MUNICIPAL BUILDING ENERGY REPORT

City of Columbia Municipal Benchmarking

2022

city of Columbia

Office of Sustainability

TABLE OF CONTENTS

Definitions.....3

Purpose & Roadmap.....4

Buildings List.....5

Portfolio Performance.....8

Metrics & Reporting.....9

1. ENERGY STAR Rating.....9
2. Energy Usage 10
3. Energy Use Intensity.....13
4. GHG Emissions.....16

Buildings Map.....19

Building Spotlights.....20

DEFINITIONS

Benchmarking means to track and input a building's or a campus of buildings' energy consumption data and other relevant building information for 12 consecutive months, to quantify the building's energy use.

Benchmarking Tool means the website-based software, commonly known as "ENERGY STAR Portfolio Manager®", developed and maintained by the United States Department of Energy and Environmental Protection Agency to track and assess the relative energy use of buildings nationwide.

Energy means electricity, natural gas, fuel oil, steam, biomass or other product for use in a building, or renewable on-site electricity generation, for purposes of powering or fueling end uses in a building.

Site Energy Use- annual amount of all the energy a property consumes on-site, regardless of the source. In this report, site energy use is *weather normalized* (see definition below).

Energy Use Intensity (EUI) EUI expresses a building's energy use as a function of its size or other characteristics for building types in Portfolio Manager. EUI is calculated by dividing the total energy consumed by the building in one year (measured in kBtu) by the total gross floor area of the building. In this report, EUI data is *weather normalized* (see definition below).

Energy Score - the "1" to "100" numerical score produced by the Benchmarking Tool, also known as "ENERGY STAR Portfolio Manager®". This assesses a building's energy performance relative to similar buildings, based on source energy use, operating characteristics, and geographical location.

Fuel Mix: the assortment of fuel types comprising an energy portfolio, expressed in percentage.

Greenhouse Gas (GHG) Emissions are atmospheric gases that are produced as a result of burning fossil fuels used to produce electricity and heat, and to power vehicles. The GHG emission data in this report is based on actual site energy consumed and is reported in units of metric tons of carbon dioxide equivalent (MTCO2e).

Gross Floor Area (GFA) means the total number of square feet measured between the exterior surfaces of the enclosing fixed walls of a building.

KBtu: thousands of British Thermal Units; a common unit of energy measurement. Energy usage in this document is reported in kBtu.

Municipal Building is a building that is owned and operated by or on behalf of the City of Columbia or for which the City regularly pays all of the annual utility bills or the portion of the annual utility bills related to City operations in the case of buildings shared with another entity.

National Median Energy Use- the 50% percentile energy usage of the national population. Medians are based on survey data and are normalized for *fuel mix*, *use type*, and *GFA*.

Weather Normalized Energy- the energy a building would have used during 30-year average weather conditions. Weather normalized data allows for building energy performance to be monitored over time without interference of weather fluctuations.

Use Type- categories for property use type as defined by Portfolio Manager for energy benchmarking purposes. There are 18 total use type categories that all buildings fall under.

PURPOSE & ROADMAP

In 2020, the Good Stewards-Buildings (GSB) Climate Action and Adaptation Plan (CAAP) Team began developing the Benchmarking Policy to meet CAAP action H-1.3.4:" Introduce a policy that requires all municipal buildings to be benchmarked with the current Energy Score rating, the energy use intensity (kBTU/sqft) and the energy reduction goal. These benchmarks and goals shall also be posted on the City's website." The team collected examples from other municipalities, consulted with staff involved in the implementation of policies, and received guidance from the Midwest Energy Efficiency Alliance. The team also collaborated with the CAAP Core and Executive teams as well as the Climate and Environment Commission to develop the policy.

The Policy Roadmap sets out the timeline of compliance for Municipal Building Benchmarking. There are an estimated 40 buildings to be entered into Portfolio Manager and benchmarked, in addition to the currently benchmarked buildings. The remaining buildings are broken up into two groups based on square footage. As shown below, the Benchmarking Policy outlines compliance deadlines for benchmarking both building groups and calls for all municipal buildings to be benchmarked by June 1st, 2023. Once Benchmarking has been completed, the GSB team and city staff will work together to establish building-level energy performance improvement goals for all benchmarked buildings.

Per the policy, an annual report must be published on the prior year's data including the ENERGY STAR score, energy usage, energy use intensity, greenhouse gas emissions, and water usage where available. This report addresses these metrics for eligible municipal buildings that have been benchmarked prior to calendar year 2021. Future reports will include water usage data and energy use reduction goals. This is the first report of municipal building energy use under the policy. It is available at www.como.gov/sustainability/internal-sustainability.

Policy Roadmap

Compliance Deadlines	Types of Buildings	Building Size
Before June 1, 2022*	Group 1 Buildings	GFA < 10k
Before June 1, 2023	Group 2 Buildings	GFA > 10k

*The Good Stewards Buildings team is in the process of benchmarking the remaining Group 1 Buildings.

BUILDING LIST

Building Name	Address	Use Type	Group
Activity and Recreation Center (ARC)	1701 W Ash Street	Fitness Center/Health Club/Gym	Group 2
Airport Main & North Terminal	11301 South Airport Drive	Office/Other-Service	Group 2
Airport Maintenance	11303 South Airport Drive	Other-Services	Group 1
Armory	701 E Ash Street	Other-Recreation	Group 1
Casteel Building	1518 Business Loop 70 E	Office	Group 2
City Hall	701 E Broadway	Office	Group 2
Fire Station #1	201 Orr Street	Other-Public Services	Group 2
Fire Station #2	1212 W Worley Street	Other-Public Services	Group 1
Fire Station #4	2300 N Oakland Gravel Road	Other-Public Services	Group 1
Fire Station #5	1400 N Ballenger Lane	Other-Public Services	Group 1
Fire Station #6	3112 Chapel Hill Road	Other-Public Services	Group 1

BUILDING LIST

Building Name	Address	Use Type	Group
Fire Station #7	401 Green Meadows Lane	Other-Public Services	Group 1
Fire Station #8	2301 East Nifong	Other-Public Services	Group 1
Fire Station #9	201 Blue Ridge	Other-Public Services	Group 1
Gentry	1 South 7th Street	Office/Self-Storage Facility	Group 1
Grissum	1313 Lakeview Ave	Other Services/Office	Group 2
Heuchan	1514 Business Loop 70 East	Office/Non-Refrigerated Warehouse/Other-Services	Group 2
Howard Building	600 East Broadway	Office	Group 2
L.A. Nickell Clubhouse	1800 Parkside Drive	Other-Recreation	Group 1
L.A. Nickell Maintenance	1900 Parkside Drive	Other-Services	Group 1
Lake of the Woods Club House	6700 St. Charles Road	Other-Recreation	Group 1
Lake of the Woods Maintenance	6700 St. Charles Road	Other- Services	Group 1
Parks and Rec Fabrication	1508 Business Loop 70 W	Other-Services	Group 1

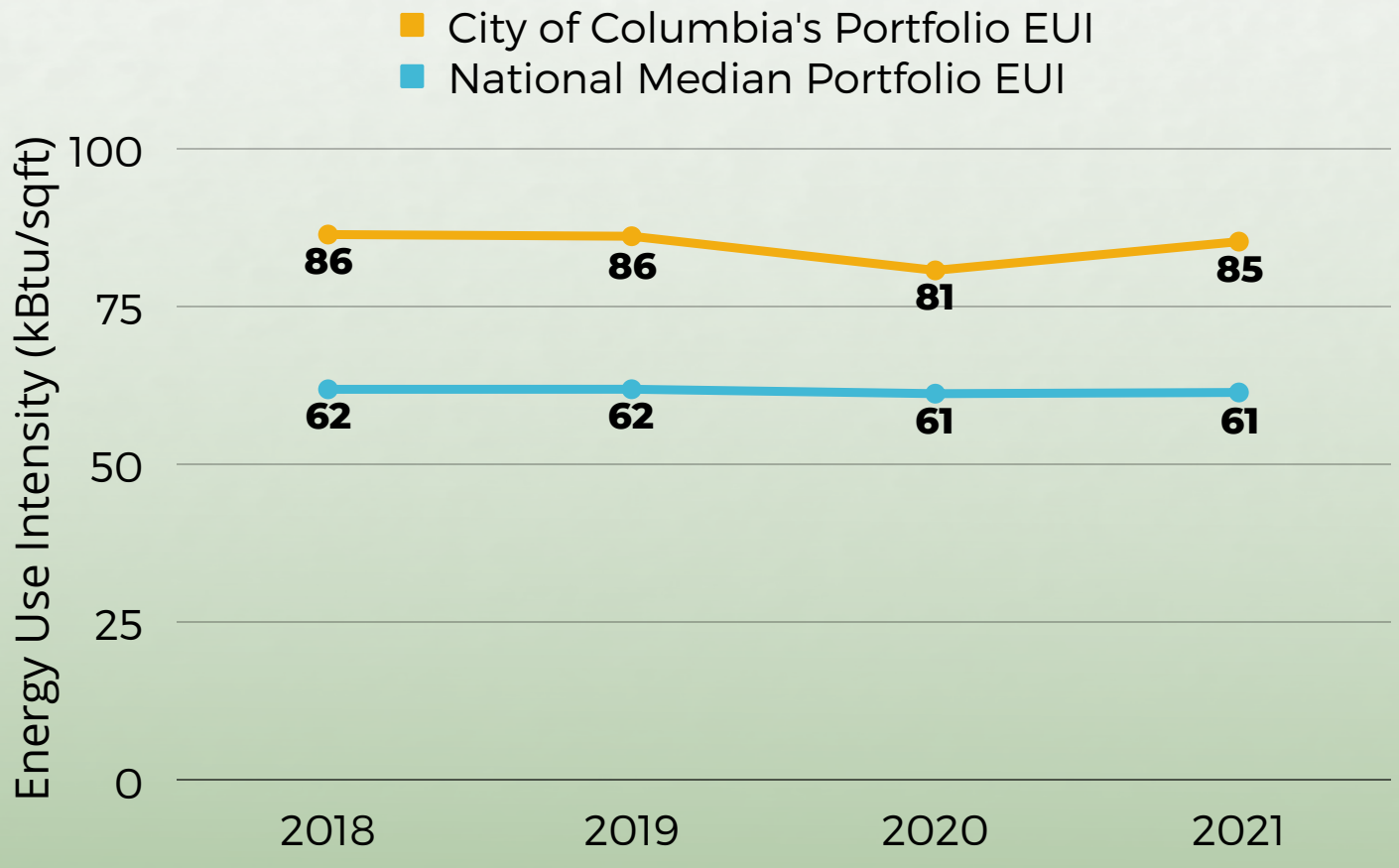
BUILDING LIST

Building Name	Address	Use Type	Group
Parking Garage 10th & Cherry	100 S Tenth Street	Parking	Group 1
Parking Garage 5th & Walnut	500 E Walnut Street	Parking	Group 2
Parking Garage 6th & Cherry	555 Locust Street	Parking	Group 2
Parking Garage 8th & Cherry	14 S Eighth Street	Parking	Group 2
Parking Plaza 7th & Walnut	16 N Seventh Street	Parking	Group 2
Police	17 North 7th Street	Office	Group 2
Reichmann Pavilion	2300 E Walnut Street	Social/Meeting Hall	Group 1
Sanford-Kimpton Building	1005 West Worley Street	Medical Office	Group 2
Thomas Walton Building	300 South Providence	Office/Social/Meeting Hall	Group 1
Wastewater Treatment Plant	4900 West Gillespie Bridge Road	Parking/Wastewater Treatment Plant	Group 2
Water Admin & Joe Crane	1514 Business Loop 70 East	Office/Other-Services	Group 1

PORTFOLIO PERFORMANCE

Portfolio performance data provides a snapshot of how all eligible buildings within the City of Columbia's portfolio are cumulatively performing. Portfolio energy use intensity (EUI) is calculated by dividing the total energy usage in the portfolio by the total square footage in the portfolio. The current portfolio EUI is consistently higher than the portfolio's national median EUI. The drop seen in 2020 was influenced by building use changes during COVID-19. The Climate Action and Adaptation plan calls for a reduction in portfolio energy use by 20% over five years (2019-2024).

The national median portfolio EUI on the chart below represents what the City of Columbia's portfolio EUI would be if each building was performing at the national 50th percentile. This is calculated by dividing the cumulative national median energy use of all properties in the portfolio by the total square footage in the portfolio. National median data takes into account the building size, fuel mix, and use type of individual buildings. Parking garages, Airport Maintenance, the Wastewater Treatment Plant, and inactive buildings are excluded from this data.



ENERGY STAR SCORE

ENERGY STAR Score assesses a building's energy performance relative to similar buildings, based on source energy use, operating characteristics, and geographical location. ENERGY STAR score trend data (below) shows how each buildings' energy score changes in relation to national peers over time. Higher ENERGY STAR scores indicate better energy performance.

	ENERGY STAR Score			
Building Name	**2018**	**2019**	**2020**	**2021**
Casteel Building	40	43	58	57
City Hall	48	44	43	42
Howard Building	42	41	45	49
Police	18	18	18	17
Sanford-Kimpton Building	91	92	93	93
Thomas Walton Building	85	87	92	89
Wastewater Treatment	88	89	83	91

*ENERGY STAR Score eligibility is based on property use type. The 7 above are the only buildings in the City of Columbia's current portfolio that are eligible for an ENERGY STAR Score.

ENERGY USAGE

The following data represents the total energy usage in kBtu of combined natural gas, electricity, and/or fuel oil each building used in the reported year. For each building, an average fuel mix is reported to show average proportions of natural gas and electricity used by each building over the four year period reported.

	Yearly Energy Usage (kBtu)				Average Fuel Mix (%)	
Building Name	**2018**	**2019**	**2020**	**2021**	**Electricity**	**Natural Gas**
Activity and Recreation Center	10,149,802	10,577,865	8,563,633	9,626,692	66%	34%
Airport Main & North Terminal*	4,319,750	4,260,700	3,761,451	3,460,789	64%	36%**
Airport Maintenance	242,924	269,520	226,253	261,997	100%	0%
Armory	1,847,522	1,613,595	1,419,000	1,766,043	43%	57%
Casteel Building	1,182,339	1,129,256	829,902	753,889	48%	52%
City Hall	10,208,763	10,753,831	11,016,554	11,241,821	78%	22%
Fire Station #1	1,282,858	1,208,956	1,184,494	1,119,751	46%	54%
Fire Station #2	341,778	381,148	375,914	401,929	45%	55%
Fire Station #4	351,161	344,570	359,387	386,043	32%	68%
Fire Station #5	384,747	428,421	465,630	428,580	33%	67%
Fire Station #6	433,268	421,275	440,481	415,458	31%	69%

*Airport Main & North Terminal data is not weather normalized.
**Airport Main & North Terminal uses Fuel Oil #2 and does not use natural gas.

ENERGY USAGE (CONTINUED)

	Yearly Energy Usage (kBtu)				Average Fuel Mix (%)	
Building Name	**2018**	**2019**	**2020**	**2021**	**Electricity**	**Natural Gas**
Fire Station #7	687,020	779,819	725,682	670,588	41%	59%
Fire Station #8	718,721	684,710	691,828	656,316	37%	63%
Fire Station #9	548,006	561,309	532,341	545,288	51%	49%
Gentry	351,565	407,451	390,638	396,965	41%	59%
Grissum	6,150,198	5,285,042	4,732,381	5,379,175	36%	64%
Heuchan	1,381,686	1,270,732	1,400,216	1,450,784	99%	1%
Howard Building	1,298,011	1,321,992	1,289,275	1,208,530	85%	15%
L.A. Nickell Clubhouse	197,331	187,144	153,526	177,452	100%	0%
L.A. Nickell Maintenance	448,443	455,436	449,603	500,841	6%	94%
Lake of the Woods Club House & Maintenance*	306,787	323,685	318,310	314,174	48%	52%
Parks and Rec Fabrication	319,973	303,402	309,622	429,223	18%	82%
Parking Garage 10th & Cherry	500,002	505,232	445,038	436,625	100%	0%

*Because of a shared meter, building-specific energy use, EUI, fuel mix, and GHG data is unavailable for Lake of the Woods Club House and Lake of the Woods Maintenance.

ENERGY USAGE (CONTINUED)

	Yearly Energy Usage (kBtu)				Average Fuel Mix (%)	
Building Name	**2018**	**2019**	**2020**	**2021**	**Electricity**	**Natural Gas**
Parking Garage 5th and Walnut	1,205,816	1,202,421	1,205,631	1,257,009	100%	0%
Parking Garage 6th and Cherry	506,695	564,582	532,179	503,552	100%	0%
Parking Garage 8th & Cherry	247,855	228,470	218,496	301,625	100%	0%
Parking Plaza 7th & Walnut	515,103	524,084	544,672	519,019	100%	0%
Police	2,891,990	2,950,601	3,086,158	3,092,397	92%	8%
Reichmann Pavilion	225,902	256,551	230,836	249,763	100%	0%
Sanford-Kimpton Building	1,409,738	1,385,821	1,400,087	1,377,680	78%	22%
Thomas Walton Building	273,770	256,819	216,579	264,021	81%	19%
Wastewater Treatment Plant	41,574,248	43,531,201	46,349,638	38,109,244	81%	19%
Water Admin & Joe Crane	824,234	761,308	729,252	773,630	51%	49%

ENERGY USE INTENSITY

Energy use intensity (EUI) is the best metric for monitoring building energy performance over time and comparing performance of buildings of different sizes. A national median EUI is shown for each building below to provide a national 50th percentile comparison of properties with similar size, use type, and fuel mix.

		Site Energy Use Intensity (kBtu/sqft)				
Building Name	**Gross Floor Area**	**2018**	**2019**	**2020**	**2021**	**2021 National Median EUI**
Activity and Recreation Center	73,000	139	145	117	132	50
Airport Main & North Terminal*	19,830	218	215	190	175	42
Airport Maintenance	8,500	29	32	27	31	35
Armory	9,820	188	164	145	180	64
Casteel Building	20,000	59	57	42	38	40
City Hall	120,000	85	90	92	94	84
Fire Station #1	16,050	80	75	74	70	46
Fire Station #2	3,696	93	103	102	109	68
Fire Station #4	3,938	89	88	91	98	52
Fire Station #5	2,980	129	144	156	144	52

*Airport Main & North Terminal data is not weather normalized.

ENERGY USE INTENSITY (CONTINUED)

		Site Energy Use Intensity (kBtu/sqft)				
Building Name	**Gross Floor Area**	**2018**	**2019**	**2020**	**2021**	**2021 National Median EUI**
Fire Station #6	3,692	117	114	119	113	55
Fire Station #7	7,791	88	100	93	86	47
Fire Station #8	8,272	87	83	84	79	50
Fire Station #9	9,038	61	62	59	60	61
Gentry	7,240	49	56	54	55	63
Grissum	71,000	87	74	67	76	57
Heuchan	21,270	65	60	66	68	32
Howard Building	20,620	63	64	63	59	56
L.A. Nickell Clubhouse	4,650	42	40	33	38	40
L.A. Nickell Maintenance	4,309	104	106	104	116	85
Lake of the Woods Club House*	4,709	N/A	N/A	N/A	N/A	N/A
Lake of the Woods Maintenance*	3,628	N/A	N/A	N/A	N/A	N/A
P&R Fabrication	6,973	46	44	44	62	69

*EUI data is unavailable for Lake of the Woods Club House and Maintenance due to a shared meter.

ENERGY USE INTENSITY (CONTINUED)

		Site Energy Use Intensity (kBtu/sqft)				
Building Name	**Gross Floor Area**	**2018**	**2019**	**2020**	**2021**	**2021 National Median EUI**
Parking Garage 10th & Cherry	93,830	5	5	5	5	N/A
Parking Garage 5th and Walnut	225,600	5	5	5	6	N/A
Parking Garage 6th and Cherry	142,848	4	4	4	4	N/A
Parking Garage 8th & Cherry	77,526	3	3	3	4	N/A
Parking Plaza 7th & Walnut	113,288	5	5	5	5	N/A
Police	34,100	85	87	91	91	58
Reichmann Pavilion	4,673	48	55	49	53	39
Sanford-Kimpton Building	29,740	47	47	47	46	76
Thomas Walton Building	8,400	33	31	26	31	62
Wastewater Treatment Plant	N/A*	2.81	2.51	2.68	2.2	3.93
Water Admin & Joe Crane	9,600	86	79	76	81	60

*Wastewater Treatment EUI is based on energy consumed (kBtu)/gallons per day rather than square footage.

GREENHOUSE GAS EMISSIONS

The City of Columbia has set goals to reach net zero emissions for municipal operations by 2050. Benchmarking is one tool to take action to reduce greenhouse gas (GHG) emissions. GHG emissions are influenced by both building energy performance and the emissions per unit of energy supplied. The City of Columbia strives to improve building efficiency and reduce emissions per unit of energy supplied through increased use of renewable energy. Building GHG intensity, which represents emissions per square foot, allows for comparison of GHG emissions between buildings regardless of building size.

	Greenhouse Gas Emissions (MTCO2e)				MTCO2e/ 1,000 sqft
Building Name	**2018**	**2019**	**2020**	**2021**	**2021 GHG Intensity**
Activity and Recreation Center	1,934	1,961	1,448	1,714	23.5
Airport Main & North Terminal	558	636	479	516	26.0
Airport Maintenance	52	64	44	49	5.8
Armory	311	240	185	225	22.9
Casteel Building	149	146	125	131	6.6
City Hall	2,090	2,227	2,213	2,255	18.8
Fire Station #1	187	175	163	165	10.3
Fire Station #2	50	55	54	54	14.6
Fire Station #4	38	40	41	46	11.6
Fire Station #5	43	51	51	51	17.1
Fire Station #6	51	47	48	45	12.2

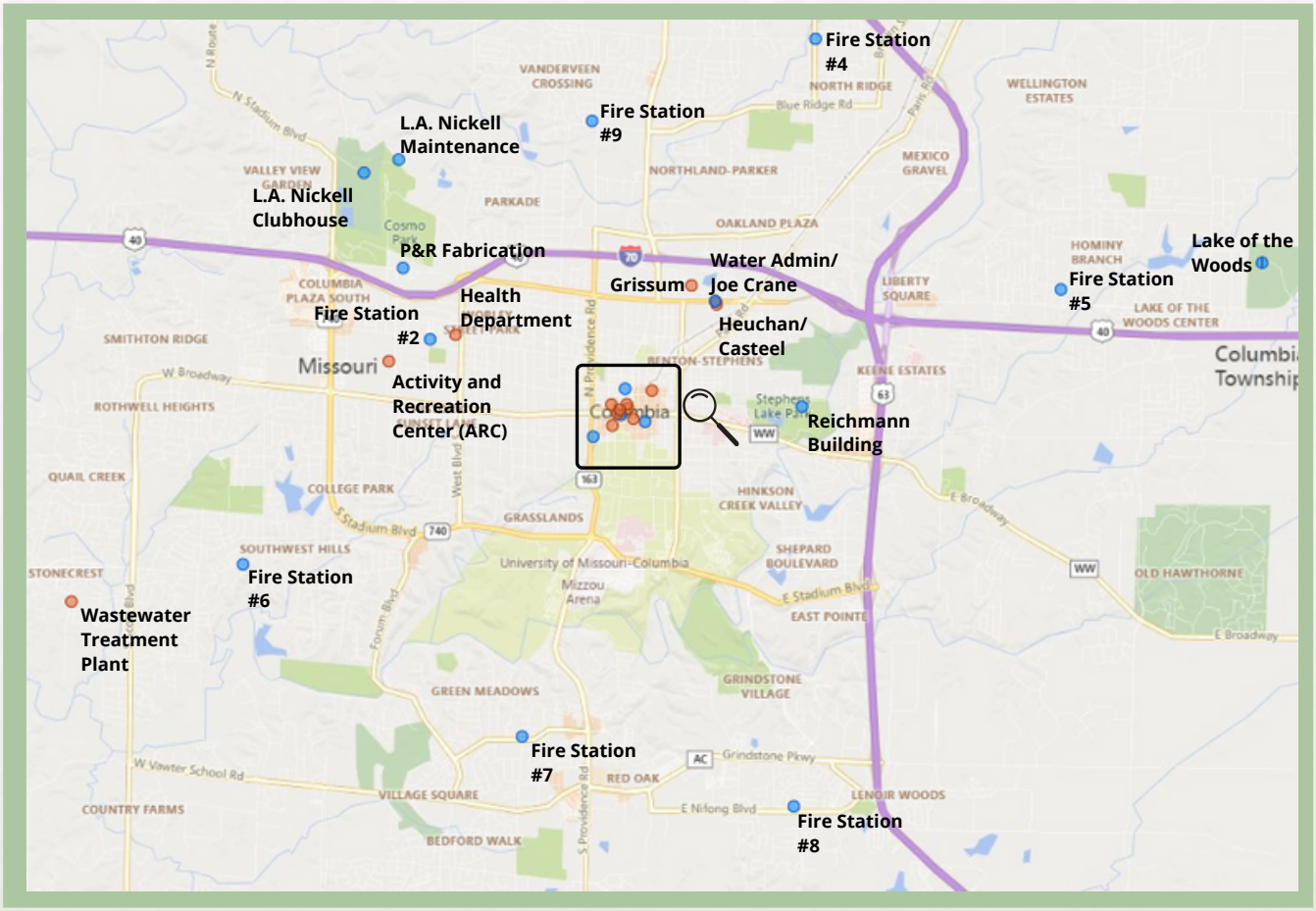
GREENHOUSE GAS EMISSIONS (CONTINUED)

	Greenhouse Gas Emissions (MTCO2e)				MTCO2e/ 1,000 sqft
Building Name	**2018**	**2019**	**2020**	**2021**	**2021 GHG Intensity**
Fire Station #7	93	100	91	93	12.0
Fire Station #8	87	88	88	82	9.9
Fire Station #9	84	83	83	86	9.5
Gentry	45	54	52	53	7.4
Grissum	763	645	568	624	8.8
Heuchan	340	319	331	350	16.5
Howard Building	285	291	273	263	12.7
L.A. Nickell Club House	51	47	35	43	9.3
L.A. Nickell Maintenance	31	30	27	29	6.6
Lake of the Woods Club House + Maintenance	41	40	37	39	4.7
P&R Fabrication	29	27	25	36	5.2
Parking Garage 10th & Cherry	122	123	107	104	1.1

GREENHOUSE GAS EMISSIONS (CONTINUED)

	Greenhouse Gas Emissions (MTCO2e)				MTCO2e/ 1,000 sqft
Building Name	**2018**	**2019**	**2020**	**2021**	**2021 GHG Intensity**
Parking Garage 5th and Walnut	292	296	293	307	1.4
Parking Garage 6th and Cherry	124	138	127	120	0.8
Parking Garage 8th & Cherry	60	56	53	75	1.0
Parking Plaza 7th & Walnut	127	129	130	123	1.1
Police	697	696	674	689	20.2
Reichmann Pavilion	59	65	54	62	13.2
Sanford-Kimpton Building	297	290	270	279	9.4
Thomas Walton Building	59	57	47	52	6.2
Wastewater Treatment Plant	8,318	9,520	9,619	8,301	N/A
Water Admin & Joe Crane	131	117	104	110	11.5

BUILDING LOCATIONS



Group One Buildings (<10k Square Feet)

Group Two Buildings (>10k Square Feet)

Central Columbia

BUILDING SPOTLIGHTS

Municipal Parking Garages

The City of Columbia Public Works Department upgraded more than 300 lighting fixtures to more efficient LED lighting in the Fifth & Walnut, Short Street, and Tenth & Cherry parking garages. This was completed in September 2021. These updates are estimated to reduce annual usage by more than 215,000 kWh and annual costs by more than $21,000.

The Howard Building

In December 2019, a renovation project to reroof the Howard Building (Municipal Court) was completed. During the project, insulation was added to the roof to minimize heat gains and losses. Improperly insulated roofs can contribute to up to 35% of a building's heat gains and losses. The annual energy usage in the Howard Building reduced by 7% between 2019 and 2021.

city of Columbia
Office of Sustainability