



CITY OF WILMINGTON

FY23 Greenhouse Gas Emissions Update

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BACKGROUND

Wilmington has been a longtime leader in addressing the challenge of climate change. In **2006**, Wilmington passed a **Resolution endorsing the US Conference of Mayors Climate Protection Agreement**. In **2009**, Wilmington performed its **first Greenhouse Gas (GHG) emission inventory** which established a GHG emission baseline. The inventory was followed by City Council passing a resolution in October **2009** setting ambitious **GHG emissions reduction goals for municipal operations**.

Wilmington has maintained the commitment to curbing climate change through resolutions supporting GHG emission reductions, including:

- 2017 - Resolution addressing climate change
- 2020 – Resolution establishing the Ad Hoc Clean Energy Policy Task Force
- 2021 – Resolution adopting 2035 and 2050 Clean Energy Goals
- 2021 – Resolution supporting the Mayors for 100% Clean Renewable Energy Pledge
- 2021 – Resolution establishing the Clean Energy Advisory Committee
- 2022 - Resolution to sign Public Comment Letter to NCUC concerning Duke Energy’s Carbon Plan

What is the Goal?



Reduce GHG emissions from **municipal operations** by **58% by 2050** from a 2007 baseline of 9,704 metric ton of CO₂e.

What are Greenhouse Gas emissions?

GHG’s such as carbon dioxide and methane trap heat in the atmosphere, warming the planet and causing cascading impacts on environmental systems. The largest source of GHG emissions from human activity in the US is from burning fossil fuels for electricity, heat, and transportation.

CO₂e, or “carbon dioxide equivalent,” is the standard unit for measuring GHG emissions. The emissions include three categories:

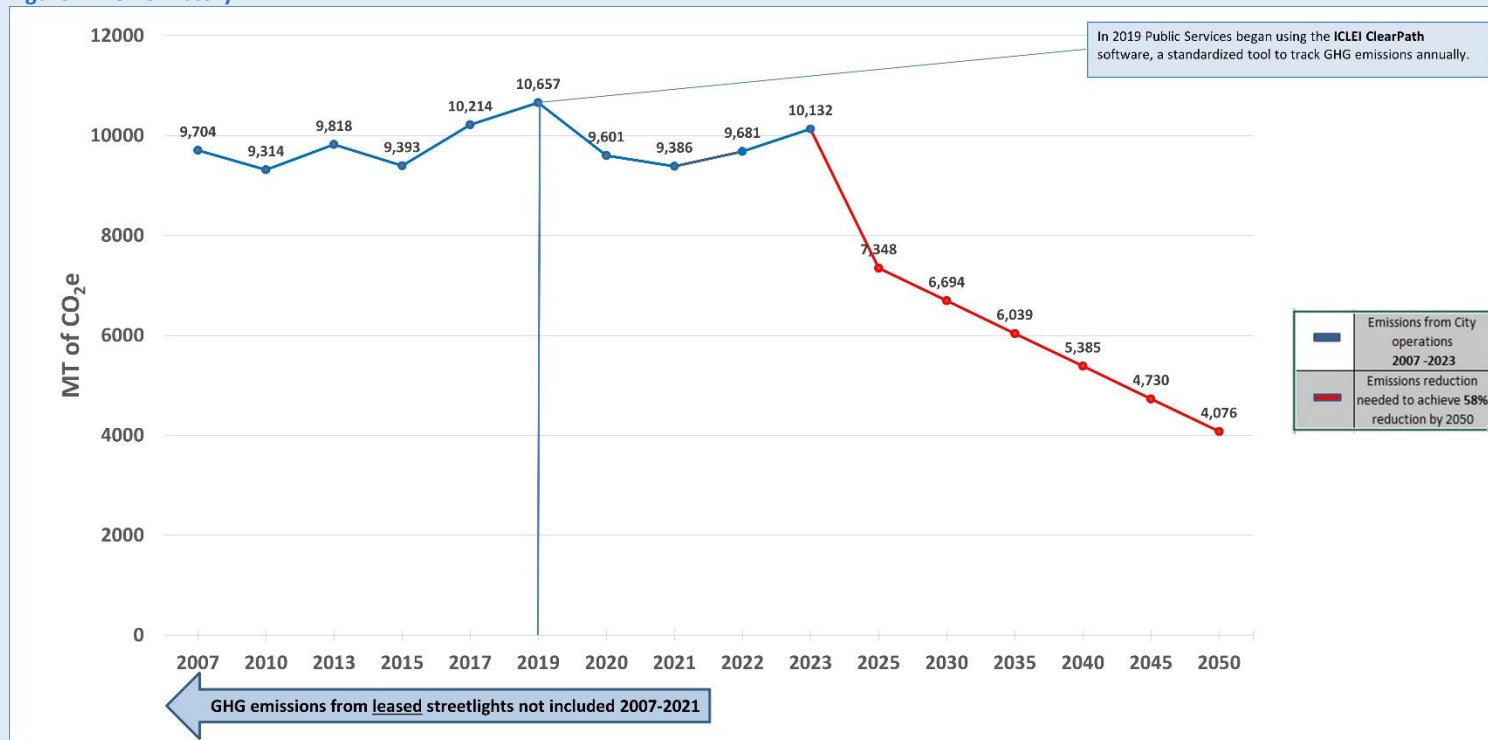
- **Scope 1** – direct emissions from activities under City control including fuel combustion on-site from gas boilers, back-up generators, and fuel usage in fleet vehicles & equipment.
- **Scope 2** – indirect emissions from electricity purchased and used by the City from Duke Energy.
- **Scope 3** – indirect emissions from City activities outside of City control such as off-site fuel purchases.

GHG emissions from the City of Wilmington include emissions from City buildings, fleet & equipment fuel use, streetlights, area lights, and traffic signals.

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What's Wilmington's GHG Emissions History?

Figure 1 – GHG History



Key Points:

- In 2023 GHG emissions were **10,132 MT CO₂e** as shown in Figure 1 above.
 - This was a slight increase (5%) from 2022 GHG emissions of **9,681 MT CO₂e**, a delta of 451 MT CO₂e.
 - The increase can be attributed to several factors, including:
 - A 3% increase in the regional eGrid factor (more info provided below).
 - A full year of *estimated* electricity usage of leased streetlights from Duke Energy. Note, the electricity usage of the *leased* streetlights, which are non-metered, was not available or reported prior to 2022. Leased streetlights utilized 2,818,922 kWh in FY23 versus 1,843,734 kWh in FY22, a difference of 975,188 kWh.
 - A full year of electricity usage from the 115 N 3rd Street Building which the City acquired at the end of FY22. In FY23, this building utilized 917,518 kWh.
 - An 8% increase in facility electricity usage from FY22. Facilities used 12,135,032 kWh in FY23 versus 11,200,937 kWh in FY22, an increase of 934,095 kWh.

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- To meet the GHG reduction goal of 58% by 2050 (or 4,076 MT CO₂e) emissions will need to decrease by an average of **224 MT CO₂e per year** between 2023 and 2050.
 - So what does a reduction of 224 MT CO₂e each year look like?
 - 25,000 gallons of gasoline, or a **4%** reduction from FY23 fuel usage.
 - 520,000 kWh of electricity, or a **3%** reduction from FY23 electricity usage.

GHG Emissions by Sector

Figure 2 – Emissions by Sector

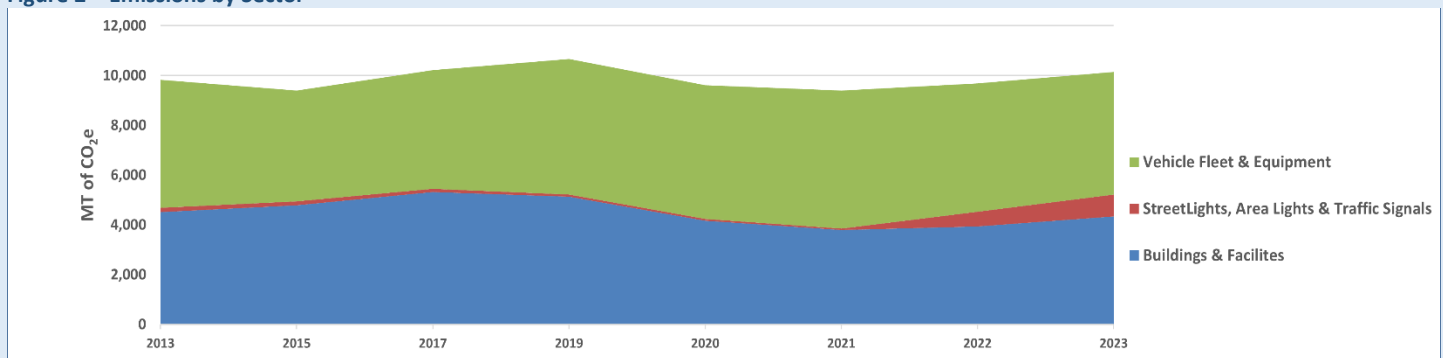


Table 1 – Historical Emissions by Sector

	MT CO ₂ e							
	2013	2015	2017	2019	2020	2021	2022	2023
Buildings & Facilities	4,503	4,776	5,312	5,121	4,160	3,782	3,926	4,334
StreetLights, Area Lights & Traffic Signals	182	157	133	95	74	69	589	880
Vehicle Fleet & Equipment	5,133	4,460	4,768	5,440	5,367	5,534	5,167	4,918
Total	9,818	9,393	10,213	10,656	9,601	9,385	9,682	10,132

Key Points:

- Vehicles & Equipment:** In FY23, the emissions from fuel usage in vehicles & equipment, **4,918 MT CO₂e** (see Table 1), composed the largest sector of the City’s GHG emissions at **49%** as illustrated in Figure 2 above.
 - Good news in this sector** - even though fuel usage increased by 1%, the GHG emissions decreased by 5% due to:
 - Less diesel use in FY23, particularly from our heavy trucks
 - Note: *1 gallon of diesel used emits 22.4 lbs CO₂ versus 1 gallon of gasoline used emits 19.6 lbs CO₂.*
 - Continued purchase of new more fuel-efficient models and hybrid vehicles
 - As the City transitions towards zero-emission vehicles (ZEV’s) the GHG emissions from this sector will decrease significantly.

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- **Buildings & Facilities:** In FY23 the emissions from Buildings & Facilities were **4,334 MT CO²e** (see Table 1). This represented **43%** of the City's GHG emissions as illustrated in Figure 2 above. The FY23 emissions were an increase (408 MT CO²e or 10%) from the FY22 emissions of 3,926 MT CO²e. As noted previously, the addition of the Harrelson building made up most of the increase in this sector. The Harrelson building utilized 917,518 kWh of electricity or 397 MT CO²e.
 - **Good news in this sector** is FY23 was an **18%** emissions reduction from a peak in 2017. Building & Facilities emissions have been on a downward trend as energy efficiency initiatives are implemented, aged building mechanical equipment is replaced with new, efficient equipment, and new facilities are designed with energy efficiency as a priority.
- **Streetlights, Area Lights & Traffic Signals:** In FY23, the emissions from this sector, **880 MT CO²e**, represented **9%** of the City's GHG emissions. The FY23 emissions were a 49% increase from FY22 emissions of 589 MT CO²e. As noted previously, the streetlight emissions increase is attributable to a full year of *estimated* electricity usage data of leased streetlights now being provided by Duke Energy. Beginning in October 2021 Duke Energy Progress updated their data software system and began reporting the *estimated* energy usage of the 8,155 leased streetlights. This new estimated energy usage is now being included in the City's annual GHG reporting, which explains the increase in GHG emissions from this sector in 2022 (589 MT CO₂e) and 2023 (880 MT CO²e) in Table 1 above.
 - **Good news in this sector** is the continued effort to reduce GHG emission in this sector by converting any remaining high-pressure sodium vapor (HPSV) area lighting to energy efficient LED. Upcoming projects in FY24 will be converting 122 area lights in several park and Fire Station locations to LED.
 - Note, the City-owned lighting (streetlights and area lights) are metered and their energy usage has always been included in annual GHG reporting.
- **eGrid Factor:** The Emissions & Generation Resource Integrated Database (eGRID) is an EPA data source that is used to calculate GHG emissions. Each region has a different eGRID factor that is determined by how the electricity provider generates electricity (e.g primarily from coal, natural gas, nuclear, hydro, biomass, wind, and solar). For Wilmington GHG emission calculations the Virginia/Carolina (SRVC) region is used. The most recent data ([eGRID 2021](#)) was released in January of 2023 and the SRVC region had and 3% increase in the eGrid emission rate (see Table 3 below). An explanation of the increase per the EPA:
 - *"In general, the CO₂ output emission rates for most eGRID subregions increased in 2021 compared to 2020. CO₂ output emission rates may fluctuate on an annual basis due to a change in the resource mix (the percentage of generation from each fuel type). The changes in the resource mix are often attributed to changes in the number of plants in an eGRID subregion (retirements or additions) or changes to operations at individual plants."*

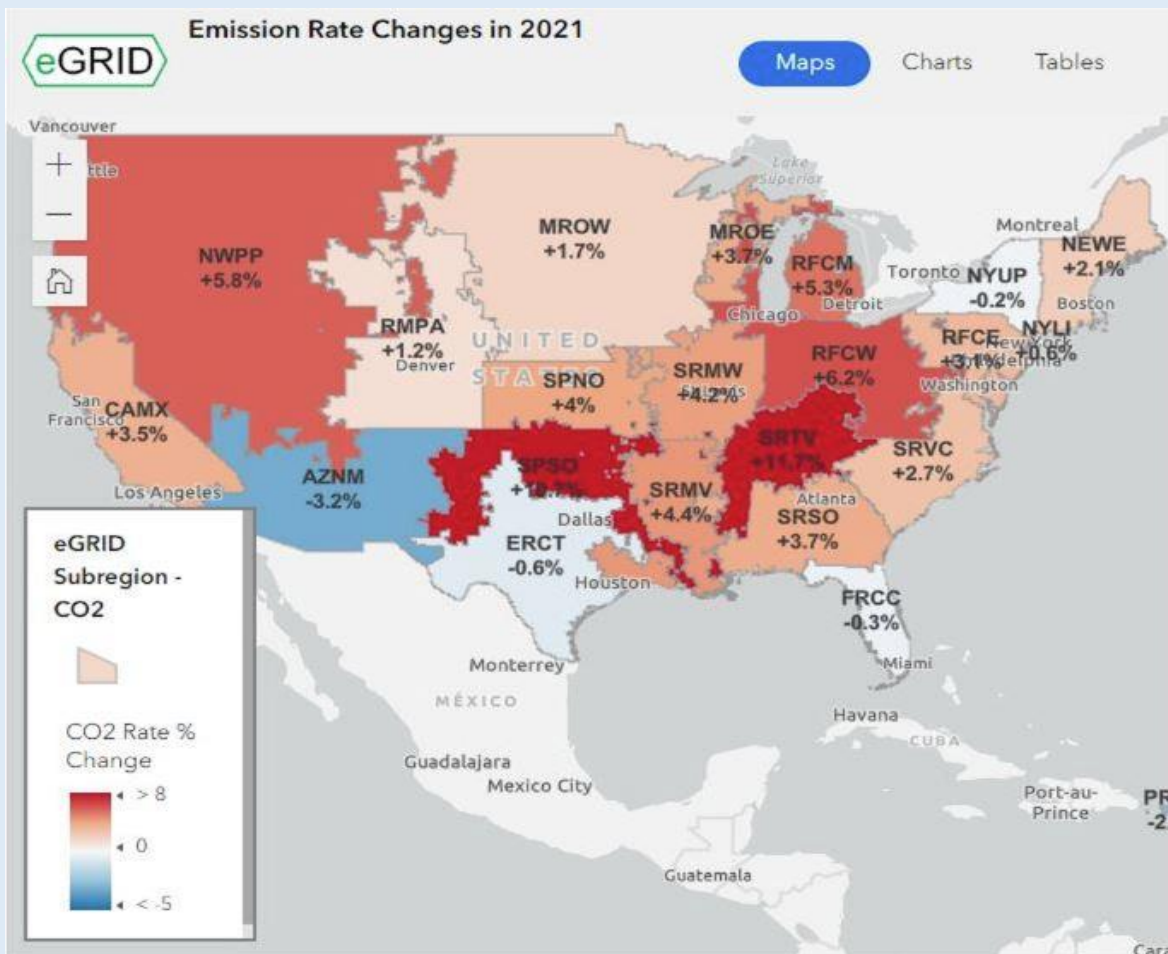
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- **Good news in this sector** - In Wilmington’s region, the electricity provided by Duke Energy Progress has increasingly been generated from cleaner sources. This change has resulted in the eGRID factor decreasing over time (25% since 2014) as noted in Table 3 and is a **significant factor in lowering Wilmington’s GHG emissions**.

Table 3- eGRID Historical Data

	VIRGINIA/CAROLINAS REGION eGRID EMISSION RATES			
	CO ₂ (lb/MWh)	CH ₄ (lb/MWh)	N ₂ O (lb/MWh)	CO ₂ e (lb/MWh)
eGrid 2014	856.6	0.096	0.138	856.8
eGrid 2016	805.3	0.067	0.011	805.4
eGrid 2018	743.3	0.067	0.009	747.5
eGrid 2019	675.4	0.058	0.008	679.1
eGrid 2020	623.1	0.050	0.007	626.3
eGrid 2021	639.7	0.052	0.007	642.9
2021 change since 2014	-25%	-46%	-95%	-25%
2021 change from 2020	3%	4%	0%	3%

<https://www.epa.gov/energy/emissions-generation-resource-integrated-database-egrid>



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- **Solar Energy Production:** The production of solar energy at municipal facilities provides a significant offset to the electricity usage of municipal operations. The City's current solar photovoltaic (PV) systems consist of:
 - 74 kW array on the Fleet Services building
 - 27 kW array on the Engineering Department building
 - A 10 kW array on the 1110 S 17th Street Facility
 - A 10 kW array at Miracle Field in Olsen Park

In FY23 these PV systems produced **137,226 kWh** of electricity or enough to offset **97.2 MT CO²e**.



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What Can Wilmington Do Next?

#1: Fleet & Equipment – As Wilmington’s municipal fleet accounts for **49%** of the GHG emissions, actions to significantly reduce emissions from this sector will have the greatest impact.



- Conduct a Fleet EV Transition Study, to include the following components:
 - Fleet evaluation / right-sizing analysis
 - Transition schedule
 - EV charging infrastructure planning
 - Sustainable Fleet policy recommendation
 - Fleet Transition Plan final report
- Consider an EV pilot project.
- Phase out use of gas mowers, leaf blowers, landscaping equipment, and golf carts and replace them with electric models
- Identify and pursue federal / state grant opportunities to support the purchase of EV’s and the installation of EV charging infrastructure.
- Support the growth and use of alternative modes of transportation.

#2: Buildings & Facilities – As our buildings & facilities represent the next largest sector of our GHG emissions at **43%**, sustainable design, construction, and operation will have significant impact on emissions for the life of the buildings. In addition, the energy efficiency of our existing buildings must continue to be a priority.



- Prioritize sustainable design, energy efficiency, and renewable energy systems for all new construction.
- Consider a resolution implementing a Sustainable Building Policy for the construction and major renovations of new City facilities.
- Continue to implement energy efficiency projects of existing buildings & facilities.
- Purchase energy efficient computers, laptops, and appliances rated by ENERGY STAR and/or EPEAT.
- Provide funding or pursue grant opportunities to install solar PV systems on suitable city-owned facilities to offset grid-produced electricity.
- Continue investments in our urban forest to produce shade and reduce the urban heat island effect.
- Be aware of FY24 additions and reductions to portfolio of city facilities and their impact on Wilmington’s GHG emissions, including:
 - Facility additions: Skyline Center, Riverlights Fire Station #6
 - Facility reductions: 115 N 3rd St, 305 Chestnut St, 414 Chestnut St (IT Dept), IT Server Building, 302 Willard St, Medical Clinic, Wellington Ave Engineering, Police SE Command

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#3: Policy & Legislation – To support achieving Wilmington’s 2050 GHG emission reduction goal, the City can stay informed of opportunities to advocate for legislation, policy, and programs that will have a significant impact, including:



- Supporting actions to achieve [North Carolina HB 951](#) which seeks to reduce carbon emissions by 70% by 2030 and achieve carbon neutrality by 2050.
- Supporting the North Carolina Utilities Commission and Duke Energy’s efforts to generate increasing amounts of electricity from clean and renewable sources.
- Continued support of recommendations from the City’s Clean Energy Advisory Committee.



THANK YOU

for more information contact

City of Wilmington

Public Works Department – Sustainability Office

www.wilmingtonnc.gov/sustainability