



# Municipal Fleet Electrification

A Case Study of Charlotte, NC  
October 2020



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# Introduction

The [Climate Mayors Electric Vehicle Purchasing Collaborative](#) (the Collaborative) is a joint effort by [Climate Mayors](#), the [Electrification Coalition](#), and [Sourcewell](#) working towards accelerating the transition of city fleets to electric vehicles (EVs). By creating a new and innovative cooperative purchasing mechanism, the Collaborative is reducing major barriers to fleet electrification for cities and other public agencies. In addition to an innovative cooperative purchasing option, the Collaborative offers a host of technical resources, analyses, and staff support, which reduces major barriers to fleet electrification for cities and other public agencies.

The Climate Mayors network is made up of over 400 U.S. mayors who are committed to taking meaningful action on climate change. The Electrification Coalition (EC) is the non-partisan, non-profit organization that leads implementation of the Climate Mayors' transportation electrification initiative, leveraging its broad experience as a municipal partner in accelerating EV adoption on a mass scale. Sourcewell, a public procurement agency, facilitates a competitive solicitation and award process for vehicles and service equipment on behalf of their 50,000+ members across North America.

The Collaborative's partners have come together to offer a platform connecting cities with a growing selection of EVs and charging stations, transparent pricing, policy guidance, technical resources, assessment tools, and financing options that can leverage the federal EV tax credit to reduce the up-front costs of EVs and support cities' fleet electrification. The Collaborative also provides cities with training, best practices, educational materials, and analysis to support the successful transition of municipal fleets to electric. with training, best

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## About Charlotte, NC

Under the leadership of Mayor Vi Lyles, the City of Charlotte has taken a truly holistic approach to EV fleet transition. A combination of ambitious, forward-thinking City leadership and unique cross-departmental teamwork has come together to put the City on track to achieve its goal for the City fleet and facilities to be fueled by 100% zero-carbon sources by 2030. City staff convened this cross-departmental team with support from the Bloomberg Philanthropies American Cities Climate Challenge (of which Charlotte is one of 25 participating cities), utilizing the resources of the Collaborative to tackle the City's new EV deployment goals. As a participant in both the Climate Challenge and the Collaborative, the City has been able to leverage support from both programs to advance their goals.

Mayor Lyles and the City Council committed to drastically reducing carbon emissions from public buildings and City-owned vehicles by 2030 and slashing emissions City-wide by more than 80% by 2050. Achieving this ambitious goal will mean significantly expanding the City's use of electric vehicles, increasing access to carbon free public transit, and growing solar capacity installed at City-owned buildings. According to Mayor Lyles, "Charlotte is focused on reducing emissions from operations across the City. The innovative policies developed and passed this year have further propelled our City down the path to achieve a 100% electric, light-duty fleet by 2030."

The City of Charlotte is the most populous city in North Carolina with 885,708 residents living within the city limits and 1,093,901 in Mecklenburg County.

## Charlotte Highlights



*Fleet Management and departments to achieve 100% zero-carbon energy sources in less than ten years.*



*City plans to purchase an additional 27 electric vehicles in FY 2021, bringing the City's total EVs to 42.*

“

*“Charlotte is focused on reducing emissions from operations across the City. The innovative policies developed and passed this year have further propelled our City down the path to achieve a 100% electric, light-duty fleet by 2030.”*

Mayor Vi Lyles  
City of Charlotte



The surrounding metro area is home to over 2.6 million residents. Plentiful rich and varied cultural amenities paired with a favorable business climate has attracted many major companies to center their headquarters in Charlotte. Due to the plethora of opportunities available, this area has seen massive growth in recent decades yet still prides itself on its moniker of the “City of Trees.” It should come as no surprise that as a city with a rich a history of automotive racing, Charlotte continues to lead the way on fleet electrification. Ambitious leadership and powerful, effective policies guide decision-making on the ground here. The prioritization of long-term planning and forward-thinking staff create the perfect environment for truly innovative projects to take shape, projects that have set Charlotte on the fast track to achieving a completely electric fleet by 2030. With 42 electric vehicles in the City’s fleet by the end of 2020, this is just the start of what the City will accomplish by the end of the decade.

## A Leading Fleet

Like most cities, the Charlotte fleet is comprised of a mix of sedans, vans, pickups, and SUVs, with a few motorcycles and off-road cart-type vehicles. The fuel sources vary from fully electric to diesel and include a number of natural gas and traditional hybrid vehicles. The fleet team manages around 5,500 units total. Approximately 3,500 of these units are considered rolling stock with over 2,700 light-duty vehicles. Vehicle year models range with an older average for some heavy-duty equipment to the current year model for the light-duty fleet and an average vehicle age of seven years.

As a testament to Charlotte’s resolution to obtaining 100% of its energy from non-carbon sources in both buildings and fleet by 2030, the City approved an

updated Sustainable and Resilient Fleet Policy on June 1, 2020. The Electrification Coalition guided this new policy, which has been described as the “gold standard” for green fleet policies and is unique in that it mandates the reduction of carbon-based energy consumption by setting forth the following mandates:

- Establish a process for fleet right-sizing to reduce fuel demand by minimizing the number of City-owned vehicles.
- Establish guidelines for the deployment of managed idle technologies to reduce fuel consumption on new and legacy fossil fuel-powered vehicles.
- Implement and maintain route optimization.

It also shifts the energy that City operations consume away from fossil fuels by incorporating alternative energy sources into the City fleet by:

- Ensuring that fleet procurements align with the City’s Strategic Energy Action Plan (SEAP) goals by purchasing zero or low emissions vehicles.
- Ensuring electric vehicle and alternative fuel infrastructure deployment is aligned with vehicle purchases.

The fleet electrification strategy in Charlotte is based on the replacement of vehicles that are being decommissioned from the City fleet with electric options if possible, so the speed that the fleet can



Charlotte is also prioritizing the electrification of public transit. 5 fully electric transit buses were delivered in September 2020.

# Estimated Operational Metrics in a 2019 Nissan LEAF BEV

In 2019, the Electrification Coalition, alongside partner telematics organization, Sawatch, assisted the City with a pilot telematics program in an effort to better understand the daily driving requirements of several city vehicles that were suspected to be good candidates for electrification. The electric vehicle analysis was quite compelling. Replacement of the top five vehicles with electric alternatives would translate to a reduction in fleet GHG emissions by 31%; save 2,870 gallons of fuel per year; reduce Cost Per Mile (CPM) by 67%; and achieve operational savings of \$11,400 per year! An analysis of one potential Chevy Impala replacement with a Nissan LEAF is detailed below:

Vehicle Miles Traveled	Greenhouse Gas Reduction	Operational Savings	Total Cost of Ownership Change	Percent Total Cost of Ownership Change
14,180	-49%	-\$18,000 - \$21,000	-\$9,000 - \$12,000	-21%

be transitioned to fully electric depends greatly on vehicle replacement cycle and suitable model availability.

## Success with Telematics

A key component of effective fleet management is the overall makeup of the fleet. Specifically, it is critical to analyze the Total Cost of Ownership (TCO) of each make and model of vehicle that is put into service. In some instances, electric vehicles are more expensive to purchase which can often cause them to be overlooked by procurement officials. The narrow approach of comparing up front purchase price on internal combustion engine (ICE) vehicles and EVs does not tell the full story of the overall cost of a specific vehicle and the impacts that it may be expected to have on the budget. EVs consistently outperform ICE vehicles when we consider the full TCO, and the Charlotte fleet team is very focused on finding cost savings opportunities through reduced fuel and maintenance spending. Because electric vehicles offer significant savings on fuel and maintenance, it makes sense to prioritize EVs where practical and to then allocate savings to future EV procurements. Real world savings are available to fleet managers that are open to deploying electric vehicles in appropriate applications.

Under the direction of Charlotte City Manager Marcus Jones, the fleet team drafted and implemented the innovative “EV first” Sustainable and Resilient Fleet Policy to this end. This policy is further strengthened by the City’s Automatic Vehicle Locator (AVL) Policy which uses real world telematics data to inform future purchasing decisions based on the lower cost to operate electric fleet vehicles. The intention of this policy is to usher in the use of telematics devices on City vehicles. The ability to show daily fuel usage, average mileage requirements, and real-world vehicle use supports the case to transition these applications to electric models. The expanded use of telematics devices on the city fleet will provide real world driving data to help to inform procurement decisions.

The practicality of transitioning a vehicle application from ICE to EV as well as potential opportunities to “right-size” or consolidate the fleet are a focus of the new policy. Right-sizing also has the effect of reducing carbon from combustion engines and will continue to strengthen the case for electrification as ICE vehicles with higher utilization rates have higher total cost of ownership due to increased fuel costs and maintenance requirements. Significant cost savings can be achieved through this approach, and the City’s focus on leveraging the data collection devices to inform decisions are expected to increase the speed at which the light-duty fleet will be transitioned to electric.

*“The City of Charlotte is working to lead by example with respect to electric vehicles and electric vehicle charging infrastructure. Per our Strategic Energy Action Plan, we are striving to reach a 100% electric vehicle fleet by 2030, and we are presently on track to hit that goal.”*

-Sarah Hazel, Assistant to the City Manager & Interim Manager of the Office of Sustainability

Telematics devices were installed on 10 city vehicles that were thought to be possible candidates for EV transition but some uncertainty surrounding day to day application feasibility existed. The vehicle models selected for this initial feasibility assessment were the Chevy Equinox and Chevy Impala. After 90 days of data collection, each vehicle application was found to be a good fit for EV replacement. Recommendations for EV models and cost savings projections were shared with the City for consideration.

## More than Light-Duty

The City of Charlotte currently employs a fleet of over 700 heavy-duty vehicles. Many of the models suited for applications like street sweeping, public safety, and garbage collection are only now becoming available with electrified options. Not only are ICE

vehicles discouraged, the Sustainable and Resilient Fleet Policy places the focus for vehicle procurement squarely on electric vehicle options. Recognizing that certain models required to accomplish city day to day work may be unavailable with electric propulsion currently, the policy offers the ability to appeal to move to the next tier with approvals from:

- Fleet Manager
- Fleet Management Advisory Team (FMAT) Review Panel
- Strategy and Budget Review
- City Manager’s Office Review

A fleet policy is only as strong as the fleet manager’s ability to procure vehicles that are practical and are a good fit for the intended application. Historically the ability to access a diversity of vehicle models with enough range and suitable specifications has been a real challenge for fleet managers. These challenges have historically been a primary factor in undercutting even the strongest fleet policy that mandates EVs.

Because Charlotte needed larger vehicles that weren’t easily accessible through the NC state procurement contracts, a key component of their procurement process is their decision to acquire vehicles through the Collaborative. The Collaborative platform hosts a variety of EVs and allowed the City to begin the replacement of existing SUVs with Kia Niro EVs. Not

*The strategy for fleet-wide carbon reduction is strengthened with its ability to strongly discourage the purchase of new ICE vehicles through a multi-tiered procurement approval process.*

### TIER 1

Zero Emission Vehicles

### TIER 2

Alternative Fueled Internal Combustion Engines

### TIER 3

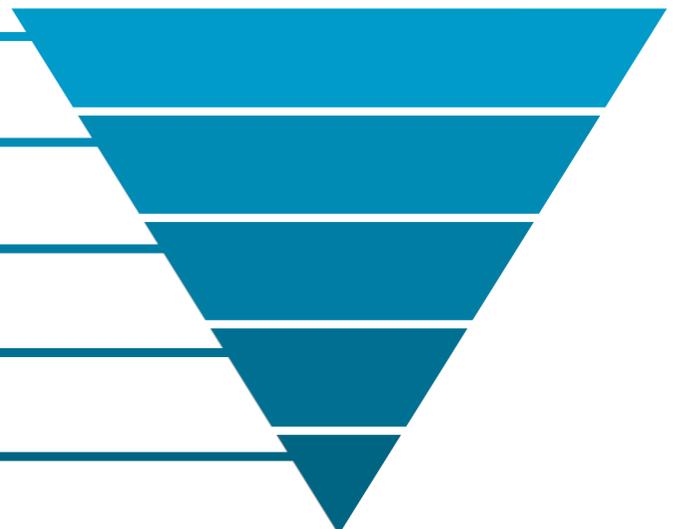
Hybrid Internal Combustion Engines

### TIER 4

Conventional Internal Combustion Engines - Gasoline

### TIER 5

Conventional Internal Combustion Engines - Diesel





only are these vehicles easily accessible through the Collaborative, because contracts are already executed and maintained by collaborative partner Sourcewell, it is not necessary for the City to manage an RFP bid process. This gave the City an accelerated pathway to adopt the right EVs into their fleet and meet their goals.

It is important to note that the City's procurement strategy of replacing vehicles coming out of the fleet with electric vehicles is highly dependent on vehicle manufacturers' ability to offer electric models that suit the needs of the application. The City currently has projects that do require a fleet vehicle to carry heavy payloads or to tow trailers. Until more heavy-duty electric options are available and are practical from a total cost of ownership perspective, the City will be limited to traditional ICE vehicles in some select applications.

## Charging Ahead

The value of implementing a strong and well thought-out policy similar to Charlotte's Sustainable and Resilient Fleet Policy is critical for cities to achieve long-term success as it relates to EV fleet transition. With the additional support of the Collaborative, public fleets can be empowered to move forward quickly with electrification, and an EV charging station strategy is an integral component. In the

case of Charlotte, the ability to move forward with EV purchases so quickly could only have happened with the support of a comprehensive plan to charge the soon to be 100% electric fleet.

The City of Charlotte manages its own network of publicly-accessible charging stations. Beginning in 2012, the City set about installing public EV charging infrastructure and this process has proven to be a very popular amenity for residents. Charlotte is now well-covered by public access charging and with the increasing rapidity of EV fleet deployment, it is critical for the success of the program to establish citywide EVSE coverage for fleet use.

To be prepared for the large number of EVs that are being phased into the City fleet, the fleet team, working in conjunction with the environmental services and buildings departments, went about identifying the top 10 locations for EVSE installations. These locations were selected because they allow enough parking with long enough dwell times to make parking and charging EVs at these locations practical. Soon after these locations were decided upon, electrical engineering evaluations were conducted and quotes for installations were approved. Once the installations were approved, electrical engineers began the process of updating the selected locations electrical equipment and charging stations were installed.

Execution of the planning, purchasing, and installation of and ongoing maintenance of a large-scale charging network like the one that has been installed in Charlotte can be a truly daunting undertaking. City buildings often vary greatly in age and electrical capacity, further complicating the task of large-scale EVSE installations. Unique wiring and building structures can be very complicated to anticipate before beginning work. Because of this it has been critical to the success of the Charlotte EVSE network to establish an electrical contract and contractor strategy that encourages preparation and future-proofing with significant flexibility built in. Future-proofing as it relates to the strategy in Charlotte refers to the City's ability to anticipate the future needs of the cities EV fleet and is a critical component for any city that is intending to efficiently and effectively install a large EVSE network. By getting a head start on the contracts for electrical engineers, cities can update electrical capacity at buildings that are most suited to receive EVSE as well as for the fleet departments that are early candidates for fleet electrification. Because the groundwork was set to deploy the installations when approval was received, building services has been able to install stations quickly.

## Conclusion

Increasingly, cities are faced with shrinking budgets and are being asked to do more with less. Charlotte has risen to the challenge of combating climate change and is doing so with an eye towards equity and inclusion. The City has set the groundwork for a more resilient and efficient future that will mean cleaner air, lower carbon emissions, and savings to taxpayers through their focus on fleet electrification. Policies like the new Sustainable and Resilient Fleet Policy and the new AVL policy will continue to pay dividends as the City moves confidently in the direction of becoming carbon neutral by 2030.

For more information about how your agency can partner with the Climate Mayors EV Purchasing Collaborative to take advantage of cooperative purchasing and rich technical assistance, please visit: [www.DriveEVFleets.org](http://www.DriveEVFleets.org)

Or call 800-267-7830



Climate Mayors, founded in 2014, is a bipartisan, peer-to-peer network of U.S. mayors working together to demonstrate leadership on climate change through meaningful actions in their communities, and to express and build political will for effective federal and global policy action. The Climate Mayors coalition has emerged as a key voice and demonstration of the ongoing commitment of U.S. cities to accelerate climate progress.



The Electrification Coalition (EC) is a nonpartisan, not-for-profit group of business leaders committed to promoting policies and actions that facilitate the acceleration of electric vehicle adoption on a mass scale in order to combat the economic, environmental and national security dangers caused by our nation's dependence on oil.



Sourcewell is a self-supporting government organization, partnering with education and government agencies throughout North America. On behalf of 50,000 members, Sourcewell conducts competitive solicitations, awarding to the most responsive and responsible vendors.