



# Advancing the Strategic Energy Action Plan

APRIL 24, 2023

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## Purpose

### Provide an Update on City Council's Strategic Energy Action Plan

- Towards 2030 (Municipal fleet and buildings)
- Towards 2050 (Community-facing)

### Highlight Opportunities and Challenges Ahead

### Receive Feedback

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# Background



# SEAP

STRATEGIC ENERGY ACTION PLAN  
CITY of CHARLOTTE


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# SEAP

STRATEGIC ENERGY ACTION PLAN  
CITY of CHARLOTTE

**GOALS**

- Strive to source 100% of municipal energy use in buildings and fleet from zero carbon sources by **2030**
- Strive to become a low carbon city by **2050**, emitting less than 2 tons of carbon dioxide equivalent per person

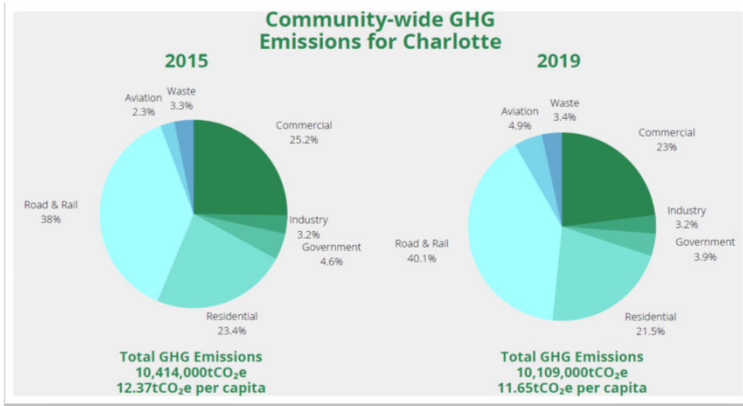
**FOCUS AREAS**

1. Buildings
2. Transportation
3. Energy Generation
4. Workforce Development


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# Greenhouse Gas Emissions – The Why



Down 5.8% per capita:

- Energy Mix
- Population Increase

**Buildings and Transportation are biggest emitting sectors, locally**

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**Toward  
2030:  
Fleet**



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## Leading the Charge...

- City has a total of **ten different electric models** in the fleet
- 2022 Brought Deliveries of First All-Electric Ford Mustang Mach-E, Ford F-150 Lightning, and Aebi Schmidt eSwingo 200 Bike Lane Street Sweeper
- Local student won decal design competition
- Ordered the first all-electric Fire Truck
- Won a Volkswagen Settlement Grant for a Class 8, Heavy Duty truck
- Continued deployment of automatic vehicle locators



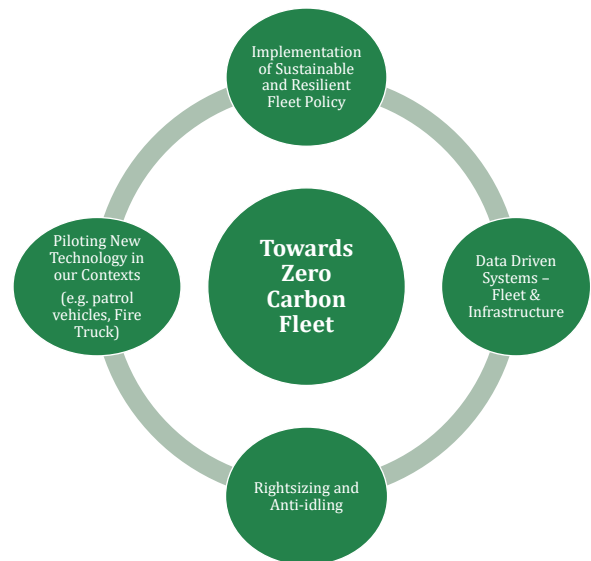
## Approach

### Strategic Energy Action Plan (2018)

- **Staggered introduction** of zero carbon over the next 12 years
- City goal to achieve a zero carbon fleet by 2030 is **aspirational** and **ambitious**
- Technology advancements, operational compatibility and risk management, and the availability of appropriate resources and funding will continue to innovate offering new opportunities.

### Sustainable and Resilient Fleet Policy (2020)

- Vehicle purchases will be assigned to a tiered system based on the degree of emissions reduction
- Fleet Management will identify the highest tier in which a suitable replacement vehicle is available



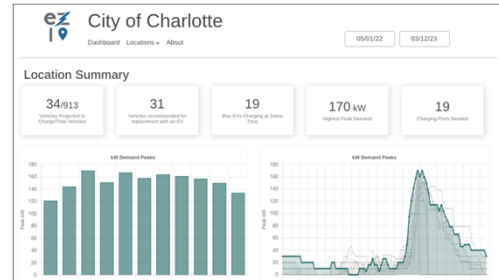


## Using Data

Continued deployment of Automatic Vehicle Locators (AVLs) provides data that supports the identification of:

- Vehicles for electrification
- Best locations for electric vehicle charging infrastructure
- Underutilized vehicles
  - ✓ Vehicles for decommissioning (24)
  - ✓ Vehicles that will be cascaded to other departments or used for a satellite motor pool (20)
- Strategies to avoid energy demand charges

Sawatch analytics uses minute-by-minute operational data to project vehicle charging load and aggregates that data to show how EV charging will impact peak demand at each facility



## By the Numbers

**CO2 Avoided: 1,727 metric tons**

*1 metric ton of Carbon Dioxide*  
= 2,564 miles driven by an average gasoline-powered passenger vehicle

10% of all City sedans are electric



17% of non-patrol sedans are electric

### Fleet and Charging Metrics



2% EVs



6% bus fleet BEBs



9% Alternative Fuel

138 EV charging stations



236 ports

50 EV charging stations available to public

93 ports










2,153 unique drivers charged

### SEAP Implementation (Snapshot)

11 EVs → 90Evs

46 EV charging stations → 138 EV charging stations

## Challenges and Opportunities


-  Supply Chain
-  Technology
-  Grid mix
-  Market availability
-  Operational Compatability
-  Take Home Vehicles
-  Offsets

## A Snapshot of Cities' Electrification Goals

City	Year	Fleet Electrification Goals
Minneapolis	2030	Reduce GHG emissions from City's fleet by 1.5% annually
Houston	2030	100% conversion of non-emergency, light-duty municipal fleet
Philadelphia	2030	100% procurement of EVs for sedans, SUVs, vans, and light-duty pickup trucks by 2030, reduce light- and medium-duty vehicle emissions by at least 45% from 2019 levels
Boston	2035, 2050	100% of passenger vehicles (light duty) are ZEVs by 2035; 100% of medium-duty vehicles are ZEVs by 2050
New York City	2040	On-road vehicles in fleet converted to all-electric or plug in electric
Greensboro	2040	City fleet composed of zero carbon sources
San Antonio	-	Convert all fleet passenger vehicles and small trucks to more efficient options by 2025 with a priority on electrification
Atlanta	-	Expand electric municipal fleet

## Toward 2030: Buildings + Energy Generation

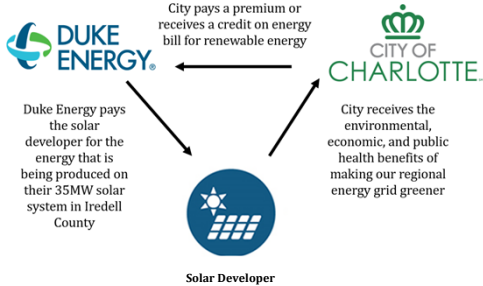




## DUKE ENERGY GREENSOURCE ADVANTAGE PROGRAM

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- Reaffirmed commitment with additional investment to program to support the development of renewable resources (35 MW solar farm) and lower carbon emissions
- Expected completion date slated for 2024




City pays a premium or receives a credit on energy bill for renewable energy

Duke Energy pays the solar developer for the energy that is being produced on their 35MW solar system in Iredell County

City receives the environmental, economic, and public health benefits of making our regional energy grid greener


Solar Developer

*Offsets approx. 21.5% of projected buildings energy usage by 2030*




*Project modeled to avoid \*\$20 million in expected regional healthcare expenses*

\*Derived from the AP2 (local) and DICE (climate) models; William Nordhaus helped develop both. His work on the DICE model was awarded the 2018 Nobel Prize in Economics


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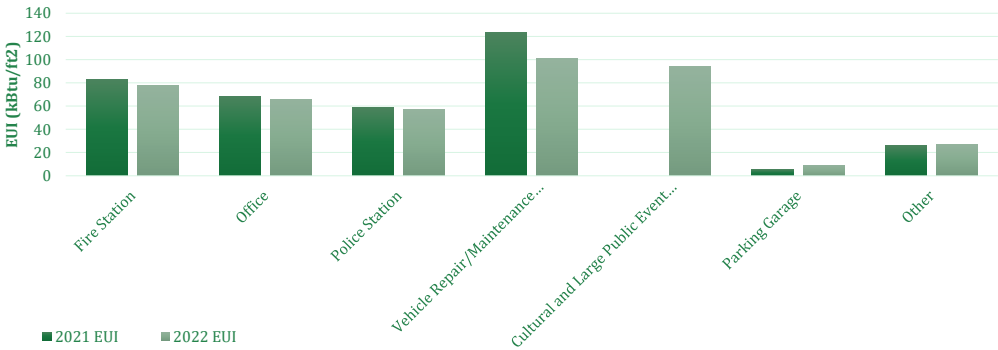
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## Towards Energy Efficiency - Municipal Benchmarking


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### Energy Use Intensity by Building Type



Building Type	2021 EUI (kBtu/ft2)	2022 EUI (kBtu/ft2)
Fire Station	~85	~75
Office	~70	~65
Police Station	~60	~55
Vehicle Repair/Maintenance...	~115	~100
Cultural and Large Public Event...	~95	~90
Parking Garage	~10	~10
Other	~30	~25

- 59% of buildings benchmarked last year improved their energy performance
- 83% of Fire Stations performed better in 2022 compared to 2021
- Strategic investments in city facilities such as building automation controls and equipment replacements coupled with informed building operations are resulting in buildings operating at higher efficiencies
- As facility uses and needs change over time, they present opportunities for efficiency focused adjustments and improvements to reduce energy usage
- A deeper look at the CMPD facilities will yield projects that lead to increased efficiency


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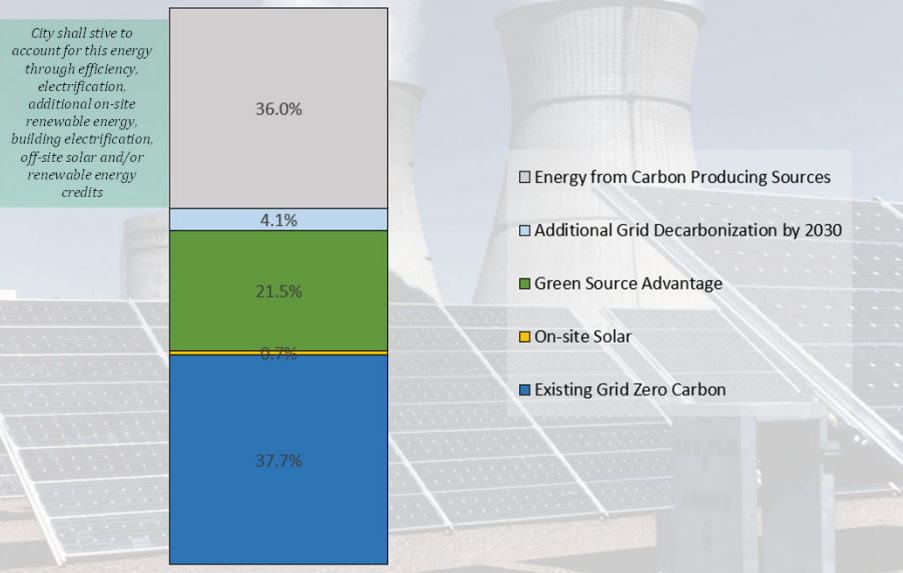
## Sustainable Investments & Sustainable Facilities Policy



- Design for the first fully electric fire facility, which will house the all-electric fire truck, **includes:**
  - Electric fire engine charging
  - Electric vehicle charging and readiness
  - Geothermal HVAC
  - All-electric hot water and bay heating
  - Rooftop solar PV system.
- CMPD South has a fully operational solar PV system which has produced 47.16 MWh since August 2022. **This offsets approximately 46% of the electricity usage at the station.**
- Charlotte Water Zone 4 field operations center, under construction, will be a LEED-certified facility, and includes solar and electric vehicle charging

Prior to SEAP implementation, the City had 6 solar PV systems, Once all the systems in design or under construction are completed, **the City will have a total of 2,194 kW of solar PV in operation, and 27 total systems.**

### 2030 City Building Zero Carbon Projection




Note: The chart makes the following assumptions:

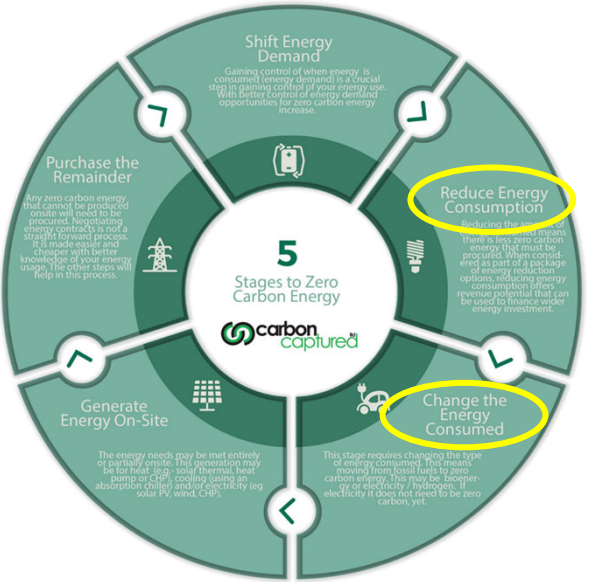
1. Total energy use will grow by 1% annually from 2022's energy use;
2. The electric and natural gas use mix will be the same as 2022;
3. No additional solar is accounted for beyond what is currently planned and budgeted for; and
4. Future energy efficiency projects are not accounted for.

\*The city continues to refine data collection, year over year in partnership with Duke Energy and internal stakeholders and update assumptions as information become available



## Towards 2050: Current Programs, Partnerships & Projects





**5 Stages to Zero Carbon Energy**  
carbon captured

**Shift Energy Demand**  
Gaining control of when energy is consumed (energy demands) is a crucial step in gaining control of your energy use. With better control of energy demands, opportunities for zero carbon energy increase.

**Purchase the Remainder**  
Any zero carbon energy that cannot be produced onsite will need to be procured. Negotiating energy contracts is not a straight forward process. It is made easier and cheaper with better knowledge of your energy usage. The other steps will help in this process.

**Reduce Energy Consumption**  
Reducing the amount of energy consumed means there is less zero carbon energy that must be procured. When considered as part of a package of energy reduction options, reducing energy consumption offers revenue potential that can be used to finance wider energy investment.

**Generate Energy On-Site**  
The energy needs may be met entirely or partially onsite. This generation may be for heat (e.g. solar thermal, heat pumps or CHP), cooling (using an absorption chiller) and/or electricity (eg solar PV, wind, CHP).

**Change the Energy Consumed**  
This stage requires changing the type of energy consumed. This means moving from fossil fuels to zero carbon energy. This may be bioenergy or electricity (hydrogen, if electricity it does not need to be zero carbon yet).

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**POWER DOWN THE CROWN**

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## Why an Energy Benchmarking Program?

SEAP goal to be a

### LOW CARBON CITY BY 2050

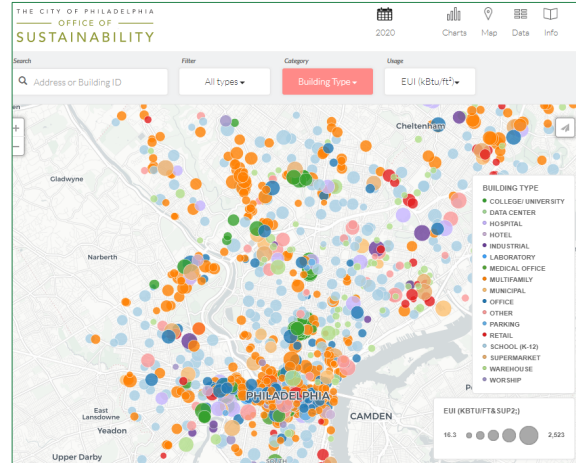
Building sector accounts for about 50% of carbon emissions in Charlotte

Job creation

Transparency

Healthier, more sustainable community

Community benchmarking is a strong practice by peers

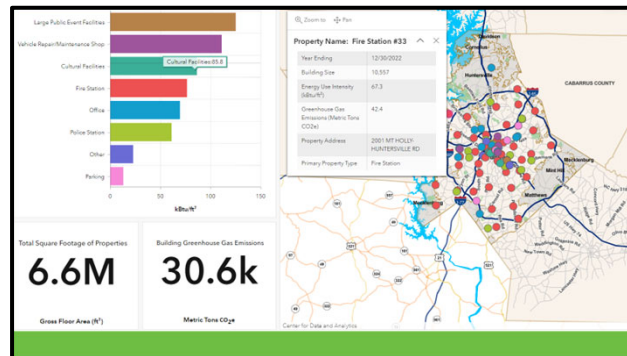


### Program Components

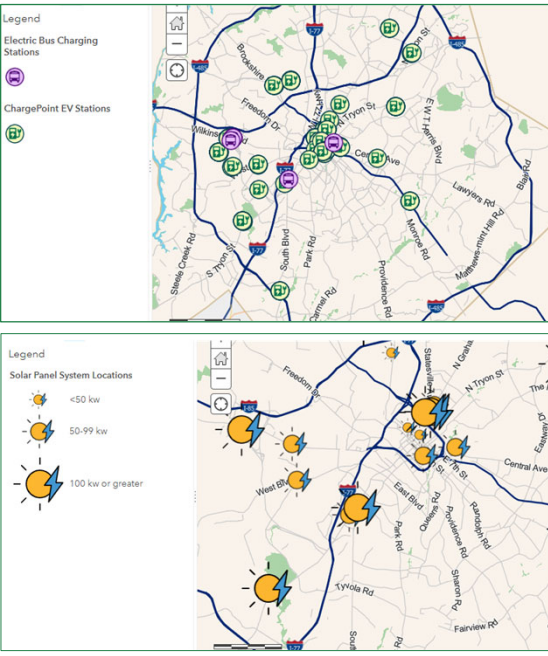
- Publicly share building energy performance through Energy Star Portfolio Manager
- Work towards portfolio wide energy use intensity reduction goal of 10% by 2030
- Provide case study on highlighting successful energy efficiency work

### Program Benefits for Participants

- Demonstrate your organization as a community leader in the effort to meet the SEAP's goals
- Share and learn energy efficiency best practices and receive technical support for tracking energy data



**Participant Partners Already Include: Central Piedmont Community College, Honeywell, Kimco Realty, Novant Health, Nucor, Trane Technologies, and UNC Charlotte**



# SEAP Data Dashboard


## Coming Soon (Spring 2023)

**Phase I**

- ▶ Electric Vehicle (EV) Charging Stations
- ▶ Solar Photovoltaic Systems
- ▶ GHG Emissions

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## Embedding Equity

**PoleVolt Pilot:** The City of Charlotte, UNC Charlotte, Duke Energy, and Centralina Regional Council partnered to pilot electric vehicle (EV) utility pole-mounted chargers.

- ▶ Educational event called EV's for Equity, hosted by CleanAIRE NC, Historic West End Green District

**AMP (Affordable Mobility Platform):** \$10 million project, 50% funded through U.S. Department of Energy's Vehicle Technologies Office, leveraging carshare software and services to increase equitable access to clean transportation options.

- ▶ Charlotte the only location on the East Coast
- ▶ Program slated to go live, Fall of 2023
- ▶ Goal: Develop a business model that will make the program self-funded in the future



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## Embedding Equity

**RENEW:** Partnership with the Urban League of Central Carolina and Goodwill provides participants with paid training and hands-on learning in the HVAC and electrical trades focused on energy efficiency and renewable energy.

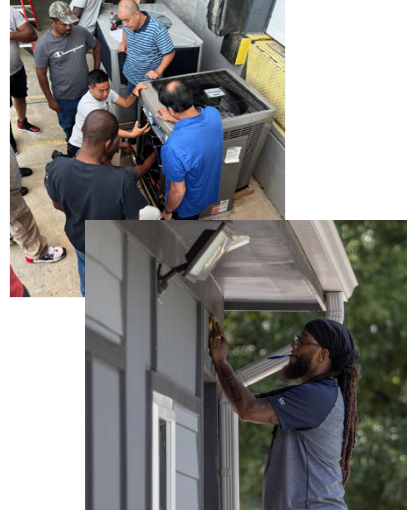
To date, 121 training participants have successfully graduated the RENEW training program.

Council allocated \$500k ARPA in 2022.

**Duke Energy – City of Charlotte Energy Efficiency Pilot Program:** The work of this partnership will complete energy efficiency retrofits and needed home rehab at no cost to approximately 500 income-qualified, high energy-use (electricity) households in Charlotte.


Duke’s energy efficiency budget for Charlotte is approximately \$4M

Council allocated \$1M in ARPA funding for home rehab to enable energy efficiency work




## Toward 2050: Policy & Investments






## Unified Development Ordinance and Strategic Mobility Plan



### Key Sustainability Themes

- Electrical Vehicle (EV) Charging
- Clean Energy fee-in-lieu
- Updated Environmental Bonus
- Updated Tree-focused requirements



#### 2040 Aspirations

**Safe | Vision Zero**

2040 Aspiration  
As a community, we will eliminate traffic deaths and serious injuries for all who share Charlotte streets.

**Equitable | 50-50 Mode Share**

2040 Aspiration  
As a community, most of our trips will be made by means other than single occupancy cars, Uber, and walking, cycling and transit.

#### Objectives

**Safe**  
Reduce transportation-related fatalities and injuries across all modes of travel.

**Sustainable**  
Reduce greenhouse gas emissions and other climate change impacts through energy and resource efficiency.

**Prosperous**  
Provide transportation-related jobs and economic development opportunities, and enhance quality of life.

**Equitable**  
Ensure transportation services are accessible and available to all people, including those with disabilities and limited resources.

**Connected**  
Improve transportation infrastructure and services to support economic growth and regional connectivity.

**Innovative**  
Explore and implement new transportation technologies, services, and business models.

#### Strategy

**Transit Framework**  
Focuses our multimodal investment to support priority bus and rail transit service, access, and comfort.

**Pedestrian Framework**  
Establishes our pedestrian priority network to direct our investments in sidewalks, crossings, intersections, and safety.

**Bicycle Framework**  
Defines our bicycle priority network to target the most impactful projects and program investment.

**Street and Roadway Framework**  
Aligns our street and roadway needs with City and regional investments to move people and goods.


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## SEAP Strategy: Facilitate Rapid Uptake of Sustainable Modes of Transportation

Example: The city is focused on creating an All Ages and Abilities (AAA) bike network and transforming Charlotte into a world-class bicycle city.

- In 2022, approximately 4 additional miles of bike facilities were constructed, resulting in the following AAA network statistics:
  - 18.5 total AAA miles
  - 6.8 miles of separated bike lanes
  - 11.7 miles of shared-use paths

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## Awards & Recognitions



## Additional Awards & Recognitions

- In partnership with UNC Charlotte and Duke Energy, the city received the Diversity, Equity and Inclusion in Cleantech award from the Research Triangle Cleantech Cluster for the PoleVolt initiative to develop curbside charging stations in the Corridors of Opportunity. The first station was installed at the Ritz at Washington Heights.
- As a signatory to the Global Covenant of Mayors, the city reports its climate actions and planning through the CDP (formerly called the Carbon Disclosure Project). CDP is a nonprofit that runs the global disclosure system for investors, companies, cities, states and regions to manage their environmental impacts. In 2022, the city received an A-, the highest grade to date. The score exemplifies the city's efforts in addressing climate change and demonstrates progress.
- In August 2022, Charlotte Douglas International Airport joined the Airport Carbon Accreditation Program at level 1 to independently assess and verify the airport's efforts to manage and reduce their CO2 emissions.



# Moving Forward

- Charlotte is making progress and continues to lead
- A Communitywide focus on 2050 low carbon city goals is key
- There is an opportunity to take a closer look at strategies and objectives given what we know now and update the SEAP
  - Set/review communitywide targets (greenhouse gas emissions, renewable energy and EVs)
  - Refine fleet targets and milestones
  - Outline offset strategies for municipal and communitywide goals



THANK YOU FOR YOUR TIME