance*), or a combination thereof.

PART 4 – CALCULATING MITIGATED EMISSIONS

Article 13 Section 17.13.3.5B(2) includes a list of approved mitigation strategies that can be utilized to reduce the project's Final Projected Emissions to meet the Performance Standard. The following section describes the methodology and values used to determine the carbon avoidance associated with each approved mitigation strategy. Each mitigation strategy is associated with the energy, transportation, or waste sectors. If a staff-approved energy model is submitted, only mitigation strategies not already included in the model shall be incorporated into the Mitigated Emissions calculation. All mitigation strategies must be depicted on the Major Site Plan (if applicable) and Building Permit plans.

RENEWABLE ELECTRICITY PRODUCTION (ENERGY)

Equation 10 is used to calculate the mitigated emissions associated with on-site and off-site renewable electricity, including solar photovoltaic and wind.

Eq. 10: $$\boldsymbol{Mitigated\ Emissions} = (\boldsymbol{Electricity\ use\ offset}) \boldsymbol{x} (\boldsymbol{Electricity\ Carbon\ Emissions\ Factor})$$

Where,

Electricity use offset is in units of kilowatt-hours; and

Electricity Carbon Emissions Factor is listed in Quantitative Values Table 1.

ON-SITE RENEWABLE ENERGY SYSTEMS (ENERGY)

Equation 11 is used to calculate the mitigated emissions associated with on-site renewable energy systems (not including solar or wind electricity production). 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.

Eq. 11: $$\boldsymbol{Mitigated\ Emissions} = (\boldsymbol{Net\ difference\ in\ electricity\ use}) \boldsymbol{x} (\boldsymbol{Electricity\ Carbon\ Emissions\ Factor}) + (\boldsymbol{Net\ difference\ in\ natural\ gas\ use}) \boldsymbol{x} (\boldsymbol{Natural\ Gas\ Carbon\ Emissions\ Factor})$$

Where,

Net difference in electricity and *natural gas use* is the difference between the proposed and baseline projected use (determined using Equations 2a and 2b or Equations 6a and 6b in Part 2);

Electricity Carbon Emissions Factor is listed in Quantitative Values Table 1; and

Natural Gas Carbon Emissions Factor is listed in Quantitative Values Table 1.

BUILDING ELECTRIFICATION (ENERGY)

This mitigation strategy eliminates all natural gas usage within the project.

Eq. 12: $\boldsymbol{Mitigated\ Emissions = Natural\ Gas\ Emissions}$

Where,

Natural Gas Emissions are determined by Equation 2b or 6b.

RECYCLING AND COMPOSTING SERVICES (WASTE)

Equation 13 is used to calculate mitigated emissions associated with recycling and composting services. This mitigation strategy must include both recycling AND composting service.

Eq. 13: $Mitigated\ Emissions = (Waste\ Emissions)\ x\ (Landfill\ Waste\ Diversion\ Rate)$

Where,

Waste emissions are determined by Equations 4 or 7 in Part 2; and

Landfill Waste Diversion Rate with universal recycling and composting waste services = 31.3%.[1]

EV CHARGING INFRASTRUCTURE, PUBLIC AND ABOVE CODE CHARGING (TRANSPORTATION)

Equation 14 is used to calculate mitigated emissions from EV parking spaces with direct access to EV charging infrastructure.

Eq. 14: $Mitigated\ Emissions =$
$(Number\ of\ EV\ Parking\ Spaces)\ x\ (Transportation\ emissions\ per\ capita)$

Where,

Number of EV Parking Spaces equals the number of designated parking spaces with direct access to EV charging beyond the minimum code requirements in LZO Article 8; and

Transportation emissions per capita values are listed in Quantitative Values Table 6.

PART 5 – CALCULATING FINAL PROJECTED EMISSIONS

Once any selected mitigation strategies have been incorporated into the project, the annual Final Projected Emissions must be calculated to determine if the Performance Standard has been met. The Mitigated Emissions and Final Projected Emissions equations may be used iteratively as various mitigation strategies are evaluated through the Major Site Plan and Building Permit review processes. Any Final Projected Emissions still exceeding the Performance Standard at the time of building permit approval after all desired mitigation strategies are implemented will be subject to the fee-in-lieu of compliance as described in *Part 6 – Calculating the Fee-In-Lieu of Compliance.*

[1] Based on average diversion rate of Front Range communities with universal recycling and composting services (Golden, Lafayette, and Fort Collins), as reported in Eco-Cycle's 2022 State of Recycling and Composting in Colorado report.

The Final Projected Emissions are calculated using **Equation 15**.

Eq. 15: $\boldsymbol{Final\ Projected\ Emissions} = (\boldsymbol{Baseline\ Projected\ Emissions}) - (\boldsymbol{Mitigated\ Emissions})$

Where,

Baseline Projected Emissions are calculated, as shown in *Part 2 – Calculating the Baseline Projected Emissions*, and

Mitigated Emissions are the emissions reduction associated with the measures described in *Part 4 – Calculating Mitigated Emissions*.

PART 6 – CALCULATING THE FEE-IN-LIEU OF COMPLIANCE

For projects electing to not incorporate mitigation strategies, or when the selected mitigation strategies do not adequately reduce a project's emissions, a fee-in-lieu of compliance is applied for ten (10) years' worth of Final Projected Emissions exceeding the Performance Standard, as calculated using Equations 16-18. An electricity grid discount is applied to account for the anticipated increase in renewable energy as part of Xcel Energy's electricity grid mix over time. The fee-in-lieu is due prior to building permit issuance.

Eq. 16: $Fee\ In\ Lieu, subtotal = (Final\ Projected\ Emissions - Performance\ Standard)\ x\ (Social\ Cost\ of\ Carbon)\ x\ 10\ Years$

Where,

Final Projected Emissions is calculated using Equation 15 (Part 5);

Performance Standard is calculated using Equations 8 or 9 (Part 3); and

the *Social Cost of Carbon* is listed in Quantitative Values Table 1.

Eq. 17: $Electricity\ Grid\ Discount = (Final\ Projected\ Electricity\ Emissions\ /\ Final\ Projected\ Total\ Emissions)\ x\ (Final\ Projected\ Emissions - Performance\ Standard) x\ (Electricity\ Grid\ Discount\ Factor) x\ 10\ Years$

Where,

Final Projected Total Emissions is the sum of electricity, natural gas, transportation, and waste emissions above zero; and

the *Electricity Grid Discount Factor* is listed in Quantitative Values Table 1.

Eq. 18: $\boldsymbol{FEE\ IN\ LIEU, Total} = (\boldsymbol{Fee\ in\ Lieu, subtotal}) - (\boldsymbol{Electricity\ Grid\ Discount})$

PART 7 – QUANTITATIVE VALUES TABLES

TABLE 1 - SUMMARY OF GHG MITIGATION PROGRAM VALUES (LISTED ALPHABETICALLY)

Factor Name	Definition	Value	Unit	Source
Average Heat Content of Natural Gas	Average heat energy per volume for natural gas in Colorado	1,068.5	BTU per CF	Energy Information Administration (Colorado 2018-2023 Average)
Electricity Carbon Emissions Factor	Latest published carbon intensity of Xcel Energy's electricity grid mix	0.426	mT CO_2e per kWh	Xcel Energy 2023 Lakewood Community Report
Electricity Grid Discount Factor[2]	Factor applied to electricity emissions when calculating the fee-in-lieu to account for the anticipated changes to Xcel Energy's electricity grid mix	42.7	%	Xcel Energy 2023 Lakewood Community Report, Xcel Energy Carbon Reduction Plan
Emissions Reduction Factor	Factor applied to achieve a 60.7% percent reduction from 2018 annual GHG emissions to meet the city's formal climate commitments	39.3	%	Lakewood's Climate Commitment: United Nation's Cities Race to Zero Science-based Emissions Reduction Target
Natural Gas Carbon Emissions Factors	Carbon intensity of Xcel Energy's natural gas	0.0052	mT CO_2e per therm	Xcel Energy 2023 Lakewood Community Report
Non-Residential Building Area (2018)	Total citywide non-residential square footage	39,712,965	SF	Jefferson County Assessor's Data
Non-Residential Building Area (2021)	Total citywide non-residential square footage	40,436,068	SF	Jefferson County Assessor's Data
Non-Residential Target Emissions per Square Foot	Maximum permitted annual GHG emissions for new non-residential development	0.00508	mT CO_2e per SF	2018 GHG Inventory
Population	Citywide population	151,411 (2018) 155,608 (2021)	persons	2018, 2021 GHG Inventory, 5-year American Community Survey

[2] Electricity grid discount rate determined based on linear interpolation from latest available emissions factor (Xcel Energy 2023 Lakewood Community Report) and Xcel Energy's latest adopted Clean Energy Plan projection of reducing carbon emissions from its electricity grid by 85% from 2005 levels (0.838 mT/MWh) by 2030.

Factor Name	Definition	Value	Unit	Source
Population	Citywide population (Projected Transportation Emissions)	155,984 (2020) 156,612 (2021) 156,114 (2022)	persons	1-year American Community Survey
Projected Energy Emissions	Projected carbon emissions associated with energy usage, based on principal building activity per SF	Varies	Kwh or therms per SF	See Table 5, 2018 CBECS/ 2020 RECS
Projected Non-Residential Waste Emissions	Projected carbon emissions per square foot associated with residential waste	0.000324	mT CO_2e per SF	2021 GHG Inventory
Projected Residential Waste Emissions	Projected carbon emissions per person associated with residential waste	0.097	mT CO_2e per capita	2021 GHG Inventory
Projected Residents	Average number of individuals per dwelling unit, based on number of units in a residential building	Varies	Persons per unit	See Table 3; 2022 American Community Survey
Projected Transportation Emissions	Projected carbon emissions per person associated with transportation	2.04	mT CO_2e per capita	Google Environmental Insights Explorer (2020-2022), American Community Survey
Residential Target Emissions per Capita	Maximum permitted annual GHG emissions for new residential development	2.47	mT CO_2e per capita	2018 GHG Inventory
Social Cost of Carbon	Cost to society for each metric ton of new emissions	76	Dollars per mT CO2e	Executive Order 13990, using 2.5% discount rate
Waste Mitigation Measure: Diversion Rate	Landfill diversion rate associated with a recycling and compost contract	31.3	%	Eco-Cycle's 2022 State of Recycling & Composting in Colorado (Figure 9, average diversion rate for Golden, Lafayette, and Fort Collins)

TABLE 2 - RESIDENTIAL PERFORMANCE STANDARD CALCULATION[3]

	Energy	Transportation	Waste	Total
Total Emissions (mTCO2e)	458,463	479,480	14,639	952,583
Population	151,411			
Emissions Per capita	3.03	3.17	0.097	6.29
Emissions Reduction Factor (%)	39.3%			
Target Emissions per Capita (mT CO2e)	1.19	1.24	0.038	**2.47**

TABLE 3 - PROJECTED RESIDENTS PER UNIT PER BUILDING TYPE[4]

Building Type	Total Households	Total Population	Average Household Size
1 unit	40,426	104,036	2.57
2-4 units	4,384	8,671	1.98
5-19 units	12,241	24,341	1.99
20-49 units	5,455	10,391	1.90
50+ units	4,930	6,959	1.41
MH, RV, etc.	675	1,717	2.54

TABLE 4 - NON-RESIDENTIAL PERFORMANCE STANDARD[5]

	Energy	Waste	Total
Total Emissions (mT CO_2e)	500,714	12,868	513,582
Non-residential Building Square Footage[6]	-	-	39,712,965
Emissions Per Square Foot	0.0126	0.000324	0.01293
Emissions Reduction Factor (%)	-	-	39.3%
Target Emissions per SF (mT CO_2e)	0.00495	0.000127	**0.00508**

[3] Source: Lakewood's 2018 Greenhouse Gas Inventory. Transportation emissions do not include aviation.
[4] 2022 American Community Survey (ACS) 5-year Estimates Table B25124 – Tenure by Household Size by Units in Structure.
[5] Source: Lakewood's 2018 Greenhouse Gas Inventory.
[6] Data from the Jefferson County Assessor's Data, filtered for non-residential buildings constructed in or prior to 2018. Method to calculate citywide square footage updated for accuracy. See the 2024 List of Updates on page 17 for detail.

TABLE 5 - PROJECTED ANNUAL ENERGY USE[7]

Principal building activity	Electricity energy intensity (kWh/square foot)	Natural gas energy intensity (cubic feet/square foot)
Education	7.9	37.5
Food sales	42.7	64.8
Food service	30.4	138.4
Health care - General	22.5	73.0
Healthcare - Inpatient	26.9	102.7
Healthcare - Outpatient	18.2	43.2
Lodging	11.4	53.9
Mercantile	12.3	38.3
Mercantile - Retail (other than mall)	10.1	28.8
Mercantile - Enclosed and strip malls	14.9	44.7
Office	11.2	27.2
Public assembly	2.6	0.0
Public order and safety	11.8	41.9
Religious worship	9.0	30.9
Residential - Mobile home	7.9	25.3
Residential - Single-family detached house	4.3	25.8
Residential - Single-family attached house	4.4	30.1
Residential - Apartment in a building with 2 to 4 units	5.6	39.2
Residential - Apartment in a building with 5 or more units	5.7	21.4
Service	6.0	55.8
Warehouse and storage	4.9	29.4
Other	23.2	58.4

[7] Energy Information Administration 2018 Commercial Building Energy Consumption Survey (CBECS) / 2020 Residential Energy Consumption Survey (RECS) data (filtered for very cold/cold climate region). For building types that reported a Q instead of an EUI due to sample size or other data issues, an approximate EUI was interpolated by calculating the overall percent change in EUI from the previous CBECS/RECS dataset and applying it to the missing building types. See the 2024 List of Updates on page 17 for more detail.

TABLE 6 - PROJECTED TRANSPORTATION EMISSIONS[8]

	2020	2021	2022	3 Year Average
Emissions (mT CO_2e)	277,693	332,388	344,109	318,063
Population	155,984	156,612	156,114	156,237

Total Projected Annual CO_2 emissions (Transportation)	**2.04**	**mT CO_2e per person**

TABLE 7 - PROJECTED WASTE EMISSIONS[9]

	Total Waste (tons)	Waste Emissions (mT CO_2e)	Population	Emissions per Capita (mT CO_2e/person)	Square Footage	Emissions per Square Foot (mT CO_2e/SF)
Residential	83,664	17,733.83	155,608	**0.097**	N/A	N/A
Non-Residential	143,704	20,846.95	N/A	N/A	40,436,068	**0.00052**

[8] Transportation emissions data from Google Environmental Insights Explorer; Population data from American Community Survey 1-year Estimates.

[9] Source: Lakewood's 2021 Greenhouse Gas Inventory.

2024 LIST OF UPDATES

Page 1 – Updated “Revised Date” and page numbers as needed.

Page 2 – Removed 2022 effective date, no longer relevant as fees apply to all new applications. Removed line for “pre-planning applications” for clarity since this is not paid separately but is part of the regular application fee.

Page 3 – Clarified EDM minimum applicability.

Page 4 – Added example to demonstrate how points and fees-in-lieu apply to a 200,000 sf development. Removed detailed C&D explanation, added reference to C&D Administration Regulation document. Clarified GHG worksheet submittal requirements.

Pages 5-7 – Added information about how energy models are incorporated into the baseline GHG calculations.

Page 8 – Updated Non-Residential Target Emissions per square foot based on Quantitative Values Tables.

Page 9 – Clarified how mitigation strategies apply when an energy model is also used, and to depict on plans.

Page 10 – Clarified timing of fee-in-lieu determination. Updated footnote to clarify waste data source.

Page 11 – Removed reference to fee-in-lieu payment at MSP approval. Fees will be due prior to permit issuance.

Pages 9-11 – Removed Energy Model Emissions calculations from Final Projected Emissions to match the organization of the updated GHG calculator and revised subsequent equation numbering accordingly. This greatly simplified the calculation explanation.

Table 1 (Pages 12-13) – Updated Summary of GHG Mitigation Program values, sources, and footnotes to reflect the most recent available data.

Table 2 (Page 14) – No changes; the Performance Standard calculations are always based on 2018 values.

Table 3 (Page 14) – Updated table and footnote based on 2022 American Community Survey estimates.

Table 4 (page 14) – Performance Standard calculations generally should not change. In this update, the methodology to analyze citywide non-residential building square footage from the Jefferson County Assessor was changed from the previous version to correct some data anomalies discovered during the update process. The new methodology was applied retroactively to the Performance Standard calculations (based on 2018 data) to fix the data issue for greater accuracy. See the Notable Changes section for more information.

Table 5 (Page 15) – EUI values for electricity and natural gas were updated based on the most recent available CBECS and RECS data from the Energy Information Administration. See the Notable Changes section.

Table 6 (Page 16) – Transportation emissions, population values, and footnote updated based on most recent data from Google Environmental Insights Explorer and American Community Survey estimates.

Table 7 (Page 16) – Waste emissions, population values, and footnote updated based on the 2021 Lakewood GHG Inventory, which was completed in 2023.

Pages 17-18 – Added 2024 List of Updates and Notable Changes.

NOTABLE CHANGES:

NON-RESIDENTIAL BUILDING AREA (2018) – changed methodology to analyze citywide square footage from Jefferson County Assessor's data for greater accuracy. The previous method clipped parcel data to the city boundary. During the 2023 update cycle, it was discovered that clipping to the city boundary included some parcels that touch the city boundary but are not fully within Lakewood. To remedy this, the parcel data was filtered by tax jurisdiction instead, and visually verified in GIS. This filtering method will be used going forward, and was retroactively applied to the 2018 square footage for consistency and accuracy.

PROJECTED ANNUAL ENERGY USE – with this update, new data was available for both CBECS and RECS. Both follow a 5-year cycle which are typically offset by 2-3 years, but were closer together this time due to pandemic delays. The CBECS data is now from 2018 and RECS is from 2020, filtered for a cold climate region. When filtered at this level, some building types reported a Q instead of an EUI for either electricity, natural gas, or both. According to the EIA, a Q means that the sample size is not large enough to report, the margin of error is too large to report, or that there is some other statistical reason why the data cannot be reported at that level. To fill these gaps, Sustainability staff explored several options to estimate the missing EUIs:

- Using the EUI reported in previous survey results from 2012/2015. This option would not take into account the great advances in efficiency for new construction since the previous surveys, which felt unfair to applicants.
- Using the national average EUI reported in the most recent surveys for the missing building types. This option would not take into account the wide range of climates in the US and felt like it would be too inaccurate to reasonably justify.
- Calculating the percent change in EUI from previous surveys to the most recent surveys and applying it to the missing building types. This option was determined to be the best balance of accuracy and fairness to applicants by using the most specific data available.

To calculate the missing EUI values, staff first determined the percent change from the previous surveys to the latest surveys for each of the building types which reported an EUI in both surveys. These were then averaged to result in an overall cold-climate percent change in EUI. For the building types which reported a Q in the latest survey, the average cold-climate percent change in EUI was applied to the previous survey results to estimate the EUI for the most recent survey year. The exception to this was when a building sub-type reported a Q, but the same general building type reported an EUI. In this situation, the percent change for the general building type was applied to the building sub-type. For example, instead of using the overall cold-climate percent change for the Healthcare - Outpatient building sub-type, the percent change for the Healthcare - General building type was used. All estimated values were compared with similar building types and with regional and national EUIs for the same building type to ensure there were no anomalies or outliers. This methodology provided enough specificity and accuracy in the EUI estimates for the purposes of projecting energy usage.