

# LINCOLN ELECTRIC VEHICLE READINESS PLAN



PREPARED FOR:  
 Lincoln Climate-Smart Collaborative  
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# LIST OF ACRONYMS

<b>ADA</b>	Americans with Disabilities Act	<b>HEV</b>	Hybrid Electric Vehicle	<b>NDEE</b>	Nebraska Department of Environment and Energy
<b>APPA</b>	American Public Power Association	<b>HOA</b>	Homeowners Association	<b>NDOT</b>	Nebraska Department of Transportation
<b>BEV</b>	Battery Electric Vehicle	<b>IBC</b>	International Building Code	<b>NEC</b>	National Electrical Code
<b>CMAQ</b>	Congestion Mitigation and Air Quality	<b>IBEW</b>	International Brotherhood of Electrical Workers	<b>NECA</b>	National Electrical Contractors Association
<b>CNG</b>	Compressed Natural Gas	<b>ICC</b>	International Code Council	<b>NEVI</b>	National Electric Vehicle Infrastructure
<b>COL</b>	City of Lincoln	<b>ICV</b>	Internal Combustion Engine Vehicle	<b>NFPA</b>	National Fire Protection Association
<b>CRP</b>	Carbon Reduction Program	<b>IEC</b>	International Electrotechnical Commission	<b>OCP</b>	Open Charge Point Protocol
<b>CSC</b>	Lincoln Climate-Smart Collaborative	<b>IECC</b>	International Energy Conservation Code	<b>OSCP</b>	Open Smart Charging Protocol
<b>DCFC</b>	Direct Current Fast Charger	<b>IRC</b>	International Residential Code	<b>PHEV</b>	Plug-in Hybrid Electric Vehicle
<b>DOE</b>	United States Department of Energy	<b>IRS</b>	Internal Revenue Service	<b>ROI</b>	Return on Investment
<b>EPA</b>	Environmental Protection Agency	<b>L1</b>	Level 1 Electric Vehicle Charger	<b>SAIDI</b>	System Average Interruption Duration Index
<b>EPRI</b>	Electric Power Research Institute	<b>L2</b>	Level 2 Electric Vehicle Charger	<b>SEP</b>	Sustainable Energy Program
<b>EV</b>	Electric Vehicle	<b>L3</b>	Level 3 Electric Vehicle Charger	<b>SFD</b>	Single Family Dwelling
<b>EVITP</b>	Electric Vehicle Infrastructure Training Program	<b>LES</b>	Lincoln Electric Service	<b>STEM</b>	Science, Technology, Engineering, and Mathematics
<b>FHWA</b>	Federal Highway Administration	<b>LPS</b>	Lincoln Public Schools	<b>SUV</b>	Sport Utility Vehicle
<b>GHG</b>	Greenhouse Gas	<b>MPO</b>	Metropolitan Planning Organization	<b>UNL</b>	University of Nebraska-Lincoln
<b>GIS</b>	Geographic Information System	<b>MUD</b>	Multi-unit Dwelling	<b>USDN</b>	Urban Sustainability Director's Network
		<b>MUTCD</b>	Manual on Uniform Traffic Control Devices		

# EXECUTIVE SUMMARY

Five agencies and organizations in the Lincoln area teamed up in 2022 to form the Lincoln Climate-Smart Collaborative (CSC). The CSC members are the City of Lincoln, Lincoln Public Schools (LPS), the University of Nebraska-Lincoln (UNL), Lincoln Electric Service (LES), and Lancaster County. The CSC partners are working together in pursuit of improved resiliency, sustainability, and reduced greenhouse gas (GHG) emissions and to ensure that the benefits of these actions are shared equitably to all who live in, work in, and visit the Lincoln area. The first action of the CSC is to develop this Electric Vehicle (EV) Readiness Plan, which has been funded by four of its members (City of Lincoln, LES, LPS, and UNL).

The CSC has selected EV readiness because of the significant impact it can have in helping meet regional climate goals, given that the transportation sector is the single largest contributor to GHG emissions. Recent advancements in vehicle and battery technology and an increased number of charging stations and available vehicle models have made EVs viable alternatives for many individuals and fleets. Actively planning for EVs will enable the CSC to ease the transition to EVs by identifying and clearing barriers to adoption, prepare the infrastructure for the additional electrical load, identify opportunities to save money, and ensure equitable access for all. The primary goals of this EV Readiness Plan are the following:



EV adoption in the Lincoln area is currently behind the national average (4.6 percent in the Lincoln area vs. 7.3 percent nationally<sup>1</sup> for the year 2022), which creates an opportunity for the CSC to learn from the experience of other agencies and to be deliberate about laying the foundation for a successful program. CSC members are leading the way by preparing for EVs in the community and their own fleets through studies, pilot projects, installing charging equipment, and replacing existing gas vehicles with EVs. Because each CSC member is at a different stage in its fleet conversion process and subject to its own constraints, it is recommended that each organization develop and implement its own custom fleet conversion plan. Each CSC member has committed to supporting each other in various ways, including sharing lessons learned, establishing a unified outreach program, and exploring the potential for shared training opportunities, shared charging stations, and joint funding opportunities.

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## EV Readiness Plan Goals



**Electrify** the CSC-member fleets



**Facilitate** expanded access to practical and affordable EV charging solutions throughout the community



**Encourage** adoption of electric transportation through community engagement and education



Enabling and encouraging general EV adoption for all individuals includes offering elements of education programs and initiatives designed to help provide equitable access to charging infrastructure, and electrified multimodal transit. To address these challenges, it is recommended that the CSC develop a joint education and outreach program directed toward individuals and multi-unit dwellings (MUDs). Continued support for transit fleet electrification and multimodal options will help bring the benefits of EVs to those who use transit by choice or by necessity.

Enabling and encouraging EV adoption and EV charger installation for businesses also has various facets, including education and early coordination for those who may electrify their own vehicle fleets. It includes guidance for those installing publicly accessible charging stations, developers, and MUD owners. Specific focus should be made to support and even incentivize those who install public or MUD accessible charging in disadvantaged communities. Lincoln area agencies should also work to incorporate EV charger considerations into local building codes and zoning ordinances, and to streamline the permitting process.

The long-term success of an EV adoption program also hinges on having a skilled workforce. The CSC members should work to include EV-related curriculum in their own programs, and work with other local partners and private organizations to provide adequate opportunities for training and education at every level.

LES is continually working to build an understanding of the EV industry and its potential impacts. It is active in national organizations that are helping to guide and influence policy and pilot load management strategies, and it already has many educational materials available for both businesses and individuals. Its current infrastructure is prepared for this initial increase in the number of EVs, and it has sufficient capacity in the generation, transmission, and distribution of electricity to support this increase in EVs for many years. LES will continue its support of EV-related growth as a public utility and will work with and support the CSC members as they work together as a region.

To help accomplish these actions, it is also recommended that the CSC develop a regular monitoring and reporting process that includes overall progress toward its goals and other metrics that provide an understanding of the global and local EV market. The CSC may also consider assignments, subcommittees, or other similar organizations that will help provide focus on specific actions as appropriate. A full set of recommended and prioritized actions are provided as guidance to help make this transformative change toward a more sustainable future for the Lincoln area.

1

# Planning for Electric Vehicles



# 1

## PLANNING FOR ELECTRIC VEHICLES

Agencies and organizations in the Lincoln area are leaders in pursuit of a more resilient and sustainable community. In April 2022, the City of Lincoln, Lincoln Public Schools (LPS), The University of Nebraska-Lincoln (UNL), and Lincoln Electric Service (LES), and Lancaster County teamed up to form Lincoln's Climate-Smart Collaborative (CSC). The CSC is defined as follows:

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***A local, interagency collaborative committed to working together toward shared resiliency and sustainability goals to reduce greenhouse gas emissions, fortify public infrastructure, transition to sustainable solutions, utilize renewable resources, reduce consumption, increase purchasing power, and save money.***

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Each CSC member organization has its own sustainability programs and goals. A few examples are listed below:

- The City of Lincoln's 2021 Climate Action Plan includes a goal of reducing greenhouse gases (GHGs) by 80 percent by 2050.
- Lancaster County has committed to developing a climate action plan/strategy by the end of 2025.
- In 2020, LES adopted a decarbonization goal to be Net Zero by 2040 by eliminating carbon dioxide production from the utility's generation portfolio.
- The LPS Board of Education maintains a sustainability policy and program to continually strengthen its environmental stewardship for the health and well-being of students, employees, and the community.
- In 2020, UNL adopted an Environment, Sustainability, and Resilience Master Plan which provides focus and goals in 10 areas that include both energy and transportation.

The CSC establishes a partnership that will help build momentum toward achieving these organization-specific and regional sustainability goals – making a true difference for those who live in, work in, and visit Lincoln. Four members of the CSC partnered to fund the development of this EV readiness plan, including the City of Lincoln, LES, LPS, and UNL. Lancaster County also has a high interest in supporting the efforts of the CSC and is evaluating opportunities to upgrade its fleet and associated fueling infrastructure.

### 1.1 The Vision for Electric Vehicles in Lincoln

Lincoln will be a leader for transformational change in reducing GHG emissions for the benefit of all area residents through the adoption of electric vehicles (EVs) in our fleets, public transit, and personal vehicles and charging infrastructure. Every resident or visitor to our community will be positively affected through benefits to health, environment, resilience, and equity as we reduce the GHG emissions impact from the transportation sector.

### 1.2 Why Plan for Electric Vehicles?

This development is the first formal action taken by the CSC for several reasons. The CSC recognizes the contribution that EVs can make towards reducing GHGs by addressing the source of the single largest contributor: transportation. Considering the significantly increased demand for EVs among consumers, technology advancements that extend the potential range, and targeted infrastructure funding from the federal government, developing an EV readiness plan is a logical first step toward helping the CSC progress toward its vision.

#### ***The Case for EVs***

EVs are an essential tool in sustainability related initiatives intended to reduce GHGs. In the United States, the transportation sector accounts for approximately 27 percent of all GHG emissions – and

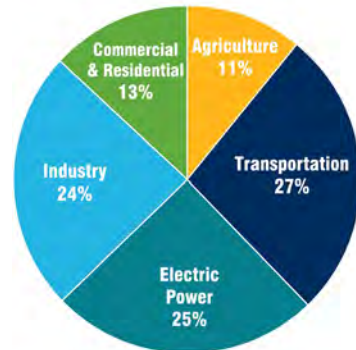


# PLANNING FOR ELECTRIC VEHICLES

more than half of that amount comes from light duty vehicles. Because EVs offer zero tailpipe emissions compared to their internal combustion engine (ICV) counterparts, shifting to an increased percentage of EVs and other low emission vehicles can have a large impact on overall GHG emissions. Additionally, as EVs can be supported by renewable electrical power generation, the total reduction in GHG emissions becomes even more significant. For the Lincoln community, transitioning more to battery electric vehicles (BEV) or plug-in hybrid (PHEV) will be critical in supporting the goal of reducing greenhouse gas emissions by 80 percent as stated in the Lincoln Climate Action Plan.

Beyond the environmental motivations, EVs also offer many practical and financial benefits when compared to traditionally fueled vehicles. Though up-front purchase costs are typically higher for EVs, the overall cost of operation is less. Not only is the cost of ‘fueling’ with electricity lower than fueling with gasoline, but the design of EVs allows for up to 30 percent reduced maintenance costs over the life of the vehicle.<sup>2</sup> These factors make EVs more sustainable and more cost-effective for many applications.

**FIGURE 1 | Total U.S. Greenhouse Gas Emissions by Economic Sector in 2020**



<https://www.epa.gov/ghgemissions/sources-greenhouse-gas-emissions>

## Plan Purpose

The primary purpose of this plan is to identify actionable strategies to leverage EV technologies in pursuit of the climate, sustainability, and quality of life goals of the CSC. The objective is to facilitate member action and community support that will help the CSC members lead the way toward EV adoption, and more equitable benefits of reduced GHG emissions.

### Specifically, the plan will lay a course through an equity lens for the CSC to:



**Electrify** the CSC-member fleets



**Facilitate** expanded access to practical and affordable EV charging solutions throughout the community



**Encourage** adoption of electric transportation through community engagement and education

EV adoption by agencies and private citizens will be accomplished through actions that can be directed, supported, or encouraged. Strong leadership on the challenge provides the CSC and its member organizations critical credibility to execute all three of these methods. For example, fleets under agency control will be converted when decision-makers have the information necessary to support the initial investment; charging infrastructure, policy or code changes will require political support; and significant adoption of EVs by private individuals will require encouragement through education if not actual incentives.

***This plan is in direct alignment with helping all Lincoln area organizations achieve regionally and agency-specific climate and sustainability goals.***

# PLANNING FOR ELECTRIC VEHICLES



Pursuing these goals will also help the CSC members be in a better position to take advantage of the many funding opportunities offered to accelerate the adoption of EVs across the country. Throughout this report, recommended actions are grouped into each of these categories and are presented within the context of each section. Each recommendation also has one or more identified champions among the CSC membership; however, all members may have a role in contributing to the action. All actions are summarized with suggested priorities in *Section 6 The Road Ahead*.

## 1.3 How this Plan was Developed

This plan has been developed through a combination of national and local research, input from the CSC members, and public outreach. This input laid a foundation for recommended actions that will help meet the specific need of the Lincoln area.

**Research** – Over the past several years, the project team has gathered information through project work and general research in the EV industry. This effort includes review of other example EV readiness plans from around the country.

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**CSC Input** – The project team held workshops to receive input from various stakeholders within each CSC member organization in addition to various follow-up communications.

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**Public Outreach** – An online survey was posted to receive direct input from members of the public representing individuals, businesses, and other interest groups. Each CSC member advertised and encouraged survey participation through its respective communications channels. There were almost 150 responses to the survey, primarily consisting of responses from individual vehicle owners. Though this survey does not represent a statistically significant sample, it does demonstrate the CSC's commitment to public engagement for this program. The survey responses that were received indicated a very positive attitude toward EVs, with 48 percent stating that they are likely to own an EV within the next 5-10 years.



2

**Where Are  
We Now?**

# 2

## WHERE ARE WE NOW?

### 2.1 The Global Electric Vehicle Industry

The automotive industry has experienced a flurry of investment and development related to EVs within the last 5-10 years. The significant reduction in the cost of lithium-ion batteries and increasing fuel economy requirements have led nearly every major automotive manufacturer to commit to substantial EV production volume growth over the next 10 years. For consumers, the increase in available EV models (particularly in sport utility vehicle [SUV] and light duty truck platforms) offer new choices that match functional needs and aesthetic expectations. There is also the growing consumer sentiment for purchasing EVs for sustainability reasons or to reduce expenses related to fueling costs.

The end of 2022 marked the most significant increase in EV sales to date. About 7.3 percent<sup>3</sup> of all new vehicles sold nationally were BEVs or PHEVs (around 980,000 in total). This is an increase from 4.4 percent in 2021. As manufacturers are investing hundreds of billions of dollars to build new battery plants and scale up production of new EV models, it is feasible that new EV sales could increase to approximately 50 percent of all new vehicles sold within the next 10 years. This growth will also be heavily influenced by the continued federal funding that is incentivizing new EV purchases and the build out of critical charging infrastructure.

Despite the growth, there are still challenges facing EV adoption. Growth has been extremely regionalized, with states such as California leading the way with more than 15 percent EV sales while many other states, including Nebraska, are less than 5 percent.

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Other headwinds challenging EV growth include vehicle cost, demand that outpaces current supply, long lead times, and some limitations related to local dealer support for EV sales. Additionally, because new production volumes are just beginning to grow, it is unlikely that any meaningful used EV market will develop within the next five years, which will continue to make purchasing EVs challenging for individuals with low and moderate incomes.

Lastly, though recent grants such as the National Electric Vehicle Infrastructure (NEVI) program have been initiated to help facilitate charging station build-out on the nation's interstates and highways, there are still significant limitations related to charging access. Buyers facing the question of whether to buy an EV still express significant concerns over access to charging and charging station reliability, which impacts the ability to consistently power their vehicles.

### 2.2 Electric Vehicles in Lincoln

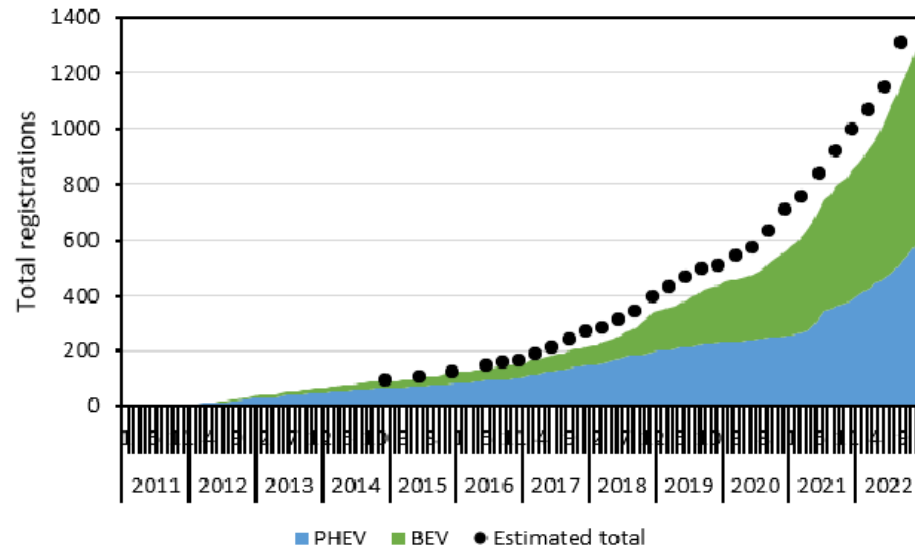
EV adoption rates in the Lincoln area have been slower than the national average. This provides a great opportunity to learn successful practices from those communities that are early adopters and allow the CSC to be deliberate in its planning for EVs. This section highlights conditions specifically related to EVs in the Lincoln area.

# WHERE ARE WE NOW?

## 2.2.1 Number of Registered EVs

As of December 2022, there were nearly 1,400 registered EVs in the Lincoln area according to the Electric Power Research Institute (EPRI). Starting in 2012, Lincoln EV registrations began to increase but stayed below 200 registrations per year until 2017. Since 2018, EV registrations have seen a notable increase with 400 registrations in 2019 and nearly 1,400 EV registrations in 2022. **Figure 2<sup>4</sup>** shows annual Lincoln area EV registrations since 2011. EV registrations in the Lincoln area for PHEV and BEV in 2022 represent 4.6 percent of all vehicles.

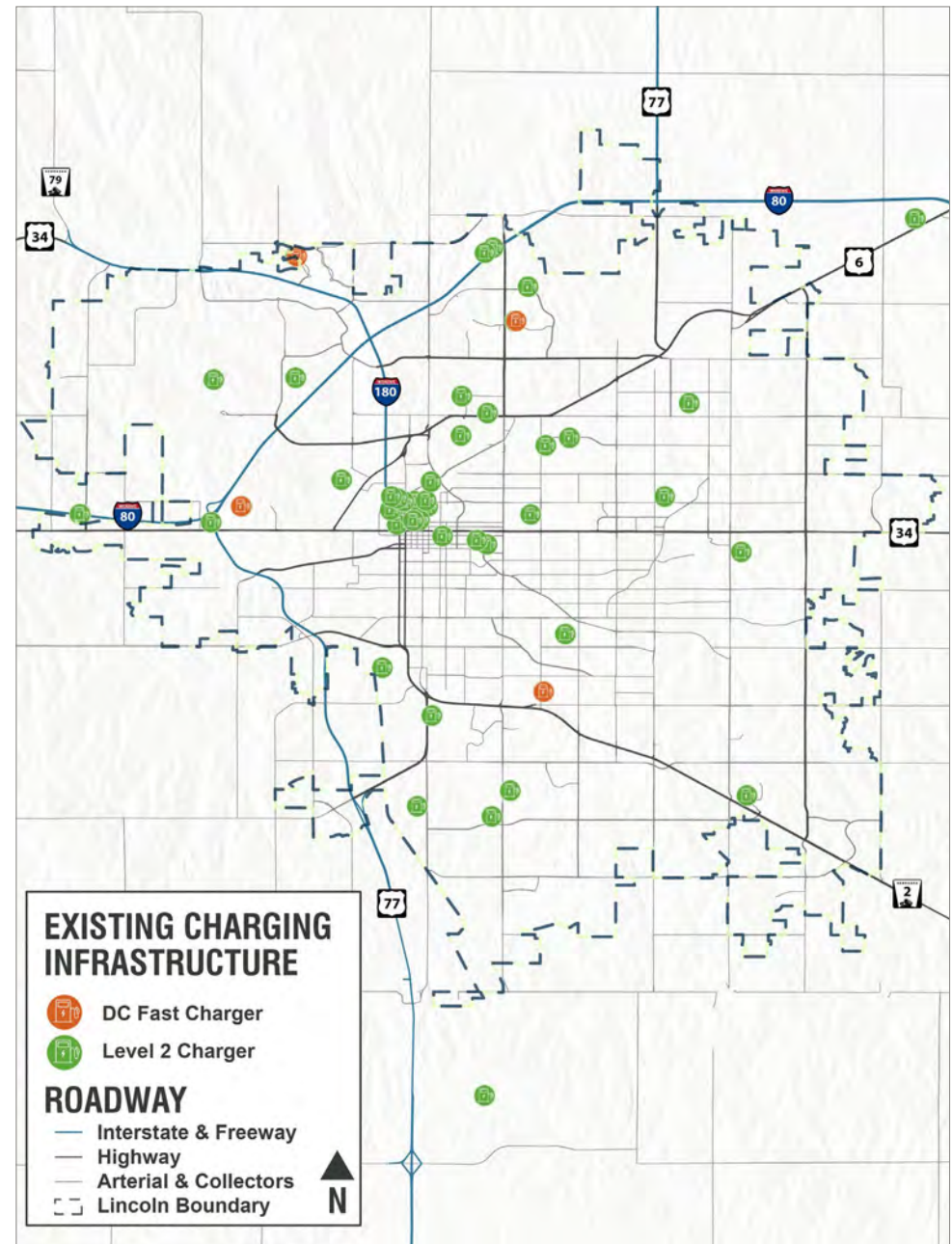
FIGURE 2 | Cumulative Lincoln Electric Vehicle Registrations by Type<sup>4</sup>



## 2.2.2 Private Fleets

Private fleet electrification conversion status in the Lincoln area is currently not available nor tracked, although LES is looking to work with its partners at EPRI to develop a model for load growth due to light and heavy duty fleets.

FIGURE 3 | Lincoln Area Existing Charging Infrastructure



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# WHERE ARE WE NOW?

## 2.2.3 Public Charging Stations

As of October 2022, there were 47 publicly available EV charging station locations in the Lincoln area, including 111 Level 2 (L2) chargers, and 26 Level 3 (L3) Direct Current Fast Chargers (DCFC). Charging station locations and types are shown in **Figure 3. Appendix A**, which includes the location of existing EV chargers and their hours of operation, type of charger, connector type, facility type, and pricing.

## 2.2.4 Policy and Codes

Municipal policies and codes are comprised of ordinances and bylaws issued by a municipality, and the rules pertinent to the municipality's operations and conduct of business. These ordinances can address things like public health and safety, zoning, budgeting rules, land use issues, and more. To date, The City of Lincoln has adopted the International Building Code (IBC), International Residential Code (IRC), International Energy Conservation Code (IECC), and the National Electrical Code (NEC) without any national amendments. The City of Lincoln does add more targeted amendments to these codes found in the City municipal code, which has guidance on how to install charging stations technically and safely. However, these codes do not specify when, where, or why these charging stations should exist within Lincoln's complete infrastructure.

For instance, if Lincoln residents would like to install an EV charging station at their residence, they are required to file an electrical permit through the City of Lincoln Building & Safety Department per chapter 23.10.140 of the Lincoln Municipal code for a L2 or DCFC charging station; however, installing a L1 charging station does not require a permit.


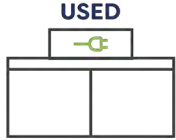






Currently, none of the jurisdictions in the Lincoln area have mandatory charging station development requirements such as EV-ready or EV American with Disabilities Act (ADA) parking requirements. The state of Nebraska has not adopted statewide EV related codes.

## 2.3 Electric Vehicle Adoption Barriers

Many variables directly or indirectly affect the actual rate of adoption for EVs. Where these items prevent or inhibit EV adoption, they are deemed to be barriers. A few specific barriers are highlighted in this section and grouped by those driven by external factors and those that can be locally influenced.

### 2.3.1 External Barriers

A few of the most impactful variables are driven by external factors as follows:

 <p><i>Global economic uncertainty</i></p>	 <p><i>Limited used vehicle market</i></p>
 <p><i>Political and funding support</i></p>	 <p><i>Longer time required to charge vs. buy gasoline</i></p>
 <p><i>Supply chain issues</i></p>	 <p><i>Limited models and range for trucks and SUVs</i></p>
 <p><i>Higher initial cost for an electric vehicle</i></p>	 <p><i>Range limitations, especially in colder weather</i></p>

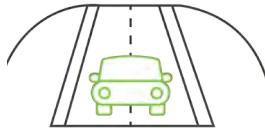
# WHERE ARE WE NOW?

## 2.3.2 Barriers that can be Locally Influenced

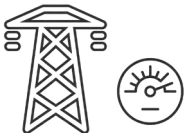
Some EV adoption barriers can be locally influenced to various degrees. A few of these are as follows:



*Lack of general information about electric vehicles and chargers*



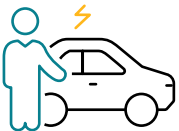
*Lack of charging in disadvantaged communities and multi-unit dwellings (MUDs)*



*Charger installation and utility costs for DCFC at 100kW or greater*



*Dealership staff untrained and unwilling to sell EVs*



*Lack of skilled workforce for EVs and charging stations*

## 2.4 Lincoln Climate-Smart Collaborative Partners – Efforts to Date

Lincoln CSC organizations have already made great strides in their efforts to create a more sustainable community through vehicle electrification. This section will summarize each of the CSC organization’s activities and progress to-date.

### 2.4.1 City of Lincoln

The City of Lincoln has been proactive in identifying and addressing climate vulnerabilities to build a more sustainable community. Toward this end, the City started an initiative known as Resilient Lincoln ([Resilient Lincoln – City of Lincoln, NE](#)).

At the heart of the Resilient Lincoln initiative is an ambitious goal: In collaboration with the City of Lincoln’s publicly owned LES, the initiative has committed to a goal of an **80 percent net reduction in the City of Lincoln’s GHGs by the year 2050**. To accomplish this, a top priority for Resilient Lincoln was to develop a Climate Action Plan, which Mayor Gaylor Baird commissioned in 2019 ([climateactionplan.pdf \(ne.gov\)](#)).

A myriad of strategies in the Climate Action Plan speak to achieving the desired goal, from including energy efficiency, generating more electricity from renewable energy, transitioning to EVs and active transportation, and employing natural climate solutions.

One of the key initiatives identified in the Climate Action Plan is to build a decarbonized and efficient transportation system with various strategies related to the electrification of transportation, including but not limited to, converting City fleets to 100 percent electric/renewable/alternative fuels by 2040, completing an inventory and creating a platform to inform citizens on where EV and alternative fueling stations are located across the city, and investigating an EV car-sharing program as a public-private partnership. The full list of recommendations from the Climate Action Plan related to transportation electrification are included in **Appendix B**.

# WHERE ARE WE NOW?

The City also participated in a collaboration of midwestern cities in 2018 through the Urban Sustainability Director’s Network (USDN) resulting in a guidance document titled “Pathways to EV - Preparing for the Proliferation of Electric Vehicles” (Cadmus, June, 2018).

## Fleet

The City has already made strides to electrifying its fleets, including City-use vehicles and its transit fleet. A summary of all vehicles owned by the City is provided in **Table 1**.

**Light Fleet and Small Engine:** The City’s light duty vehicle fleet includes approximately 436 total vehicles, including 122 hybrid electric vehicles (HEVs), six PHEVs, and six BEVs. The City has been attempting to purchase additional EVs, but supply chain shortages have delayed shipment for more than 18 months. As of January 2020, the City has another 74 HEVs on order. In the short term, the City is exploring electrification of small engine items.

**Medium and Heavy Fleet:** The City’s medium and heavy fleets include approximately 140 vehicles. Because of a lack of models and power for the required drive cycle and dutycycle,

the City has not yet developed plans to replace these vehicles with EVs. The City is, however, continually monitoring and piloting specific vehicles and technologies. For example, an aerial lift truck has been ordered that uses a diesel engine for driving and has an electric package for on-site power and bucket operations.

**Transit Vehicles:** StarTran, the City of Lincoln’s bus system, has made significant strides toward a clean transportation fleet. In 2018, it received a grant to support conversion to compressed natural gas (CNG), and recently received additional CNG vehicles. In 2020, it received an additional grant for 10 electric buses, which are currently in operation. With only 6 hours of run time per charge, StarTran has had to adjust routes and vehicle assignments to optimize their EV usage, which includes charging time in the middle of the day. StarTran reports there have been challenges with maintaining both vehicles and chargers because of supply chain issues. It also reports that operations during cold weather diminish the vehicle range because of the additional energy required to provide heat for passengers. StarTran is collecting data on its experience with these vehicles to inform the path forward.

TABLE 1 | City of Lincoln’s Fleet Composition Summary

Vehicle Classification	Examples	Number of Combustion Engine Vehicles	Number of Hybrid Electric Vehicles (HEV)	Number of Plug-In Hybrid Electric Vehicles (PHEV)	Number of Battery Electric Vehicles (BEV)	Additional Comments
LIGHT	Sedan, Sport utility vehicle, Light-duty pickup, utility cargo van	436	122	6	6	Additional 74 HEVs on order
MEDIUM	Medium-duty truck, large van, school bus, bucket truck	64				
HEAVY	Transit bus, refuse truck, regional haul freight truck	76				



# WHERE ARE WE NOW?

**Micro Mobility:** The City supports a bike share program (BikeLNK), which has a small number of e-bikes in its fleet. It also supports a dockless scooter program (ScooterLNK). Both these programs provide an important service to commuters and other travelers and extend the benefits of micro mobility and electrification to those who may not own an EV.

## Infrastructure

Since 2016, the City has installed charging infrastructure for its own fleets and for the public. As is typical during the early stages of any new technology, there have been some learning experiences with the maintenance and operations of the charging infrastructure. The City has taken these lessons to help optimize its processes and anticipates that operations will continue to improve as the technology matures and as the City staff gains experience.

**Public Charging:** The City began installing EV charging infrastructure in December 2016 and has installed stations in nine City parking garages. While charger use was significantly reduced during the COVID-19 pandemic, it has been steadily increasing since that time. The Parking Services Division reports approximately 125 charging sessions per month across 20 parking stalls.

**Fleet Charging:** Because the City's light fleet is distributed throughout the city, there is no centralized charging facility, although one may be considered as part of a long-term charging plan.

**Transit Charging:** StarTran has installed DCFC charging equipment specifically for its electric buses. The charging equipment has built-in logic to help reduce charging during peak times and avoid demand charges.



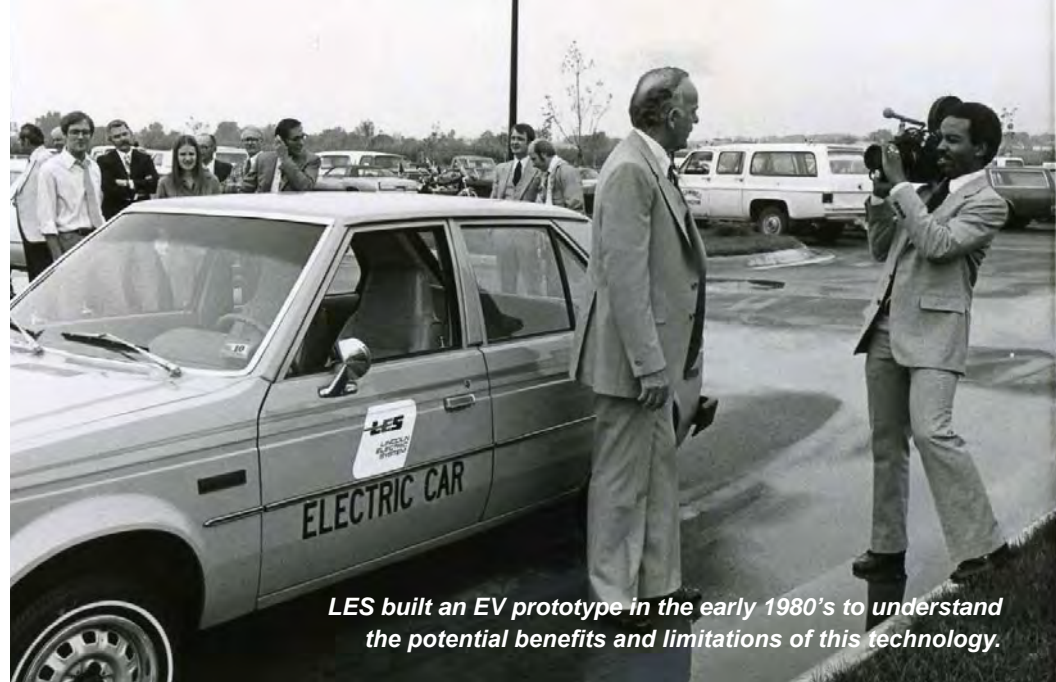
## WHERE ARE WE NOW?

### 2.4.2 Lincoln Electric Service

In addition to partnering on the Resilient Lincoln initiative, LES has been leading transportation electrification in a variety of ways. **LES has set an ambitious decarbonization goal to be net zero by 2040.** LES has been active in the EV space dating back to the early 1980s, when it built an EV prototype to understand the potential benefits and limitations of this technology. LES also installed the community's first public charging stations in the Lincoln area in 2013 in the West Haymarket. Since that time, LES has supported its service area's transportation electrification journey internally through its own fleet and operational equipment and externally through leading public educational events and facilitating EV rebates and charging infrastructure grant funding.

LES has also initiated and participated in multiple studies related to EVs. This effort includes an LES EV Adoption Study in 2018, where LES collaborated with EPRI to learn more about the prospects for the future growth of EVs. This effort, comprising eight utilities across the country, surveyed customers to understand more about the key barriers and drivers for plug-in vehicle adoption. The study culminated in 2019 with the development of a new model intended to assess the impacts that various types of incentives and other factors would have on adoption in the LES service area.

In parallel to the LES Adoption Study conducted in 2018, LES also conducted a Residential EV Charging Study to understand its customers' charging behaviors and the impact on the local grid. LES provided participants with an easy-to-install module that recorded when and where customers charged, when and how far they traveled, and the energy consumed while both traveling and recharging. For 2021, LES added a demand response pilot to the study scope, incentivizing participants to avoid charging during peak system demand periods in the winter and summer seasons. LES has received two grants to



*LES built an EV prototype in the early 1980's to understand the potential benefits and limitations of this technology.*

help support the project the American Public Power Association's (APPA) Demonstration of Energy & Efficiency Development Program awarded LES a grant of \$46,000 and the Nebraska Environmental Trust awarded LES a grant of \$20,000 to help support the project.

LES provides a wealth of knowledge and resources related to transportation electrification on its website, including a dedicated web page for EV-related resources. Whether individuals own, lease, or are simply interested in EVs, LES has created an EV-interest group to keep consumers informed and engaged. It notifies consumers about educational gatherings and periodically shares information about the evolving world of electric transportation. It also provides a video series targeted toward educating consumers on the benefits and limitation of EVs, charging practices, and even what to consider when purchasing an EV. Outside of the general educational components LES provides, it also has interactive resources on its webpage where consumers can view all of the charging station locations in the Lincoln community. The site also includes an EV shopping assistant tool for consumers to narrow their search by range, type of vehicle, and budget.

# WHERE ARE WE NOW?

To maintain an active understanding of EV industry changes and advancements, LES staff members are actively engaged with various national organizations, including participation on the EPRI Electric Transportation Advisory Council and with APPA. These organizations are focused on monitoring changes in the industry, sharing lessons on how to serve the needs best, and helping to influence national policy.

## Fleet

Currently, 76 percent of the LES passenger fleet is electric or hybrid. Out of its 21-passenger fleet vehicles, 16 are either fully electric or hybrid: 10 HEVs, three PHEVs, and three BEVs. LES also has a Ford Lightning and a Rivian light duty pickup truck on order. LES is in the same position as the City of Lincoln when it comes to medium and heavy vehicle fleets, because they currently do not have plans to replace these vehicles with EVs because of current technology constraints.

One very important reason to not convert heavy vehicles yet is that their heavy vehicles are used to help restore power outages, when there would be no power to charge them. LES will investigate the feasibility of converting to heavy vehicle EVs as the technology evolves. A fleet composition summary for LES is provided in **Table 2**.



TABLE 2 | LES Fleet Composition Summary

Vehicle Classification	Examples	Number of Combustion Engine Vehicles	Number of Hybrid Electric Vehicles (HEV)	Number of Plug-In Hybrid Electric Vehicles (PHEV)	Number of Battery Electric Vehicles (BEV)	Additional Comments
LIGHT	Sedan, Sport utility vehicle, Light-duty pickup, utility cargo van	127	10	3	3	2 BEV pickups on order
MEDIUM	Medium-duty truck, large van, school bus, bucket truck	41				Piloted hybrid bucket truck
HEAVY	Transit bus, refuse truck, regional haul freight truck	23				

# WHERE ARE WE NOW?

## Infrastructure

**Generation, Transmission, and Distribution:** LES provides robust and reliable power to the Lincoln area. LES' programs and policies have been established to maintain sufficient capacity to accommodate peak demand when necessary. The success of these policies and programs is reflected in the System Average Interruption Duration Index (SAIDI), which measures the average annual number of hours that a customer experiences a power outage outside of major events. Nationally, the average outage for public utilities is just over 2 hours whereas LES maintains a SAIDI rating less than 30 minutes. LES will continue to monitor and prepare for the impacts of increased EV adoption on the infrastructure. Besides aiding as-needed distribution infrastructure upgrades to support large private fleets, LES does not anticipate any significant impact for several years.

**Charging Infrastructure:** LES installed the community's first public charging stations in late 2013 in the West Haymarket to understand utilization, maintenance, and any potential limitations the infrastructure could present. To date, LES has installed 16 240 volt charging stations used by LES fleet vehicles and visitors and maintained by LES. At this time, similar to the City, LES will own, operate, and maintain charging infrastructure to support its fleet electrification efforts but does not anticipate owning, operating, or maintaining public charging infrastructure.



## 2.4.3 Lincoln Public Schools

LPS is a public primary and secondary school system and exists to serve its students and families, including doing its part to secure a sustainable and climate-resilient future. LPS leadership is committed to Resilient Lincoln's vision and intends to turn reducing GHG emissions citywide into a learning opportunity for its students. LPS has already begun involving students by incorporating climate and sustainability elements into the curriculum through special projects. Examples include the economic and financial analysis of EVs and other sustainable technologies such as renewable energy, recycling, and manufacturing.

### Fleet

LPS' fleet includes approximately 312 vehicles, consisting of 75 light duty vehicles, 162 school buses, and 75 other medium duty vehicles. As of January 2023, all of LPS' fleet vehicles have ICVs. LPS has set aside funds to purchase light duty EVs once dealership lead times are feasible. LPS also pursued funding to electrify its school buses through the first round of the Environmental Protection Agency (EPA) Clean School Bus funding. The application was not successful in the first round of funding and was put on a wait list for consideration on subsequent rounds. LPS anticipates pursuing future funding opportunities to electrify its school buses. A fleet composition summary of LPS' fleets is provided in **Table 3** on the following page.



# WHERE ARE WE NOW?

**TABLE 3 | LPS Fleet Composition Summary**

Vehicle Classification	Examples	Number of Combustion Engine Vehicles	Number of Hybrid Electric Vehicles (HEV)	Number of Plug-In Hybrid Electric Vehicles (PHEV)	Number of Battery Electric Vehicles (BEV)	Additional Comments
<b>LIGHT</b>	Sedan, Sport utility vehicle, Light-duty pickup, utility cargo van	75				
<b>MEDIUM</b>	Medium-duty truck, large van, school bus, bucket truck	237				162 standard school buses, 75 small school buses & other vehicles
<b>HEAVY</b>	Transit bus, refuse truck, regional haul freight truck					

## Infrastructure

In 2020, LPS installed charging stations at the six existing high schools and at the LPS operations building. These stations are in the visitor parking lots and are publicly available to faculty, staff, students, and visitors. LPS noted that use of these charging stations is consistently increasing over time and schools have received requests for more charging stations.

These first stations required more extensive work to install at existing buildings and were funded by one-time available funds from the Nebraska Department of Environment and Energy (NDEE) and LES. Installation at new construction schools is simpler and has been established as the expectation for design guidelines going forward. The district opened Robinson Elementary and Northwest High School in 2022 with EV charging stations installed at each site. While retrofitting existing buildings is more challenging, LPS intends to strategically evaluate and install charging stations at those facilities when feasible.



# WHERE ARE WE NOW?

## 2.4.4 University of Nebraska-Lincoln

UNL is contributing to the more sustainable operation and the advancement of the use of EVs and related industries through education and research. UNL is committed to working toward sustainability both as a regional partner of the CSC and as an organization. UNL adopted its Environment, Sustainability, and Resilience Master Plan in 2020, which provides strategic vision related to environment, sustainability, and resilience topics at UNL and serves as framework for change. The plan identifies aspirational goals and associated long- and short-term objectives across ten themes, one of which is transportation. The aspirational goal of the transportation theme is to “Develop an integrated transportation system with the City of Lincoln that promotes multi-modal and sustainable transportation consistent with public health requirements.” The short-term goal related to EVs is to “Diversify the UNL in-town fleet (50-mile radius) vehicles with electric vehicles where appropriate.”

### *Fleet*

UNL’s fleet includes approximately 194 vehicles: 161 light duty, 29 medium duty, and four heavy duty vehicles. UNL was an early adopter of EVs through the purchase of Mitsubishi iMiEVs, but these vehicles had ranges of only approximately 60 miles, which limited their operational capability. UNL currently owns and operates eight BEVs: four for parking services, one for the utility plant, one for university police, and the remaining two are pending permanent assignment. Plans include converting the university police fleet to EVs starting in 2024 by replacing Ford Explorer Utility Police Interceptors with the Chevrolet Blazer EV. The university is also slated to purchase one of the first Chevrolet Silverado EV pickups once production begins. A composition summary of UNL’s fleet is provided in **Table 4** on the following page.

### *Micro Mobility*

UNL has been a supporter of BikeLNK since its introduction to Lincoln. The City initiated the program based on a request from UNL’s student government association (Association of Students of the University of Nebraska) to examine the impacts, benefits, and feasibility of a bike share program in 2014. UNL currently sponsors 5 bike share stations on City Campus and East Campus, and 12 e-bikes within the fleet. Since April 2018, BikeLNK’s station location at the Nebraska Union (UNL City Campus) has been the most used BikeLNK station with over 30,000 total bike checkouts.



# WHERE ARE WE NOW?



TABLE 4 | University of Nebraska-Lincoln Fleet Composition Summary

Vehicle Classification	Examples	Number of Combustion Engine Vehicles	Number of Hybrid Electric Vehicles (HEV)	Number of Plug-In Hybrid Electric Vehicles (PHEV)	Number of Battery Electric Vehicles (BEV)	Additional Comments
LIGHT	Sedan, Sport utility vehicle, Light-duty pickup, utility cargo van	151	1	1	8	
MEDIUM	Medium-duty truck, large van, school bus, bucket truck	29				
HEAVY	Transit bus, refuse truck, regional haul freight truck	4				

## Infrastructure

UNL has six publicly accessible charging stations (four at Hawks Hall on the City Campus and two at the Nebraska East Union on East Campus) that were partially funded through an NDEE grant. These stations are available 24 hours a day for use by the campus community and the public. In addition to these 6 stations, there are 10 other Level 2 charging stations located in various locations on the UNL campus to serve fleet vehicles, including: four for Parking Services, two for Utilities; one for Custodial Services; one

for Campus Police, and two for University Fleet Management. UNL has received consistent requests for additional charging stations from school departments and the public. Parking on campus is a limited resource for the university; the increased demand of charging stations from both internal and external parties means charging spaces for students and faculty will have to be thoroughly planned and accounted for. In the short term, UNL is evaluating its role in owning, operating, and maintaining charging stations.

# WHERE ARE WE NOW?

## 2.5 Disadvantaged Communities

The electrification of vehicles can and should benefit everyone. Lincoln is determined to bring the benefits of EVs to all including those in disadvantaged communities. The federal government created the Justice40<sup>5</sup> initiative to address historical underinvestment in these communities, directing 40 percent of benefits from clean energy and clean transportation investments to them. Among other challenges, these communities face higher transportation burdens, higher rates of environmental pollution, higher dependence on fossil energy sources, and higher rates of social vulnerability<sup>6</sup>. **Figure 4**<sup>7</sup> shows the various percentages of persons living below the poverty level, one socioeconomic indicator of disadvantage, in the Lincoln area.

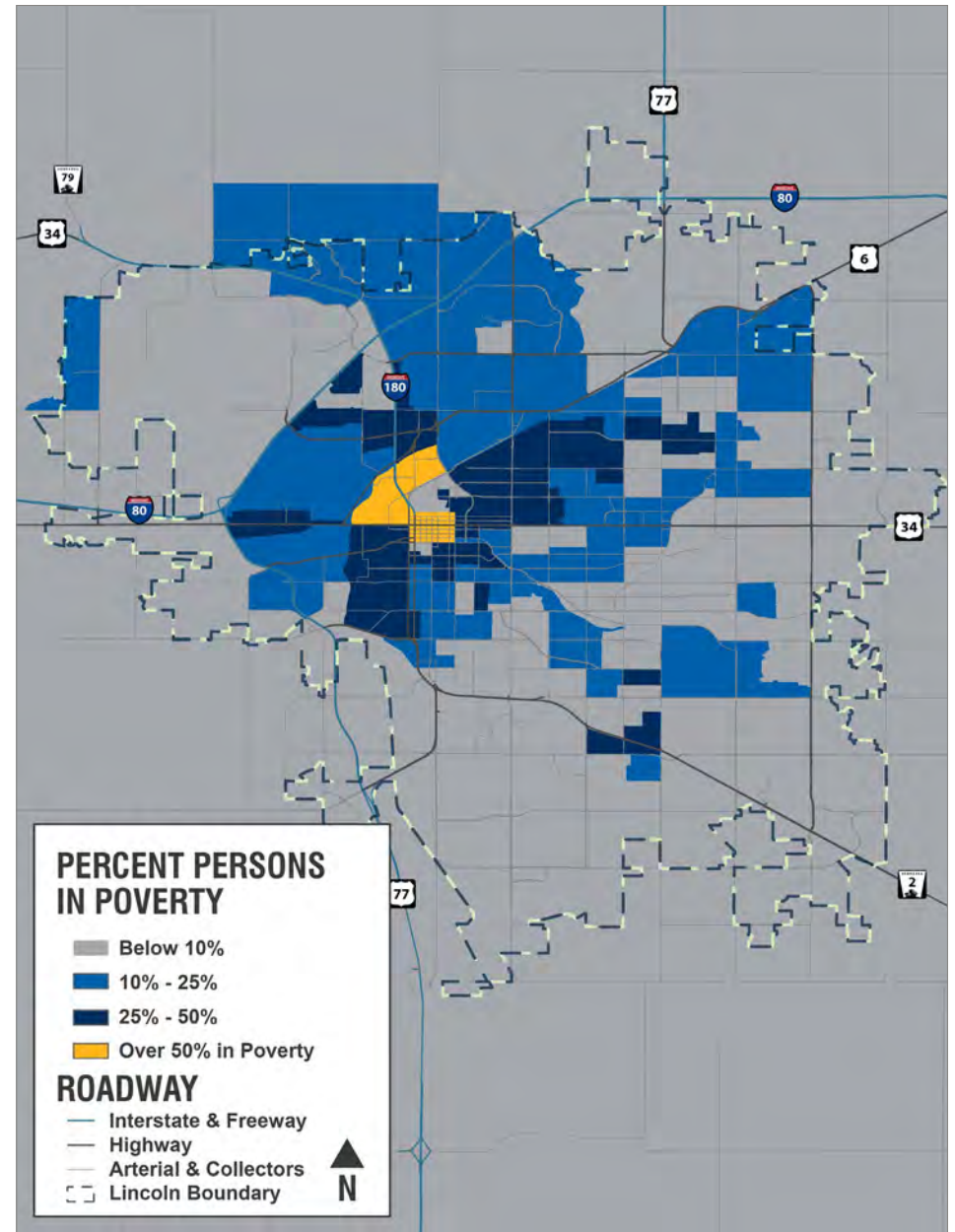
5 <https://www.energy.gov/diversity/justice40-initiative>

6 Agronne National Laboratory, <https://www.anl.gov/es/electric-vehicle-charging-equity-considerations>

7 Data Source: 2019 ACS 5-year



FIGURE 4 | Percent of Persons Below Poverty Level in the Lincoln Area



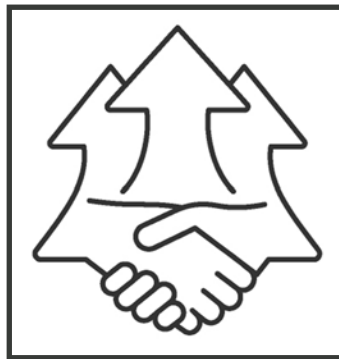


# WHERE ARE WE NOW?

Deploying EVs in a truly transformational way requires consideration of these burdens to disadvantaged communities and employing intentional efforts to address them. The CSC will focus on making EV charging accessible to renters in multi-unit dwellings (MUDs) with and without garages. E-bikes may present a more affordable and accessible electric transportation option for some Lincoln area residents. Readiness efforts should also be mindful of reaching all areas equitably so that communities are poised to take advantage of key workforce and economic opportunities associated with this transition.

Community members should be meaningfully consulted to ensure potential negative impacts of this transition have been properly assessed. As called for by Justice40, combining each of these considerations for a comprehensive approach toward EV readiness will ensure long-term investment in disadvantaged communities.

Many of the recommended actions directly or indirectly address burdens affecting disadvantaged communities. These recommendations are threaded throughout the entire report, underscoring the ubiquitous nature of inequity and the opportunities available to address it. All actions that have a potential positive impact or influence on these communities are marked with this icon:



3

Leading  
The Way






# 3

## LEADING THE WAY

Members of the CSC have a unique opportunity to lead the transition to EVs by demonstrating a commitment within their own fleets. Not only does taking the lead in conversion to EVs help meet regional sustainability goals, but it also serves as an example to the entire area regarding the merits and feasibility of large-scale conversion.

To date, each CSC member is at a different stage of fleet electrification, but each can take additional steps collectively to support further adoption. Though several of the following recommendations will require individual assessment by each of the CSC members, it is important that the CSC continue to engage collectively for guidance, sharing knowledge, and building momentum.

As EV volume continues to grow, it will be all the more important to consider the impacts it will have on energy usage, transportation modes, and facility/regional master planning. Therefore, the CSC should consider evaluating the impacts of EVs through every master plan or long-range strategic plan.

CATEGORY	ID	RESPONSIBILITY	ACTIONS	EQUITY	
 FACILITATE	3.1	CSC	Continue to incorporate EVs and other sustainability considerations into City and regional planning efforts and documents		
		COL*			●
		LES			●
		LPS			●
		UNL			●
	3.2	CSC	Continue to support actions identified in each member organization's sustainability and climate action plans		
		COL			●
		LES			●
		LPS			●
		UNL			●

\*Note that for the actions, the City of Lincoln is abbreviated as "COL."

## 3.1 Agency Fleets

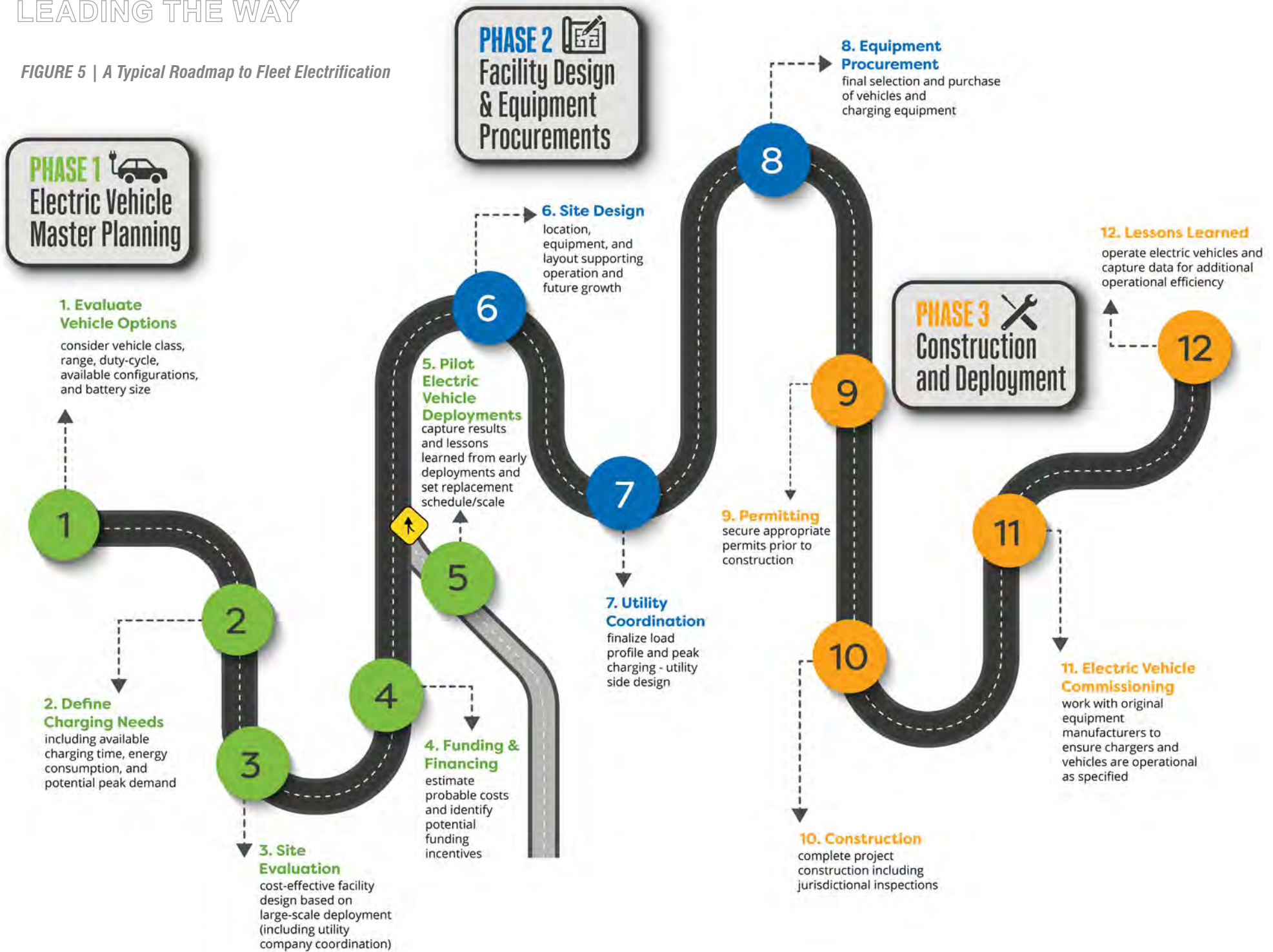
Though the collective fleets of CSC members represent a substantial number, each member's fleet is comprised of a diverse set of vehicle types and usage profiles. Because of the unique composition of each fleet, it is necessary for each member of the CSC to create its own, unique plan to transition away from ICVs. Each of these plans will serve as the basis for goals for transition to EVs and addressing the key barriers associated with fleet electrification. A typical roadmap to fleet electrification is provided in **Figure 5**. Full plan details should account for time, cost, responsibility, and success metrics for each step in the roadmap. If needed for the individual CSC member organization, the plan can also include a business case for transitioning and a life cycle cost analysis. Even though each member of the CSC may be at a different point along the transition roadmap, universal recommendations are on the following page.

**Fleet Transition Plans:** During each agency's development of a fleet transition plan, it is important to note that not all vehicle types and applications are currently suitable for battery electric conversion. Priority should be given to light and medium duty applications in the near term. Longer-term objectives for heavy duty applications may include newer battery technology or other reduced emission technologies such as hydrogen or recycled biofuels (such as renewable natural gas). Additionally, for vehicles with dutycycles that are more challenging for battery electric powertrains, pilot vehicle deployment can be used to evaluate performance



# LEADING THE WAY

FIGURE 5 | A Typical Roadmap to Fleet Electrification





# LEADING THE WAY

prior to transitioning full segments of the fleet to BEVs. Each agency should also develop a plan to transition its transit fleet (if applicable). This can be included as a subsection of the overall fleet transition plan, or it can be a stand-alone plan.

CATEGORY	ID	RESPONSIBILITY	ACTIONS	EQUITY	
 ELECTRIFY	3.3	CSC	Develop and implement organization-specific fleet transition plans, with specific goals and timeframes		
		COL			●
		LES			●
		LPS			●
		UNL			●

**Long-term Charging Plans:** BEV operation requires significant electrical infrastructure for charging. Careful evaluation of existing and new facilities should be conducted to understand electrical capacity limitations and what additional infrastructure is required to support targeted EV adoption. Thought should be given to which facilities or areas EVs will operate from, and it may be necessary to consider consolidation of operations to minimize the cost and quantity of charging infrastructure required. For example, several CSC fleets could use one, centrally located DCFC charging station in conjunction with their individually managed L2 stations. Additionally, there may be opportunities for charging infrastructure to serve both the CSC’s collective fleets and general community needs. For example, fleet charging infrastructure may be used as supplemental community charging facilities during one-off events like major sporting events (e.g., Husker football and basketball games) or concerts. Furthermore, CSC collective facilities located next to parks and other frequently visited venues could be used by the public when not required by fleet vehicles. In each of these situations, ownership, operation, and payment strategies would have to be developed to ensure success.


The long-term charging plan will also have to consider other factors such as emergency backup power generation for critical operations and incorporate planning for multiple low- or no- emission fuel types as described above.

CATEGORY	ID	RESPONSIBILITY	ACTIONS	EQUITY	
 ELECTRIFY	3.4	CSC	●	Develop organization specific long-term charging plans	
		COL	●		
		LES	●		
		LPS	●		
		UNL	●		
	3.5	CSC	●	Explore the potential for shared charging infrastructure	
		COL			
		LES			
		LPS			
	3.6	CSC		Install charging infrastructure as appropriate at new building sites	
		COL	●		
		LES	●		
UNL		●			

**Operations, Maintenance and Workforce Development:** Long-term success in transitioning to EVs requires robust operational plans that help maximize return on investment (ROI) for fleet vehicles. It is essential that transition plans establish appropriate means for workforce training in both maintenance and operation of new vehicle technologies. Because the technical expertise for EV maintenance will take time to develop, the CSC may consider establishing a mechanism for cross-training staff within the CSC or sharing a specialized EV workforce. Furthermore, because each CSC member is working to adopt new EVs into new applications,

# LEADING THE WAY


a significant opportunity is presented to share in lessons learned on pilot vehicle deployments. Additional information on workforce development is included in Section 4.3.2.

CATEGORY	ID	RESPONSIBILITY	ACTIONS	EQUITY
 ELECTRIFY	3.7	CSC	Consider shared EV vehicle and charging station training for CSC organization staff members	
		COL		
		LES		
		LPS		
		UNL		
	3.8	CSC	Establish a process for capturing and sharing pilot vehicle lessons learned across the CSC	
		COL		
		LES		
		LPS		
		UNL		

**Alternative Zero-emission Technologies:** In January of 2023, the federal government released *The U.S. National Blueprint for Transportation Decarbonization*<sup>8</sup>. The document outlines several policy-level recommendations surrounding the reduction of GHG emissions in the transportation sector by 2050. Several technology solutions are identified within the document that will be required to support large-scale decarbonization. Hydrogen and sustainable liquid fuels are included in the document as technology solutions; these applications likely represent the greatest long-term potential for zero-emission heavy duty and off-road applications. Though these technologies are still in early development phases, their potential long-term use in some of the CSC fleets should be considered as part of any long-term facilities planning exercise.

<sup>8</sup> Reference: <https://www.energy.gov/articles/biden-harris-administration-releases-first-ever-blueprint-decarbonize-americas>

**Additional Considerations:** As manufacturers continue to increase EV production volumes, many vehicle models continue to experience extremely long lead times. Many public fleet operators across the country have expressed an inability to procure EVs. In the past, creating multiagency buying groups has been a means of price negotiation, but those types of groups may need to form today to secure vehicles by presenting themselves as larger buying groups to Original Equipment Manufacturers (OEMs). However, even if long lead times persist into the next year, members of the CSC can progress in fleet transition through expediting their infrastructure planning activities. In fact, planning, designing, and construction of facility charging will have to occur well before vehicle purchases because infrastructure component lead times for electrical and charging equipment are often greater than those being experienced for EVs. In addition to planning for added charging infrastructure, energy redundancy considerations should be evaluated and implemented as needed for vehicle usage and availability.

CATEGORY	ID	RESPONSIBILITY	ACTIONS	EQUITY
 ELECTRIFY	3.9	CSC	Once supply begins to meet the demand, explore potential for CSC purchases of EVs, including potential discounts and other advantages	
		COL		
		LES		
		LPS		
		UNL		










### 3.2 Funding

There are many funding opportunities available to help pave the way toward vehicle electrification. Some of these funding opportunities are awarded on a competitive basis, which may include time-intensive grant preparation and submission. Other funding opportunities will come through formula channels to agencies such as the Lincoln Metropolitan Planning Organization (MPO). Regardless of the mechanism of funding, there is tremendous value in members of the CSC coordinating to collectively use common resources to apply and compete for grants. These grants may be jointly pursued by the CSC or individually pursued by each member agency. Additionally, working together to identify funds and help administer them in the community by acting as a pass-through funding organization can be extremely productive in getting resources to important projects.

It should be noted that several federal grant programs have Justice40 equity requirements associated with administration of the programs. Developing a regional equity action plan or incorporating similar components into other regional plans will demonstrate intentional consideration for disadvantaged communities. Establishing equity as a key priority in regional planning, policy, and documents will support funding pursuits and administration of secured funds in a way that benefits all members of the community. Proactively seeking to mitigate any of the burdens categorized under the Justice40 criteria can be used as evidence to support the demonstration of need for federal or other funding.

**Table 5** provides a summary of funding mechanisms that may be of particular interest in supporting electrification-related initiatives.

CATEGORY	ID	RESPONSIBILITY	ACTIONS	EQUITY	
 ELECTRIFY	3.10	CSC	●	Jointly pursue funding opportunities	
		COL			
		LES			
		LPS			
		UNL			
 ENCOURAGE	3.11	CSC	●	Curate information for other funding opportunities, grants, or incentive programs	
		COL			
		LES			
		LPS			
		UNL			
 FACILITATE	3.12	CSC	●	Secure funds that can be administered and offer to private organizations to encourage/ incentivize charging station installation in desired areas	
		COL			
		LES			
		LPS			
		UNL			
	3.13	CSC		Develop a regional equity action plan or incorporate similar components into other plans or documents to demonstrate need and set a foundation of support for EV deployments	
		COL	●		
		LES			
		UNL			

**TABLE 5 | Example Funding Sources Supporting Electric Vehicle Adoption**

FUNDING PROGRAM	EV ADOPTION	EV INFRASTRUCTURE	DESCRIPTION
<b>National Electric Vehicle Infrastructure (NEVI )</b>		●	The NEVI program is a five-year program administered by Nebraska Department of Transportation (NDOT) that provides \$30B to Nebraska. Phase I of the program requires build-out of charging infrastructure on the alternative fuel designated corridors. Following completion of Phase I, the remaining funding can be used for other regional electric vehicle (EV) infrastructure projects. This program requires a local 20 percent match.
<b>Carbon Reduction Program (CRP)</b>	●	●	The CRP can fund a range of projects designed to reduce carbon dioxide emissions from on-road highway sources. Funds are available at both the state and Metropolitan Planning Organization (MPO) level. The program will provide approximately \$48B in funding to Nebraska over a five-year period.
<b>Congestion Mitigation and Air Quality (CMAQ)</b>	●	●	The CMAQ Improvement program provides funds to support meeting requirements of the Clean Air Act. These funds are distributed to state and local agencies and are approximately \$11.5M for fiscal year 2023.
<b>Internal Revenue Service (IRS) New EV Tax Credit</b>	●		The IRS provides a mechanism for up to \$7,500 credit on new EVs and a \$4,000 credit on used EVs. Municipalities may receive the credit as a direct payment.
<b>IRS Used Clean Vehicle Credit</b>	●		Beginning January 1, 2023, if a buyer purchases a qualified used electric vehicle (EV) or fuel cell vehicle (FCV) from a licensed dealer for \$25,000 or less, they may be eligible for a used clean vehicle tax credit (also referred to as a previously owned clean vehicle credit). The credit equals 30% percent of the sale price up to a maximum credit of \$4,000.
<b>IRS EV Commercial Vehicle Tax Credit</b>	●		The IRS provides a credit mechanism for 15-30 percent of EV purchase price (up to \$7,500 for vehicle weight ratings under 14K pounds and \$40,000 for all other vehicles). Municipalities may receive the credit as a direct payment.



4

# Enabling and Encouraging Electric Vehicle Adoption for Everyone



# 4

## ENABLING AND ENCOURAGING ELECTRIC VEHICLE ADOPTION FOR EVERYONE

The benefits of electrification belong to everyone. Reaching the point where all can reap those benefits requires consideration and effort from many different angles. Understanding a few of the challenges for and perspectives from individuals and businesses helps define how to meaningfully engage with them. Following are a few of those challenges and perspectives:



### INDIVIDUALS

- Should benefit from EVs even when they don't own a vehicle.
- Will not purchase an EV until they understand the benefits of owning one.
- Will not purchase an EV unless they can afford one.
- Will not purchase an EV unless they have convenient access to a charger.



### BUSINESSES

- Are more likely to convert vehicle fleets if vehicles are available, meet their needs, and provide economic benefit.
- Are more likely to install public chargers if there is economic benefit through charging, attracting customers, or providing a benefit to employees or visitors.
- Are more likely to sell EVs (dealers) if they can make a profit on the sale or maintenance.
- Are more likely to thrive if there is a workforce skilled in EV sales, maintenance, and charging station installation and maintenance.

This section will explore strategies that will help remove barriers and encourage adoption by individuals and businesses. Specifically, it will address near-and long-term strategies.

## 4.1 Individuals

Individuals benefit from vehicle electrification in different ways. In the broadest sense, every Lincoln area resident and visitor will benefit from vehicle electrification because of its contribution to cleaner air and reduced climate pollution. Workforce opportunities prompted by vehicle electrification will also contribute to the economic mobility of individuals, regardless of adoption.

Those who do not own personal vehicles will be able to benefit from electric transit vehicles, e-bikes, or scooters, and those who lease or own EVs benefit from reduced operations and maintenance costs.

### 4.1.1 Electrified Transit

Electrification of transit applications offers a unique opportunity to provide the benefits of electrified mobility to a broader range of users within the community. Though many of the same principles of fleet electrification apply (section 3.1), there are several special considerations that must be accounted for in electrified transit applications. For electric transit vehicles, these considerations include careful evaluation and planning for routes that will accommodate the range constraints without negatively impacting the experience for riders and infrastructure that will support the heavy charging demands.




Each CSC agency has a role to play in transit electrification, including the City of Lincoln, under which StarTran operates; LPS which operates a school bus fleet; UNL, which operates shuttle services; and LES, which supplies the energy for the EVs. Each agency should ensure that electrification is included in its sustainability plans. Transit fleet electrification should be included as part of each overall fleet transition plan, as a stand-alone plan, or as part of an existing low- or no-emissions vehicle plan that also considers other alternative fuels.

LES should be included as a stakeholder during the development of each of these plans to help prepare for and install infrastructure that meets the charging demand and minimizes electricity costs.

# ENABLING AND ENCOURAGING ELECTRIC VEHICLE ADOPTION FOR EVERYONE

Agencies should also explore opportunities to work together on projects. For example, the City’s Climate Action Plan included a recommendation to explore the feasibility of an electric shuttle circulating between UNL and other city destinations.

Transit fleet transition is a major focus of many EV-related grants and funding opportunities. By having a completed fleet transition plan, each agency will be prepared to apply for and receive such grants, which can provide the needed capital to accelerate transition.

CATEGORY	ID	RESPONSIBILITY	ACTIONS	EQUITY	
 ELECTRIFY	4.1	CSC	Continue to support transit electrification efforts		
		COL			●
		LES			●
		LPS			●
		UNL			●
	4.2	CSC	Include transit electrification as part of organization-specific fleet EV transition plans or other low- or no-emissions fleet plans		
		COL			●
		LES			●
		LPS			●
		UNL			●

## 4.1.2 Electric Bicycles and Scooters

The CSC recognizes that there are modes of transportation that can supplement mobility options for those who cannot access, afford, or otherwise use EVs. For this reason, the City has partnered with BikeLNK for docked bicycles. The program allows businesses and organizations throughout the community to sponsor charging stations. UNL was an early participant in the program with sponsorship of 5 stations and 12 pedal-

assist e-bikes. The City has also partnered with ScooterLNK for dockless scooters, all of which are electric. Investments in these technologies can supplement EVs in several ways listed below.





- 1. Cost-effective:** E-bikes are generally less expensive than electric cars, making them a more accessible form of electric transportation for many people.
- 2. Improved mobility:** E-bikes can help extend the comfortable range of travel over traditional bicycles, allowing users to travel longer distances without relying on a car.
- 3. Convenience:** E-bikes can be used for short trips around town, such as running errands or commuting to work. They are generally easier to park and navigate through traffic than cars, making them a more convenient option for all types of short trips.



The City and CSC members should continue to support these and similar shared programs. CSC members may also be interested in supporting e-bike growth through other ways, such as an income driven voucher program to that could be purchased at local shops.

When considering these additional transportation options, it is important to note that infrastructure such as multiuse paths, bike lanes, and even sidewalks are not available everywhere throughout the city. The CSC members should also continue to support investment into this infrastructure to provide a safer path for users of these modes. This infrastructure will also continue to ease reliance on personal automobiles and contribute to a reduction in emissions. Lastly, the CSC could consider advocacy stances for legislation on active transportation that are aimed at making the transportation system more accessible, equitable, and safe.

# ENABLING AND ENCOURAGING ELECTRIC VEHICLE ADOPTION FOR EVERYONE

CATEGORY	ID	RESPONSIBILITY	ACTIONS	EQUITY	
 <b>ELECTRIFY</b>	4.3	CSC	Continue to expand electric mobility options, such as e-bikes and scooters		
		COL			●
		LES			
		LPS			
		UNL			
 <b>FACILITATE</b>	4.4	CSC	Continue to support active transportation infrastructure improvement		
		COL			●
		LES			●
		LPS			●
		UNL			●





## 4.1.3 Vehicle Ownership Costs

Despite documented lower total cost of ownership for EVs versus their ICV counterparts, there are many reasons why individuals are not able or interested in purchasing an EV at this time. This section addresses vehicle and charging costs specifically, and other reasons for buyer reluctance (lack of accurate information, range anxiety, lack of a nearby charger, etc.) are covered later in this chapter.

### Higher Initial Vehicle Cost

The initial cost of an EV is approximately 35% higher than a comparable ICV (excluding incentives or tax rebates), primarily because of the cost of batteries. This higher cost makes the purchase of an EV inaccessible to many. To help offset this initial cost and encourage EV adoption, the federal government continues to offer tax credits for many qualifying models. Some states and utilities have added their own incentives for investing in EVs and charging stations.

For economic reasons, many vehicle owners prefer to purchase a used car. Because of the current high demand for EVs and their recent introduction into the market, the selection of used EVs available for purchase is limited. There is evidence that this is already improving, as there is at least one used car business in Lincoln that sells only used EVs (<https://chargedautomotive.com>). It is anticipated that this market will continue to increase as current vehicles age. As this increase in used EVs occurs, the adoption level in lower income areas will also likely increase. In addition, in January 2023 the IRS has instituted a Used Clean Vehicle Credit. If income-qualified buyers purchase a qualified EV from a licensed dealer for \$25,000 or less, they can qualify for a credit of 30% of the total sale price up to a maximum credit of \$4,000.



CATEGORY	ID	RESPONSIBILITY	ACTIONS	EQUITY	
 <b>FACILITATE</b>	4.5	CSC	Work with NDOT to explore a state rebate/tax credit program in addition to other national programs for the purchase of EVs – especially for used EVs		
		COL			
		LES			
		LPS			
		UNL			
 <b>ENCOURAGE</b>	4.6	CSC	Provide current information on available credits and rebates to potential EV buyers		
		COL			
		LES			
		LPS			
		UNL			

### Charging Stations in Single-family Dwellings

Though most current EV owners live in single family dwellings (SFDs), this ownership is anticipated to become more widely distributed over time. According to a study by LES, many of these current owners are content with charging their vehicles with a “trickle charge” (L1 charger). Others are willing to pay to upgrade the power service to accommodate faster L2 charging. Some agencies have worked with their local

# ENABLING AND ENCOURAGING ELECTRIC VEHICLE ADOPTION FOR EVERYONE

power provider to offer a credit or rebate for upgrading charging infrastructure to L2, including providing an increased benefit for those who live in a disadvantaged area. Though this strategy can have an impact on overall adoption, if it is considered, it should be paired with a similar incentive program targeting those who live in MUDs to not unfairly benefit individuals who live in SFDs.




CATEGORY	ID	RESPONSIBILITY	ACTIONS	EQUITY	
 FACILITATE	4.7	CSC	Consider charger installation incentive programs for individuals that benefit those who live in both SFDs and MUDs		
		COL			●
		LES			●
		LPS			
		UNL			

## 4.2 Businesses

Electrification affects businesses in many industries, and they are critical partners in its adoption and success. These businesses function as consumers and operators of vehicles and charging equipment, as suppliers through manufacturing and distribution, and as supporters through installation and maintenance. This section covers how the CSC can partner with and enable businesses in various segments to help advance toward the goals and benefits of electrification.

When engaging with businesses, it is important to remember that although many are dedicated to climate preservation, their actions and activities must also make financial sense. That means when they install public charging stations, for example, they will benefit by attracting and retaining customers, tenants, or employees or will profit from the charging itself. To justify charger installation, the amount of financial benefit

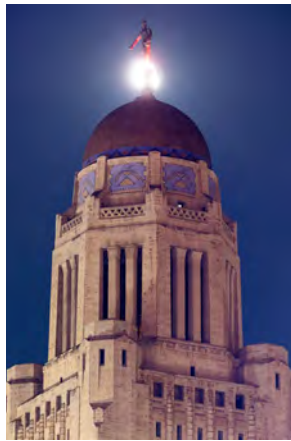
must be greater than the installation, operation, maintenance, and energy costs. Some opportunities are available to help offset the capital expenses, including a tax credit established through the IRS for up to 30 percent of the cost of charger installation, not to exceed \$100,000, with labor and geographic limitations.

CATEGORY	ID	RESPONSIBILITY	ACTIONS	EQUITY	
 ENCOURAGE	4.8	CSC	Curate and make information available on current charger funding opportunities for businesses		
		COL			
		LES			
		LPS			
		UNL			
	4.9	CSC	●	Provide information to potential charger installers including the anticipated demand for chargers and their installation and operation – such as anticipated costs, best practices, standards for ADA compliance and other safety codes, etc.	
		COL			
		LES			
		LPS			
		UNL			



## Recognition Programs

An additional way of providing general encouragement to business owners to embrace vehicle electrification is simply to recognize their efforts. One way to recognize these efforts is to add EV considerations to the numerous green and sustainability award programs already in place through various organizations. In addition, CSC members could initiate or work with these organizations to include EV-specific awards or categories for such recognition programs. A few examples of existing programs are the following:




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***The Lincoln Chamber of Commerce  
– Green Business of the Year***

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***Nebraska Department of Education  
– Green Ribbon Schools***

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***Keep Nebraska Beautiful –  
Environmental Awards***



## 4.2.1 Owners of Public Charging

Many types of businesses may provide publicly available charging stations. Examples include fueling stations, public parking areas, hotels, grocery stores, restaurants, event venues, or other retail locations where customers spend time. The type of charger needed depends on the purpose of the visit and desired customer dwell time. For example, a fueling station is more likely to install DCFC chargers to accommodate short visits and pass-through traffic; grocery stores or restaurants may install an L2 charger for medium-duration visits; and a hotel or MUD may install an L2 or L1 chargers to provide overnight charging.

Some employers may also demonstrate their commitment to sustainability and promote EV adoption among their employees by providing public charging infrastructure (primarily intended for employees and visitors) to use during the workday. Such an amenity can be a significant benefit to employees who do not have access to overnight charging.

To help accelerate the adoption of EVs, the CSC may consider establishing one or more programs to incentivize charging infrastructure installation in addition to or in concert with broader federal incentives. Example programs around the country consist of incentives, rebates, or tax credits. Many such programs provide an increased benefit for installations in disadvantaged communities as a way to foster equitable access to charging infrastructure. The program could also be structured to provide greater benefit for areas that lack sufficient charging infrastructure. The CSC should consider further investigation into the development of such a program, including potential funding sources, to both accelerate the installation of charging stations and to influence their equitable distribution (*also see Section 4.3.5*).

CATEGORY	ID	RESPONSIBILITY	ACTIONS	EQUITY
 <b>ENCOURAGE</b>	4.10	CSC	Investigate and encourage organizations to include EV elements in sustainability leadership and recognition programs	
		●		
		COL		
		LES		
		LPS		
UNL				

CATEGORY	ID	RESPONSIBILITY	ACTIONS	EQUITY
 FACILITATE	4.11	CSC	Investigate an incentive program for public charger installation to accelerate their installation and influence their locations	
		COL		
		LES		
		LPS		
		UNL		

## 4.2.2 Developers and Multi-unit Dwellings




Those who develop and manage commercial and residential properties play an important role in the electrification process. This section addresses general developments and MUDs specifically.

### New and Existing Developments

Charging capacity is up to 75 percent less expensive<sup>9</sup> when developers plan for and build it into new developments. Despite incurring lower infrastructure costs by considering charging capacity when planning new projects rather than retrofitting built projects, many developers are not yet following this protocol. Developers are primarily ignoring charging capacity when planning new projects because of the up-front cost, and the demand from customers is currently more anticipated than actual. Even if developers only provide space for additional electrical equipment and empty conduit to potential future charging station sites, this is much less expensive than retrofitting an established development. **Table 6** describes a few of the challenges of retrofits:

<sup>9</sup> <https://www.swenergy.org/transportation/electric-vehicles/building-codes#include>

TABLE 6 | Challenges of Retrofits



CHALLENGE	DESCRIPTION
 <p><b>Power Supply</b></p>	Transformers supplying power to many buildings often have 10 percent to 15 percent excess capacity, or overhead, which is enough to sustain only a few L1 or L2 charging stations.
 <p><b>Proximity to Metering Equipment</b></p>	Building service panels can be located substantial distances from where the charging station is to be installed, which may require larger electrical conductors or other equipment.
 <p><b>Parking Spaces</b></p>	Some existing buildings or parking lots do not have parking spaces that can be dedicated to EV charging, and may require sidewalks or other modifications.

In general, developers will provide EV charging capacity and services when the customers demand them. The CSC's actions to remove barriers and provide encouragement for EV adoption will help accelerate the naturally increasing demand, and developers are likely to respond accordingly. In addition to the actions for businesses in general (*see the beginning of Section 4.2*), the CSC can help influence developers to accommodate current and future EV charging capacity by:

- Including EV considerations in relevant building codes (*see Section 4.3.3*).
- Establishing charging station standards (*see Section 4.3.4*).
- Streamlining EV-related application and permitting processes (*see Section 4.3.3*).

## Multi-unit Dwellings (MUDs)

MUDs are of particular interest to equitable charging distribution because individuals who live in a MUD depend on the property owner to provide overnight charging capability. Though many of the challenges for MUDs are consistent with those for general businesses and developments already described in this section, parking and tenant cost allocation represent a unique challenge. This is primarily because parking is not standard across MUD building types. There are various systems and solutions to these challenges; however, MUD owners and property managers may lack information about how to solve them. MUDs should be given specific consideration in any incentive program developed by the CSC or its members.

CATEGORY	ID	RESPONSIBILITY	ACTIONS	EQUITY	
 ENCOURAGE	4.12	CSC	Develop customized educational materials for MUDs that includes information on various parking and tenant cost allocation solutions		
		●			
		COL			●
		LES			●
		LPS			
UNL					



### 4.2.3 Private Fleet Operators

The electrification of vehicle fleets presents a significant opportunity for organizations to reduce their operating costs and drive the adoption of emissions-free transportation within the region. A recent study from the Rocky Mountain Institute<sup>10</sup> found that large-scale EV adoption can risk driving up costs and impacting the local power grid when not tackled systematically. With the declining

<sup>10</sup> <https://rmi.org/insight/steep-climb-ahead/>

upfront cost of zero-emission trucks and their associated fueling infrastructure, increased model availability, improved range, and robust government and utility incentives, private fleets of all sizes and duty cycles are making commitments to deploy zero-emission trucks.

The CSC can take a strong role in encouraging private fleet EV adoption by sharing lessons learned from their own fleet electrification progress. Releasing communication about new CSC collective fleet electric vehicles or sharing information on the ROI for successful implementations will provide valuable resources to fleet owners who may be less inclined to try electric vehicles or charging stations. LES may be one of the primary contact points in this identifying these opportunities as fleets reach out to coordinate utility demands when assessing future fleet electrification needs. They can both provide information from CSC EV fleet success and provide other resources and expertise to streamline private fleet electrification.

CATEGORY	ID	RESPONSIBILITY	ACTIONS	EQUITY	
 ENCOURAGE	4.13	CSC	Develop customized educational materials for private fleet owners that includes information on actual costs, benefits, and operational lessons learned from general and CSC fleet operational experience		
		●			
		COL			
		LES			
		LPS			
UNL					





## 4.2.4 Dealerships

Many dealerships are hesitant to sell EVs.

Some reasons for this are as follows:

- EV maintenance requirements are significantly less than those of an ICV, resulting in less revenue for dealership service departments.
- Selling an EV generally takes more staff time than selling an ICV because most buyers have a large amount of technical questions; time spent results in lower profit margins.
- Dealership sales and maintenance staff lack EV training.

Because most vehicle manufacturers have recently increased EV production, they are putting some pressure directly on the dealerships to increase EV sales. In addition to this internal encouragement, some regions have implemented programs to engage dealerships in increasing EV sales. Notably, the Smart Columbus organization in Ohio implemented an “Electrified Dealer” program, in which dealerships would meet specific requirements for stocking and promoting EVs and in return, Smart Columbus provided training, educational materials, community recognition, co-marketing opportunities, and other benefits. The CSC may consider interviewing various dealerships in the region to determine the current state of education and training, manufacturer incentives, inventory levels, and reluctance to actively sell EV models. Based on the results of this investigation, the CSC may develop its own incentive program like the Ohio example, if it is determined to be beneficial.

CATEGORY	ID	RESPONSIBILITY	ACTIONS	EQUITY
	4.14	CSC	Investigate development of a dealership recognition and/or incentive program (if needed)	
		COL		
		LES		
		LPS		
		UNL		

## 4.3 General Strategies

This section addresses various additional areas related to the overall success of vehicle electrification in the Lincoln area. These include topics related to outreach and education, workforce development, regulatory items, regional planning, and general partnerships that will help drive preparation, adoption, and success.

### 4.3.1 Outreach and Education

Throughout this report there have been numerous references to the need for education and outreach to various audiences. There is a general need to provide timely and accurate information about EVs to dispel misconceptions and facilitate and encourage adoption. It is important to recognize that there are many existing online resources that provide information about vehicles, charging infrastructure, available funding (federal, state, and area-specific), and many other topics. However, many find it frustrating to try to find information relevant to a specific need – including Lincoln area residents and businesses.

By working together, the CSC members are in a unique position to reach a large percentage of the population in the Lincoln area. The CSC members can work together to develop a unified message, develop shared materials, collaborate on events, and disseminate information through the many channels represented by the combined CSC organizations. It is recommended that the CSC members work together to prepare and disseminate information (including curated and reliable external resources) that is specifically helpful for Lincoln area audiences.

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Meaningful efforts should also be made to perform inclusive outreach with the barriers and challenges that are specific to disadvantaged communities in mind. Community leaders, beyond those represented in the CSC, should be consulted to ensure their communities are engaged and receiving the benefits of electrification. Targeted education and outreach that prioritizes disadvantaged communities is more likely to lead to the development of applicable solutions for those communities. By addressing communities that face the biggest barriers, the CSC can set a better standard for all.

It is important to note that CSC members have already made significant efforts with public education and outreach through websites, materials, “ride-and-drive” events, and other activities.



This report recommends continuing these efforts and strengthening them through increased collaboration among the CSC members. Some characteristics of such a program may include the following table:

TABLE 7 | Potential Public Education and Outreach CSC Member Collaboration

POTENTIAL TARGET AUDIENCES	POTENTIAL SUBJECTS
<ul style="list-style-type: none"> <li>Individual consumers</li> <li>Private fleets</li> <li>Developers</li> <li>Educators/trainers</li> <li>Employers</li> <li>Dealerships</li> <li>Fueling station owners</li> </ul>	<ul style="list-style-type: none"> <li>Dispelling myths</li> <li>Benefits and costs</li> <li>Rebates, credits, and grant opportunities</li> <li>Charger installation and maintenance</li> <li>Charging station standards, codes, statutes, and best practices</li> <li>Progress toward GHG reduction goals</li> <li>CSC member activity leadership highlights</li> <li>Certified partner promotions (if those programs exist, such as local charging station installers, service providers, electrified dealers, etc.)</li> </ul>

CATEGORY	ID	RESPONSIBILITY	ACTIONS	EQUITY
 ENCOURAGE	4.15	CSC	Develop and implement a common EV education and outreach program.	
		COL		
		LES		
		LPS		
		UNL		

## 4.3.2 Workforce Development

The success of EVs and other sustainability technologies requires a skilled workforce. In the short term, training and certification programs are needed for technicians who install and maintain charging stations, vehicle technicians who service EVs, and emergency personnel who respond to traffic incidents involving EVs. In the longer term, EV topics should be included in secondary education science, technology, engineering, and mathematics (STEM) curriculum. This topic will excite some students to pursue specialized advanced degrees, which will support the continued advancement of the industry at every level.

### ***EV and Charging Station Technicians***

#### **Charging Station Technician Certification Programs –**

Numerous organizations provide EV-specific training and certifications to electrical workers, vendors, engineers, and others. Some providers offer independent short-term boot camp type trainings; others have established more formal education programs with local community colleges. Some examples include the following:

- Electric Vehicle Infrastructure Training Program (EVITP) for electricians (<https://evitp.org/>)
- Hybrid and Electric Vehicle Engineering Academy for engineers (<https://www.sae.org>)




#### **EV Maintenance Technician Certification Programs –**

Similar to training for ICVs vehicles, EV technicians can learn EV systems either through a manufacturer-specific program or through a more general after-market program. Each manufacturer either has or is developing a training program for the new EVs in its product line. These programs are generally intended for individuals who work in the service departments of local dealerships. Aftermarket providers, such as FutureTech Auto (<https://www.futuretechauto.com/>), provide more generalized training to service a wider variety of vehicles from various manufacturers.

**Local Contractors –** Local contractors and businesses are often exploring opportunities to expand the scope of their services to remain current and capable of meeting the needs of the existing market. Learning how to install charging stations is one way to drive the local economy toward an electrified future that supports local contractors and local jobs. The EVITP provides training and certification for contractors and electricians interested in installing charging stations. The program is coordinated by the U.S. Department of Energy (DOE), the International Brotherhood of Electrical Workers (IBEW), and the National Electrical Contractors Association (NECA), and is offered at some community colleges and local electrical industry training centers.

It is recommended that the CSC organizations consider technician-level training at two levels. For its internal maintenance staff members, the CSC organizations could collaborate on any vehicle or charging station maintenance training opportunities by opening them up to each other (*discussed previously in Section 3.1*). For the community at large, the CSC should monitor the general state of the Lincoln area's technician workforce. If there is an observed need to accelerate the process, CSC members could explore a partnership with an external training provider to bring regular training to the area, reducing required travel expenses for local businesses and residents.

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CATEGORY	ID	RESPONSIBILITY	ACTIONS	EQUITY
 <b>FACILITATE</b>	4.16	CSC	Consider partnerships with external training organizations to strengthen the local workforce	
		COL		
		LES		
		LPS		
		UNL		
	4.17	CSC	Work with local educational institutions to offer technician-level training in the Lincoln area	
		COL		
		LES		
		LPS		
		UNL		

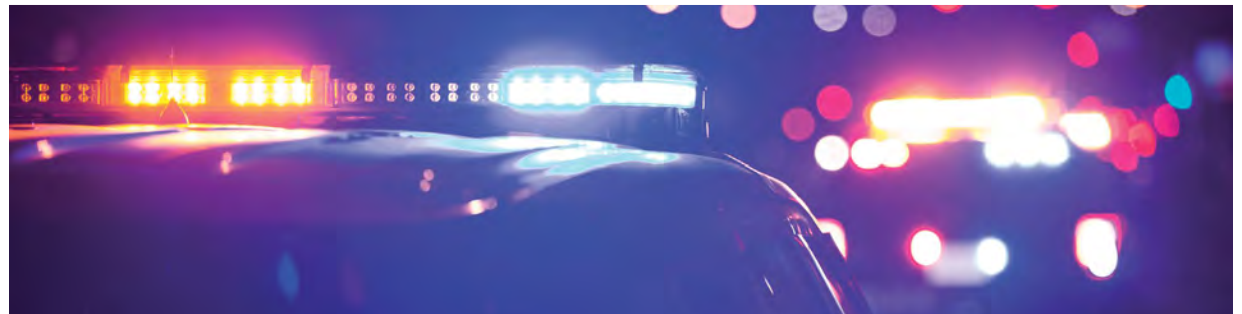
## First Responders

First responders encounter EVs either on the scene of an accident or when assisting a stranded motorist. It is vital they have knowledge about the technology and learn how to safely remove a passenger, tow a vehicle off the road, and extinguish an EV battery fire. Several private providers, such as the National Fire Protection Association (NFPA), offer specific training geared to first responders to ensure they are properly equipped when encountering an EV on the road. Example training opportunities include:

- National Fire Protection Association – Alternative Fuel Vehicles Safety Training
- Some vehicle manufacturers offer emergency responder EV training, including Tesla and GM





CATEGORY	ID	RESPONSIBILITY	ACTIONS	EQUITY
 <b>FACILITATE</b>	4.18	CSC	Work with Lincoln Fire and Rescue and other area first responders to ensure that they have access to specialized EV response training	
		COL		
		LES		
		LPS		
		UNL		



## Secondary Education

At the secondary education level, EV and other sustainability curriculum can be incorporated into traditional STEM courses, or even automotive shop-type courses. Exposure to these topics at this level has helped students begin to understand the technology and importance of sustainability and can get them excited to join the workforce in a role that will make the world a better place to live.

CATEGORY	ID	RESPONSIBILITY	ACTIONS	EQUITY	
 ENCOURAGE	4.19	CSC	Build EV and other sustainability topics into secondary education curriculum		
		COL			
		LES			
		LPS			●
		UNL			



## Post-secondary Education Programs

Multiple areas have established partnerships between training organizations and local community colleges to provide certificates or associate degrees. The Lincoln area’s own Southeast Community College has already purchased several EVs and incorporated EV-specific curriculum as part of its partnership with Ford Motor Company to train automotive technicians. Although not a member of the CSC, the Southeast Community College is a great local resource that is also active with vehicle electrification. The number and variety of similar programs is quickly evolving.

Some examples of these efforts include the following:

- Southeast Community College Ford ASSET Program (<https://www.southeast.edu/fordasset/>)
- Tesla START program (<https://www.tesla.com/careers/tesla-start>)
- Electric Vehicles Apprenticeship Hub being developed through the American Association of Community Colleges (AACCC) in partnership with Tesla and Panasonic (<https://www.ccdaily.com/2023/01/new-hub-will-create-talent-pipeline-for-ev-industry/>)
- Heartland Community College in Normal, Illinois (<https://www.heartland.edu/ev/info.html>)
- Michigan Tech undergraduate and graduate curriculum in Hybrid Electric Vehicle (HEV) Technology (<https://www.mtu.edu/hybrid/>)

UNL may investigate EVs and other sustainability-curriculum for bachelors and advanced degrees. The CSC may also work with Southeast Community College and other local educational institutions to support the expansion of EV-related programs. Access to these programs should be extended to disadvantaged community members through existing educational institution’s scholarships and other programs.

CATEGORY	ID	RESPONSIBILITY	ACTIONS	EQUITY
 FACILITATE	4.20	CSC	Provide post-secondary EV related curriculum through educational institutions and partnerships	
		COL		
		LES		
		LPS		
		UNL		

## 4.3.3 Regulatory Elements

Regulatory elements such as permitting, building codes, zoning ordinances, and accessibility should be adjusted to align with Lincoln's EV readiness program. Though many of these EV elements are already present, some changes and enhancements may be needed. These changes are described in the following subsections.

### **Permitting**

The primary aim of the permitting process is safety. Through this process, officials review and approve permit applications once they're satisfied that the project's plans, calculations, and specifications comply with relevant codes.

**Residential SFDs and MUDs** – Permitting for installing a charging station at a residential location varies depending on the type of charger. L1 chargers do not currently require any notification or permit to be installed in the Lincoln area. However, installing an L2 or DCFC charger requires filing an electrical permit through the City of Lincoln Building & Safety Department per chapter 23.10.140 of the Lincoln Municipal code.

**Commercial and Public Properties** – Though most current EV charging happens at home, charging stations at commercial and public locations offer flexibility in traveling, and maximize electric miles driven. The installation of charging stations at commercial locations is typically more complex than at residential locations. A public or commercial installation may require a modification to an existing use permit or a site plan addressing specific community, zoning, and electricity design criteria.

**Currently, there is no difference between the permitting process of residential, commercial, and public properties.**

This report recommends that the City and LES develop guidance and a streamlined permitting process to assist applicants with permitting, installation, and inspections of commercial and public charging stations. Factors the CSC should consider that differ from residential charging stations include property owners in comparison to property tenants, what type of charging is needed, and who will pay for the costs associated with charging.


**Appendix C** includes a variety of best practices for permitting gathered from other agencies and national sources.

### **Building Codes & Zoning Ordinances**

Building codes and zoning ordinances offer an ideal mechanism for local governments to define opportunities for charging station installations through development. Currently, none of the jurisdictions in the Lincoln area have mandatory charging station development requirements.

The Lincoln area can support charging station deployment by amending local jurisdiction's municipal codes. The City and Lancaster County have adopted various model building codes from the International Code Council (ICC) along with specific local amendments (<https://www.lincoln.ne.gov/City/Departments/Building-Safety/Codes>). EV-specific codes can be added to the local amendments as appropriate. Because of the increase in demand for EV charging infrastructure, the ICC produced the *Electric Vehicles and Building Codes: A Strategy for Greenhouse Gas Reductions* document in 2021. This document includes model code language that the City and the CSC can review for inclusion in the local amendments.

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CATEGORY	ID	RESPONSIBILITY	ACTIONS	EQUITY	
 <b>FACILITATE</b>	4.21	CSC	Develop guidance and a streamlined permitting process to assist applicants with permitting, installation, and inspections for residential charging stations		
		COL			●
		LES			●
		LPS			
		UNL			
	4.22	CSC	Consider a standardized regional permitting process for commercial and workplace charging station installations		
		COL			●
		LES			●
		LPS			
		UNL			


One specific recommended step would be to adopt a framework requiring prewiring for charging stations and several charging station installed spaces for development for the following conditions:

- All newly constructed residential and nonresidential buildings.
- Major remodeling affecting more than 25 percent of the existing building (excludes building repairs).
- Parking lot alterations affecting more than 50 percent of the existing parking lot.

As deemed appropriate, The City of Lincoln may also choose to adopt the recommended parking requirements for EVs based on land uses included in the recently updated section 492 of the IBC (**provided in Table 8**). Considering the various factors associated with EV adoption (including local views), the percentages included in Table 8 may increase or decrease. The CSC should monitor the IBC for future amendments and adjustments to these requirements.

**TABLE 8 | Recommended Parking Requirements for Electric Vehicles (EV) Based on Land Uses.<sup>11</sup>**

TYPE	EV-CAPABLE SPACES	CHARGING STATION INSTALLED
<b>Certified affordable multifamily housing</b>	20%	Not Required
<b>Multifamily, hotel</b>	20%	2% (requirement begins at 50 spaces)
<b>Non-residential (offices, retail, public, recreational, and institutional uses)</b>	10%	2% (requirement begins at 250 spaces)
<b>Industrial (employee parking only)</b>	10%	2% (requirement begins at 250 spaces)

CATEGORY	ID	RESPONSIBILITY	ACTIONS	EQUITY	
 <b>FACILITATE</b>	4.23	CSC	Research and include EV-related language into local municipal building codes		
		COL			●
		LES			
		LPS			
		UNL			
	4.24	CSC	Modify local codes and zoning ordinances to require EV-capable and EV charging station equipped spaces		
		COL			●
		LES			
		LPS			
		UNL			



<sup>11</sup> International Building Code Section 492

## Accessibility

The ADA has specific access requirements to ensure that parking spaces accessible to persons with disabilities are provided in the public; however, these requirements have presented several challenges to charging station installations. There are currently no mandatory requirements for incorporating ADA charging station parking spaces in development projects. Individual jurisdictions can develop standards for application within their own boundaries if they choose.

### Charging stations and ADA accessible parking spaces:

1. It is important to consider ADA (Americans with Disabilities Act) accessible parking spaces when planning for charging station installations. Charging stations should be provided for both accessible and non-accessible spaces.
2. Charging stations for accessible spaces should display signage that indicates they are reserved for ADA accessible parking permit holders.
3. Charging stations for accessible spaces must be designed and installed in an ADA compliant manner, including access and operation.

CATEGORY	ID	RESPONSIBILITY	ACTIONS	EQUITY
 FACILITATE	4.25	CSC	Modify building and development codes to require capacity defined standards for EV standard and ADA parking spaces and access	
		COL		
		LES		
		LPS		
		UNL		

## 4.3.4 Standards

Standards and guidelines that are in addition to building codes can help facilitate the consistent and safe installation of charging infrastructure while reducing risk and liability. Such standards might include minimum equipment specifications, typical drawings, contractor qualifications, and a model scope of work. To develop these standards and guidelines, agencies can build on work that has already been completed. A few topics that could be covered by standards or guidelines include:


- **Safety:** Safety standards are critical to ensure that EV charging equipment is safe for users, installers, and the public. The NEC and the International Electrotechnical Commission provide safety standards for EV charging equipment, including requirements for grounding, electrical connections, and protection against electrical shock.
- **Interoperability:** Interoperability standards are essential to ensure that EVs can charge at any charging station, regardless of the manufacturer. The Open Charge Point Protocol (OCPP) and the OpenADR Alliance are examples of standards that promote interoperability between charging stations and EVs.
- **Communications:** Communication standards are important to enable charging stations to communicate with the grid and provide information on charging status and energy consumption. The Open Smart Charging Protocol (OSCP) is an example of a communication standard that enables charging stations to communicate with the grid and other smart devices.
- **Accessibility:** Accessibility standards are important to ensure EV charging infrastructure is accessible to all users, including those with disabilities. The ADA dictates requirements for accessibility, including standards for clear signage, designated accessible parking spaces, and level ground surfaces. The U.S. Access Board provides additional resources for implementing accessibility measures that go beyond the ADA requirements.



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- **Energy Efficiency:** Energy efficiency standards are important to promote the use of clean energy and reduce greenhouse gas emissions. The DOE’s ENERGY STAR program provides energy efficiency standards for EV chargers, including requirements for energy efficiency and standby power consumption.

By following these standards and communicating or requiring these for private charger construction, the CSC will be able to ensure that EV charging infrastructure is safe, reliable, and inter-operable and supports a clean energy future.

CATEGORY	ID	RESPONSIBILITY	ACTIONS	EQUITY
 FACILITATE	4.26	CSC	Develop regional guidelines or standards for charging station installation	
		COL		
		LES		
		LPS		
		UNL		

## Signage

The Federal Highway Administration (FHWA) defines minimum standards for signage, which it publishes in the Manual on Uniform Traffic Control Devices (MUTCD). The MUTCD standards are federally mandated by law and apply to signage on all public highways, streets, bike-ways, and private roads open to the public, such as roads internal to shopping centers or airports. The revised MUTCD, to be published no later than May 15, 2023, is expected to include standards on EV signage. Prior to receiving more comprehensive guidelines, refer to the FHWA interim designs approved for use at charging stations:



*D9-11bp*



*D9-11b*





These designs can be combined with directional arrows and mileage for wayfinding purposes. Wayfinding signage helps EV drivers navigate to charging stations from other destinations, such as a freeway exit. Additionally, signage can be used to designate parking used only for EVs that are actively charging, or place time limits.

To be enforceable, any signs posted in public right-of-way must be supported by local ordinances that specify time limits, penalties, and definitions. Pavement markings painted on the surface of a parking space can be used to reinforce signage for charging stations, but most jurisdictions deem pavement markings unenforceable on their own.

# ENABLING AND ENCOURAGING ELECTRIC VEHICLE ADOPTION FOR EVERYONE

The CSC is recommended to work with local jurisdictions and relevant Lincoln area stakeholders to develop guidance and standards for charging station signage.

CATEGORY	ID	RESPONSIBILITY	ACTIONS	EQUITY
 FACILITATE	4.27	CSC	Develop regional guidelines or standards for charging station signage	
		COL		
		LES		
		LPS		
		UNL		

## 4.3.5 Regional Planning for Public Charging Stations



A geographic information system (GIS) computer mapping analysis was used to identify gaps in the Lincoln area’s short-range charging network. The recently completed state of Nebraska NEVI plan<sup>12</sup> is anticipated to address the long-range charging network needs of the Lincoln area. Multiple factors were combined to find areas around Lincoln that had a high potential to fill the gaps in the short-range (L1 and L2) charging station network and are detailed in this section.

### Charging Station Needs for Short-range Travel (L1 & L2)

Factors considered for the short-range travel gap analysis were based on a 10-minute walking distance proximity (or one-quarter mile) from land use types where drivers might park for extended periods of time. Land use types include MUDs with more than five units, parks, hotels, supermarkets, universities and trade schools, offices, theaters, and the airport. Household income and the current presence of L1 and L2 chargers also played a role in the gap analysis.

<sup>12</sup> [https://dot.nebraska.gov/travel/nevi/#/analyze?region=US-NE&fuel=ELEC&show\\_map=true](https://dot.nebraska.gov/travel/nevi/#/analyze?region=US-NE&fuel=ELEC&show_map=true)

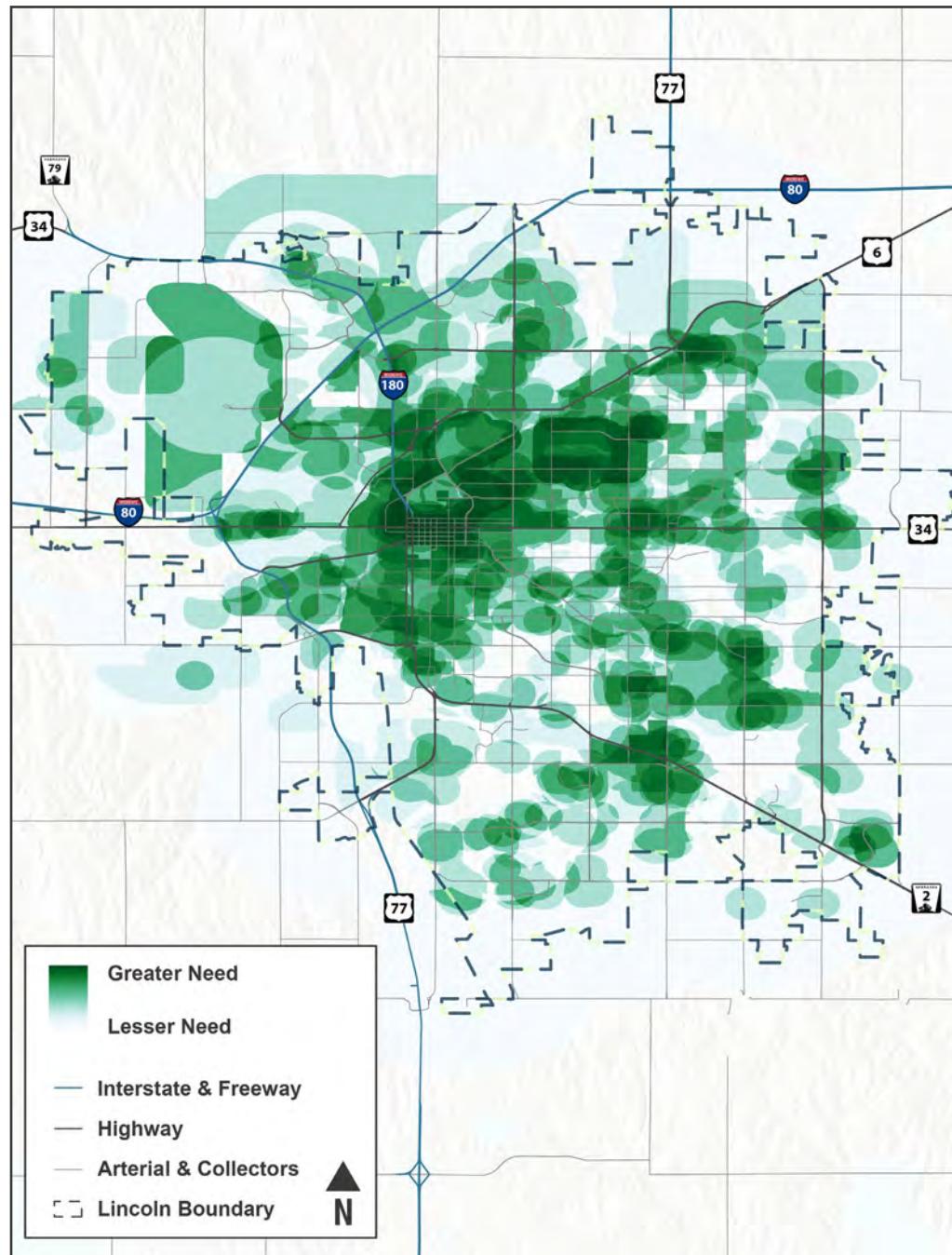
All these factors were given a weight value ranging from minus 2 to plus 3, with higher values indicating a greater need for a charging station, and lower or negative values indicating a lesser need. **Table 9** provides an overview of each assigned weight. Results from the short-range travel gap analysis are included in **Figure 6**. Areas depicted in dark green are more desirable charging station locations, and areas depicted from white to light green are less desirable. This map is not an indication of charging infrastructure to be built by members of the CSC, rather the analysis is meant to provide a general understanding of where public chargers may be best utilized in the future.

CATEGORY	ID	RESPONSIBILITY	ACTIONS	EQUITY
 FACILITATE	4.28	CSC	Develop a regional charging station location plan utilizing the L2 charger gap analysis as a resource	
		COL		
		LES		
		LPS		
		UNL		



# ENABLING AND ENCOURAGING ELECTRIC VEHICLE ADOPTION FOR EVERYONE

**FIGURE 6 | Map of Short-range Charging Station Location Needs\***



**TABLE 9 | Factors for Short-range Charging Station Location Needs Analysis\***

FACTOR	WEIGHT
Park	1
Hotel	
Supermarket	
Multifamily with 5 or more Units	
College / Trade School	
Office	
Theater	
Further than 1 Mile from Existing Charging Station	2
Airport	
University	-2
Existing Charger	
Under 10% Persons Below Poverty	0
10%-25% Persons Below Poverty	1
25%-50% Persons Below Poverty	2
Over 50% Persons Below Poverty	3

\*The total need for each specific location was calculated by adding all factors within 1/4 mile of that location.

**For example, if a location is:**

- within 1/4 of a park (+1)
- within 1/4 mile of 20 unit apartment complex (+1)
- within 1/4 mile of an existing charger (-2)
- in an area with 35 percent of persons below poverty level (+2)

The total value for that location would be  $(+1 + 1 - 2 + 2) = 3$ .

The map is color coded to reflect greater needs as darker colored areas, and lesser needs as lighter colored areas.



5

# Preparing the Electrical Infrastructure

# 5

## PREPARING THE ELECTRICAL INFRASTRUCTURE

All current and future success with vehicle electrification is founded on the assumption that there will be sufficient reliable energy to support it. LES has demonstrated its commitment to enabling this transformational change in the Lincoln area. This section will cover topics related to the infrastructure required for vehicle electrification. This section focuses on LES electrical infrastructure to serve privately owned charging stations. LES has indicated that there are no current plans to own and operate public EV infrastructure with a preference for private operators to own and operate these devices.


It should be noted that although LES is the primary power utility in the Lincoln area, some outlying regions are served by other providers. Some aspects of this report may be extended to these other providers; however, only LES is discussed in this report because of its role and membership in the CSC.



### 5.1 Monitoring Changes and Anticipating Needs

The landscape of the EV industry is continually shifting because of the myriad of elements that affect it. These elements include external factors such as manufacturing, supply chain, and externally available funding. Factors also include more local metrics such as changes in demand and regional EV sales and registration rates among individuals and companies. LES has a particular responsibility to monitor for changes in power consumption due to EVs – a task that is already part of its operation.



With these monitoring insights, LES and the CSC will be able to prepare for and anticipate future needs. For example, an increase in the number of EV charger permit requests at MUDs may be a lead indicator to a greater demand in those areas as residents gain access to convenient overnight charging.

CATEGORY	ID	RESPONSIBILITY	ACTIONS	EQUITY
 FACILITATE	5.1	CSC	Continue to monitor and report on changes in power consumption due to EVs	
		COL		
		LES ●		
		LPS		
		UNL		





## 5.2 Load Management Strategies

In many ways, LES has already begun to prepare for changes in demand because of EVs. For example, it recently completed a study for Residential EV Charging and Demand Response, in which participants were asked to voluntarily avoid charging when demand was high. This allowed LES to learn about charging behaviors and compliance rates among current EV owners. As more individuals and companies purchase EVs, LES should continue to monitor changes in charging behavior, especially as adoption increases outside of SFDs.

CATEGORY	ID	RESPONSIBILITY	ACTIONS	EQUITY
 FACILITATE	5.2	CSC	Continue to monitor and report on changes in charging behavior	
		COL		
		LES ●		
		LPS		
		UNL		


A less direct load management strategy lies in the education of those who are planning for and installing charging stations. Specifically, many don't understand the distinction and specific use cases for L1, L2, and L3 charging. For example, an L1 charger may be sufficient for many individuals who primarily use their vehicles for short around-town trips and who charge overnight (shown by the Residential EV Charging and Demand Response study). The L1 SmartPlug can provide the needed charge and manage the charging to avoid peak demand times. These types of plugs are easily installed, which minimizes costly service upgrades. In addition, reducing the demand in this way may also reduce the potential need and costs for upgrading power service panels in existing buildings, which can extend the reach of charging infrastructure to existing businesses and MUDs.

CATEGORY	ID	RESPONSIBILITY	ACTIONS	EQUITY
 FACILITATE	5.3	CSC	Develop educational materials to aid in the selection of appropriate level charging infrastructure	
		COL		
		LES ●		
		LPS		
		UNL		

The charging requirements for private fleets may require more specialized analysis and interactions. LES can continue to compile and analyze data on the charging demands of various fleets (including CSC member fleets) to help provide guidance for private organizations looking to convert their own fleets. Data may include vehicle use cases (mileage, time of day, vehicle type, application, etc.). This data can be transformed into guidance for private organizations that want to convert their own fleets. In addition, LES may consider developing the capacity, expertise, and processes needed to engage fleet owners early to provide analysis, guidance, and assistance as they plan for and implement charging infrastructure. These services should include load management strategies specific to fleet charging, such as battery storage systems. Such strategies can help save the customer demand charges, provide emergency backup, and minimize the overall demand on the infrastructure. Coordination between LES and fleet managers early in the transition period will also allow sufficient time for any needed infrastructure upgrades.



# PREPARING THE ELECTRICAL INFRASTRUCTURE

CATEGORY	ID	RESPONSIBILITY	ACTIONS	EQUITY
 <b>FACILITATE</b>	5.4	CSC	Compile, analyze, and provide information to fleets on the charging demands for various types of fleets and usages	
		COL		
		LES ●		
		LPS		
		UNL		
	5.5	CSC	Develop the capacity, expertise, and processes to engage fleet owners early and provide analysis, guidance, and assistance for fleet transition	
		COL		
		LES ●		
		LPS		
		UNL		

## 5.3 Rate Structures and Incentive Programs

Charging rate structures have a direct impact on EV adoption for individuals and businesses. LES is continually assessing and optimizing its rate structures to balance the needs of all its customers with the cost of delivering consistent, reliable power. When considering rate structures, it is important to understand that as a publicly owned utility, LES works to provide “cost of service” power rather than “subsidized costs” where higher costs can be assessed from some customers in order to subsidize others.

### ***Demand Charges***

The power needs and resulting costs of EV charging stations present various challenges. The primary challenge is for fleets and businesses with DCFC chargers, where there may be a high demand for a short period of time. For this type of demand, it is common for utilities like LES to assess a “demand charge,” to adequately capture costs associated with

providing each customer with ample and reliable capacity, from generation and transmission to substation and distribution at all times. Demand charges can be expensive for owners who do not actively optimize how large power-consuming equipment operates.



One method of smoothing out these charging peaks for EVs is installing local battery storage, which can charge from the power grid at a lower and more consistent rate while delivering power to a vehicle quickly. LES should consider working with fleet and DCFC owners to determine suitable strategies to avoid peak demand periods and/or mitigate the possibility of demand charges.

### ***Residential Peak Usage***

The recent study completed by LES determined that most current residential EV owners charge overnight. It is possible that as more owners adopt EVs, they may return home from a workday in the late afternoon and plug their vehicle in to charge. This can be an issue because late afternoon/evening is often a peak time for electricity usage. A residentially managed charger can be programmed to defer charging until later in the evening when demand is lower. LES can and should continue educating customers on the use of such chargers and continue to investigate EV charger programs like its managed thermostat program.



# PREPARING THE ELECTRICAL INFRASTRUCTURE

CATEGORY	ID	RESPONSIBILITY	ACTIONS	EQUITY
 <b>ENCOURAGE</b>	5.6	CSC	Continue to provide educational materials to SFD EV owners on in-home charging and peak demand avoidance	
		COL		
		LES		●
		LPS		
		UNL		
 <b>FACILITATE</b>	5.7	CSC	Continue to investigate home-charging demand management programs (similar to managed thermostats)	
		COL		
		LES		●
		LPS		
		UNL		

## Incentive Programs

Many incentive programs have been implemented across the country to encourage EV adoption. Examples of these programs include demand charge holidays, rebates, and sliding scale demand charges that fluctuate based on how much power the charger is using during any particular month. These types of incentives are more often seen in investor-owned utilities that have subsidized cost rate structures.

LES does, however, administer a Sustainable Energy Program (SEP), which provides financial incentives to residential and business customers. The program is intended to encourage customers to make energy saving investments, such as insulation, high-efficiency heat pumps, air conditioners, water heaters, and lighting. Managed charging may be a program to consider including in the SEP in future years. Investigation into the benefits and costs of incentive programs from various perspectives are included in recommendations 3.12, 4.7, and 4.11.






# PREPARING THE ELECTRICAL INFRASTRUCTURE

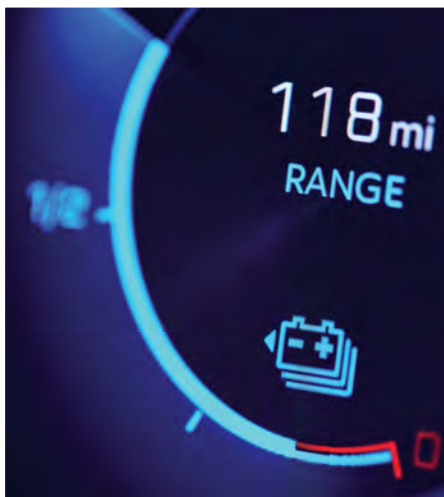
## Infrastructure Upgrades

The LES electric grid is very robust and currently has capacity available for growth. However, the widespread adoption of EVs has the potential to stress even the best of systems. LES should continue to study this issue to properly plan future upgrades to the generation and distribution capacity of the system. This effort will allow LES to know the threshold when upgrades are necessary as more and more EVs come online. Infrastructure upgrades can take significant time to implement, especially in our current supply chain situation. Setting a lower threshold for upgrade will ensure the system is ready for future needs. With a good plan, LES should be well poised to take advantage of state or federal grant money to assist in paying for upgrades necessary for EVs.

Although LES has overall system capacity, this capacity may not always be in the right location. For example, a traditional vehicle fleet depot is typically provided with a relatively small service for general building loads. Transitioning fleets to electric will add significant load at specific locations, requiring new transformers, switchgear, and possibly new distribution lines to be run to the facility. Being aware of these locations will allow LES to plan system improvements as necessary.

Widespread adoption of EVs could have an impact on the electrical distribution system in residential neighborhoods. As a previous LES study showed that many current EV owners charge at home, adding a charger to several houses on a particular street may stress transformers and the distribution lines and require system upgrades.

CATEGORY	ID	RESPONSIBILITY	ACTIONS	EQUITY
 FACILITATE	5.8	CSC	Monitor and study the potential impacts of electrification on the power infrastructure to anticipate and prioritize potential future upgrades	
		COL		
		LES ●		
		LPS		
		UNL		
	5.9	CSC	Evaluate current infrastructure upgrade thresholds to accommodate and accelerate EV charging installations	
		COL		
		LES ●		
		LPS		
		UNL		



An aerial photograph of a city, likely Charlotte, North Carolina, with a prominent multi-lane highway curving through the center. The image is overlaid with a large, white, stylized outline of the number '6'. The entire scene is tinted with a warm, golden-yellow color.

6

# The Road Ahead


# 6

## THE ROAD AHEAD

Over time, the Lincoln area’s progress toward vehicle electrification will have a positive impact on helping reach its climate and sustainability goals. It also anticipated that the vehicle electrification industry will continue to change rapidly like it has in recent years. This constant stream of changes will require the CSC to stay nimble. The CSC should continuously monitor for external, internal, and regional changes, industry advancements, and progress toward the identified actions in this plan – and adjust course as needed.

### 6.1 Organizing for Success

To make meaningful progress toward achieving its goals, the CSC should continuously adjust its organizational structure. For example, the CSC has already formed a subcommittee focused on fleet transitions. Various additional recommendations are included in this report that may also benefit from a similar focus, such as the many actions centered on education and outreach. As the EV industry evolves and as the CSC organizations make progress on the identified actions, the CSC should consider adjusting its organization to meet those needs (e.g., making specific assignments, modifying or creating new subcommittees or task forces, or even adding new CSC member organizations).

CATEGORY	ID	RESPONSIBILITY	ACTIONS	EQUITY
 FACILITATE	6.1	CSC	●	Adjust the assignments or support organization of the CSC to meet specific needs as changes in the industry or progress on this plan require
		COL		
		LES		
		LPS		
		UNL		

### 6.2 Monitoring, Measuring, and Reporting

It is important for any organization working toward a goal to monitor, measure, and report on progress. For this plan, monitoring should include external factors that affect the industry, internal measures of progress toward completing the activities in this plan, and the desired plan outcome (GHG emissions, EV adoption rates, CSC fleet conversion status, etc.).

#### Monitoring and Measuring

**External Factors:** The CSC should monitor external factors that reflect changes in the state of the industry. Such changes may require changes to the actions identified in this plan, and the CSC can be prepared to pivot as needed. Examples of these external factors include: new and used EV sales and registrations, number of charger permit requests, EV delivery lead times, supply chain status, political and funding changes, and other influences.

**Internal Metrics:** The CSC should monitor internal measures related to this plan. These metrics can include those related to each individual member organization (e.g., fleet conversion status), and progress toward completion of the action items in this plan. In addition, LES may consider sharing information about impacts of EV charging on the electrical infrastructure.


#### Reporting

A regular cadence of reporting will help keep progress and targets at the forefront for all members and other stakeholders. Reporting for tasks of this nature are often divided into two categories: strategic, and tactical.

# THE ROAD AHEAD


**Strategic reports** are typically much higher level, and intended to be shared with policymakers, elected officials, or the public. Strategic reports indicate progress toward goals and provide highlights. Such reports can also be shown as a project dashboard and posted to a common website.

**Tactical reports** are generally intended for those responsible for implementing the actions. Tactical reports are generally more detailed and provide insights that support operational adjustments to make better progress toward the intended goals.

CATEGORY	ID	RESPONSIBILITY	ACTIONS	EQUITY
 FACILITATE	6.2	CSC	Establish a program to monitor, measure, and report on external and internal factors indicating progress toward the stated goals	
		COL		
		LES		
		LPS		
		UNL		

## 6.3 Regular Plan and Strategy Updates

Given the quickly evolving nature of EVs, it is recommended that the CSC regularly review all progress along with external and internal factors, and update the strategies identified in the plan on an annual or even semi-annual basis as circumstances require.

CATEGORY	ID	RESPONSIBILITY	ACTIONS	EQUITY
 FACILITATE	6.3	CSC	Monitor and update the EV readiness plan strategies on an annual or semi-annual basis as needed	
		COL		
		LES		
		LPS		
		UNL		

## 6.4 Action Summary

All actions within this plan have been presented in the context of their specific sections. A summary of all these actions is provided here along with a proposed priority and a relative cost. Both the priority and cost are relative values only and may be refined further by the CSC as it undertakes specific actions. The relative cost values were assigned as follows:











\$	<b>Little or No Cost:</b> items that can be undertaken as an assignment to existing CSC staff
\$\$	<b>Medium Cost:</b> items that may be completed by an outside party or that require some CSC funding to accomplish
\$\$\$	<b>Higher Cost:</b> construction projects, capital expenses, or new program administration

*(See the spreadsheet on following pages for more detail.)*









ELECTRIFY








CATEGORY	ID	CSC	COL	LES	LPS	UNL	ACTIONS	EQUITY	COST
<b>★ PRIORITY 1 ACTIONS</b>									
<b>PLANNING</b>	3.3		●	●	●	●	Develop and implement organization-specific fleet transition plans, with specific goals and timeframes		\$\$
	3.4	●	●	●	●	●	Develop organization-specific long-term charging plans		\$\$
	4.2		●	●	●	●	Include transit electrification as part of organization-specific fleet EV transition plans or other low- or no-emissions fleet plans		\$\$
<b>★ PRIORITY 2 ACTIONS</b>									
	3.10	●					Jointly pursue funding opportunities		\$
	4.1		●	●	●	●	Continue to support Transit Electrification Efforts		\$\$\$
<b>★ PRIORITY 3 ACTIONS</b>									
	3.8	●					Establish a process for capturing and sharing pilot vehicle lessons learned across the CSC		\$
	4.3		●				Continue to expand electric mobility options, such as e-bikes and scooters		\$\$
	3.5	●					Explore the potential for shared charging infrastructure		\$\$\$
	3.6		●	●	●	●	Install charging infrastructure as appropriate at new building sites		\$\$\$
<b>★ PRIORITY 4 ACTIONS</b>									
	3.7	●					Consider shared EV vehicle and charging station training for CSC organization staff members		\$
	3.9		●	●	●	●	Once supply begins to meet the demand, explore potential for CSC purchases of EVs, including potential discounts and other advantages		\$\$

CATEGORY	ID	CSC	COL	LES	LPS	UNL	ACTIONS	EQUITY	COST	
 ENCOURAGE	<b>★ PRIORITY 1 ACTIONS</b>									
		4.15	●				Develop and implement a common EV education and outreach program		\$	
	<b>★ PRIORITY 2 ACTIONS</b>									
	EDUCATION		3.11	●				Curate information for other funding opportunities, grants, or incentive programs		\$
			4.6	●				Provide current information on available credits and rebates to potential EV buyers		\$
			4.8	●				Curate and make information available on current charger funding opportunities for businesses		\$
			4.9	●				Provide information to potential charger installers including the anticipated demand for chargers and their installation and operation – such as anticipated costs, best practices, standards for ADA compliance and other safety codes, etc.		\$
			4.12	●	●	●		Develop customized educational materials for MUDs that includes information on various parking and tenant cost allocation solutions		\$
			4.13	●				Develop customized educational materials for private fleet owners that includes information on actual costs, benefits, and operational lessons learned from general and CSC fleet operational experience		\$
			5.6			●		Continue providing educational materials to single family home EV owners on in-home charging and peak demand avoidance		\$
	<b>★ PRIORITY 3 ACTIONS</b>									
	RECOGNITION		4.10	●				Investigate and encourage organizations to include EV elements in sustainability leadership and recognition programs		\$
			4.14	●				Investigate development of a dealership recognition and/or incentive program (if needed)		\$\$
	<b>★ PRIORITY 4 ACTIONS</b>									
		4.19				●		Build EV and other sustainability topics into secondary education curriculum		\$

# THE ROAD AHEAD







CATEGORY	ID	CSC	COL	LES	LPS	UNL	ACTIONS	EQUITY	COST	
 FACILITATE	<b>★ PRIORITY 1 ACTIONS</b>									
	6.1	●					Adjust the assignments or support organization of the CSC to meet specific needs as changes in the industry or progress on this plan require		\$	
	<b>CODE</b>	4.23		●			Research and include EV-related language into local municipal building codes		\$	
	<b>★ PRIORITY 2 ACTIONS</b>									
	6.3	●					Monitor and update the EV readiness plan strategies on an annual or semi-annual basis as needed		\$	
	<b>CODE</b>	4.24		●			Modify local codes and zoning ordinances to require EV-capable and EV charging station equipped, spaces		\$	
	<b>CODE</b>	4.25		●			Modify building and development codes to require capacity and access for standard and ADA EV parking spaces		\$	
	<b>PERFORMANCE MANAGEMENT</b>	6.2	●				Establish a program to monitor, measure, and report on external and internal factors indicating progress toward the stated goals		\$	
		5.1			●		Continue to monitor and report on changes in power consumption due to EVs		\$	
		5.2			●		Continue to monitor and report on changes in charging behavior		\$	
		5.8			●		Monitor and study the potential impacts of electrification on the power infrastructure to anticipate and prioritize potential future upgrades		\$	
	<b>PLANNING</b>	3.1		●	●	●	●	Continue to incorporate EVs and other sustainability considerations into City and regional planning efforts and documents		\$
		3.2	●	●	●	●	●	Continue to support actions identified in each member organization's sustainability and climate plans		\$
		4.28	●					Develop a regional charging station location plan utilizing the L2 Charger gap analysis as a resource		\$\$
		3.13		●				Develop a regional equity action plan or incorporate similar components into other plans or documents to demonstrate need and set a foundation of support for EV deployments		\$\$

# THE ROAD AHEAD

CATEGORY	ID	CSC	COL	LES	LPS	UNL	ACTIONS	EQUITY	COST	
 FACILITATE	PERMITTING	4.21		●	●		Develop guidance and a streamlined permitting process to assist residential applicants with EV charger permitting, installation, and inspections		\$	
		4.22		●	●		Consider a standardized regional permitting process for commercial and workplace charging station installations		\$	
	5.3			●			Develop educational materials to aid in the selection of appropriate level charging infrastructure		\$	
	4.18	●	●	●		●	Work with Lincoln Fire and Rescue and other first responders to ensure that they have access to specialized EV response training		\$	
	★ PRIORITY 3 ACTIONS									
	INCENTIVIZE	3.12	●					Secure funds that can be administer and offer to private organizations to encourage/incentivize charging station installation in desired areas		\$\$
		4.7		●	●			Consider charger installation incentive programs for individuals that benefit those who live in both SUDs and MUDs		\$\$
		4.11	●	●	●			Investigate an incentive program for public charger installation to accelerate their installation and influence their locations		\$\$
	STANDARDS	4.26	●					Develop regional guidelines or standards for charging station installation		\$\$
		4.27		●				Develop regional guidelines or standards for charging stations signage		\$\$



# THE ROAD AHEAD

CATEGORY	ID	CSC	COL	LES	LPS	UNL	ACTIONS	EQUITY	COST	
 <b>FACILITATE</b>	<b>WORKFORCE</b>	4.17	●				Work with local educational institutions to offer technician-level training in the Lincoln area		\$\$	
		4.16	●				Consider partnerships with external training organizations to strengthen the local workforce		\$\$	
		4.20	●				●	Provide post-secondary EV related curriculum through educational institutions and partnerships		\$
	5.5			●			Develop the capacity, expertise, and processes to engage fleet owners early and provide analysis, guidance, and assistance for fleet transition		\$	
	5.4			●			Compile, analyze, and provide information to fleets on the charging demands for various types of fleets and usages		\$	
	5.7			●			Continue to investigate home-charging demand management programs (similar to managed thermostats)		\$\$	
	4.4		●	●	●	●	Continue to support active transportation infrastructure improvement		\$\$\$	
	★ <b>PRIORITY 4 ACTIONS</b>									
	4.5	●						Work with NDOT to explore a state rebate/tax credit program in addition to other national programs for the purchase of EVs – especially for used EVs		\$\$\$
	5.9			●				Evaluate current infrastructure upgrade thresholds to accommodate and accelerate EV charging installations		\$\$\$

# APPENDIX

LOCATION OF EXISTING EV CHARGERS



# APPENDIX A

STATION	ACCESS	HOURS	LEVEL 2	DCFC	TOTAL	NETWORK	CONNECTOR	FACILITY	PRICING
<b>Pawnee State Recreation Area</b> 3900 NW 105th, Lincoln, NE 68524, USA	Public	24 hours daily	14		14	Non-networked	NEMA 14-50	Recreational Area	\$8 daily entry for Nebraska plates, \$12 daily entry for non-Nebraska plates
<b>Russ's Market Express</b> 13901 Guildford St, Waverly NE 68462	Public	24 hours daily	4	2	6	ChargePoint	J-1772, CCS/SAE, CHAdeMO	Market	\$0.50/hr
<b>GSK Consumer Healthcare</b> 10401 Cornhusker Hwy, Waverly, NE 68462	Public	24 hours daily				ChargePoint	J-1772	Healthcare Manufacturer	\$2.00
<b>Wunder Roost Bed &amp; Breakfast</b> 14817 South 25th Street, Roca, NE, 68430	Private	24 hours daily	4		4	Non-networked	NEMA 14-50	Hostel	
<b>Phillips 66 - U-Stop Convenience Shop #32</b> 6930 S 73rd St, Lincoln, NE 68516, USA	Public	24 hours daily				Non-networked	CCS/SAE, CHAdeMO	Convenience Store	\$0.20/min
<b>Sid Dillon Nissan</b> 2627 Kendra Lane, Lincoln, NE 68512	Public	24 hours daily	1		1	Non-networked	J-1772	Motor Vehicle Dealer	
<b>Lincoln Southwest High School</b> 7001 S 14th St, Lincoln 68512	Public	6am-10pm	1		1	ChargePoint	J-1772	High School	First 4 hr(s) \$0.25/hr Thereafter \$1.00/hr
<b>SouthPointe Mall Parking Garage</b> 2920 Ridgeline Rd, Lincoln, NE 68516	Public	24 hours daily	4		4	ChargePoint	J-1772	Shopping Mall	
<b>GP Customs</b> 1501 Cushman Dr, Lincoln, NE 68512	Public	24 hours daily	1		1	Non-networked	Tesla	Car Customization	\$0.20/min
<b>Russ's Market</b> 33rd & Hwy 2 4400 S 33rd Ct, Lincoln 68516	Public	24 hours daily	4	2	6	ChargePoint	J-1772, CCS/SAE, CHAdeMO	Shopping Mall	DC: \$0.10/min, AC: \$0.05/min
<b>Judson Irrigation Inc</b> 3901 South 6th Street, Lincoln, NE 68502, USA	Public	24 hours daily	3		3	Non-networked	Tesla, J-1772, NEMA 14-50	Company Office	Free

# APPENDIX A

STATION	ACCESS	HOURS	LEVEL 2	DCFC	TOTAL	NETWORK	CONNECTOR	FACILITY	PRICING
<b>Shoemakers Travel Center</b> 151 Southwest 48th Street, Lincoln, NE, 68522	Public	24 hours daily	2		2	Non-networked	Wall, NEMA 14-50	Truck Parking Lot	\$1/hour
<b>HVCcycle</b> 360 SW 25th St, Lincoln, NE 68522	Public	6am-10pm M-F 9am to 3pm Saturday	2			Electrify America	J-1772, Wall	Shopping Plaza	
<b>Casey's General Store</b> 110 NW 20th Street, Lincoln, Nebraska, 68528	Public	24 hours daily		8	8	Non-networked	CCS/SAE, CHAdeMO	Convenience Store	
<b>Super Saver</b> 840 Fallbrook Blvd, Lincoln 68521	Public	24 hours daily	2	4	6	ChargePoint	J-1772, CCS/SAE, CHAdeMO	Grocery Store	DC: \$0.10/min AC: \$0.05/hr
<b>Duncan Aviation</b> 2400 W Adams St, Lincoln NE 68524	Public	24 hours daily	5		5	Non-networked	J-1772	Work Place	
<b>GARAGESTATIONS BOND STREET</b> 949 W Bond St, Lincoln 68521	Public	24 hours daily	2		2	ChargePoint	J-1772	Municipal Services	4 hr(s) - \$0.25/hr Then - \$1.00/hr
<b>Husker Mercedes Benz</b> 6701 Telluride Dr, Lincoln, NE 68521	Public	24 hours daily	1		1	Non-networked	J-1772	Car Dealership	
<b>Best Western Plus Lincoln Inn &amp; Suites</b> 2201 Wildcat Dr, Lincoln, NE 68521	Public	24 hours daily	4		4	Non-networked	Wall, J-1772	Hotel	
<b>Lincoln North Star High School</b> 5801 N 33rd St, Lincoln 68504	Public	6:00am-10:00pm	1		1	ChargePoint	J-1772	High School	4 hr(s) - \$0.25/hr Then - \$1.00/hr
<b>Lincoln Supercharger</b> 5020 N 27th St, Lincoln, NE 68521, USA	Public	24 hours daily		8	8	Tesla	Tesla (Fast)	Grocery Store	\$0.12 / \$0.24 per minute
<b>Northeast High School</b> 6345 Madison Ave, Lincoln 68507	Public	6:00am-10:00pm	1		1	ChargePoint	J-1772	High School	4 hr(s) - \$0.25/hr Then - \$1.00/hr

# APPENDIX A

STATION	ACCESS	HOURS	LEVEL 2	DCFC	TOTAL	NETWORK	CONNECTOR	FACILITY	PRICING
<b>Prehistoric Putt</b> 3901 South 6th Street, Lincoln, NE 68502, USA	Public	10am to 10pm Sun 12 to 9pm	1		1	Non- networked	J-1772	Miniature Golf Course	Free
<b>Nebraska East Union</b> 1705 Arbor Dr. Lincoln, NE 68503, Lincoln 68503	Public	24 hours daily	2		2	EV Connect	J-1772	Café	\$1.50/Hour
<b>GARAGESTATIONS WASTE WATER</b> 2400 Theresa St, Lincoln 68521	Public	24 hours daily	2		2	ChargePoint	J-1772	Treatment Site	
<b>Nebraska Innovation Campus (NIC)</b> 2021 Transformation Dr, Lincoln, NE 68508	Public	24 hours daily	2	2	4	ChargePoint	CCS/SAE, CHAdEMO, J-1772	University	1 hr(s) - \$5.00/hr Then - \$20.00/hr
<b>Oakcreek Dr Parking Lot</b> 100 Oakcreek Dr, Lincoln 68528	Public	24 hours daily	2		2	ChargePoint	J-1772	Parking Lot	First 4 hr(s) - \$0.25/ hr Then - \$1.00/hr
<b>Lincoln East High School</b> 1000 S 70th St, Lincoln 68510	Public	6AM - 10PM	1		1	ChargePoint	J-1772	High School	4 hr(s) - \$0.25/hr Then - \$1.00/hr
<b>Lincoln Southeast High School</b> 2930 S 37th St, Lincoln 68506	Public	6am - 10pm	1		1	ChargePoint	J-1772	High School	4 hr(s) - \$0.25/hr Then - \$1.00/hr
<b>VFD Innovative Dental</b> 343 N Cotner Blvd, Lincoln, NE 68505, USA	Private	7am - 5pm	2		2	Tesla	J-1772	Dentist's Office	
<b>Lincoln Lancaster County Health Department</b> 3140 N St, Lincoln 68510	Public	24 hours daily	4		4	ChargePoint	J-1772	Health Dept.	
<b>Lincoln Public Schools Operations Department</b> 800 S 24th St, Lincoln, NE 68510, USA	Public	7am to 6pm	1		1	ChargePoint	J-1772	Office Building	4 hr(s) - \$0.25/hr Then - \$1.00/hr
<b>Lincoln High School</b> 2229 J St, Lincoln 68510	Public	7 AM to 10 PM	3		3	ChargePoint	J-1772	High School	4 hr(s) - \$0.25/hr Then - \$1.00/hr
<b>Ferguson House</b> 700 S 16th St, Lincoln 68508	Public	6:00am- 10:00pm	2		2	ChargePoint	J-1772	Event Venue	4 hr(s) - \$0.25/hr Then - \$1.00/hr

# APPENDIX A

STATION	ACCESS	HOURS	LEVEL 2	DCFC	TOTAL	NETWORK	CONNECTOR	FACILITY	PRICING
<b>GARAGESTATIONS K ST COMPLEX</b> 440 S 8th St, Lincoln 68508	Public	24 hours daily	2		2	ChargePoint	J-1772	Apartment Complex	\$0.12 / \$0.24 per minute
<b>Larson Garage</b> 1317 Q St, Lincoln 68508	Public	24 hours daily	2		2	ChargePoint	J-1772	Garage	4 hr(s) - \$1 Then - \$1.00/hr
<b>University Square Parking</b> 101 N 14th St, Lincoln 68508	Public	24 hours daily	2		2	ChargePoint	J-1772	Parking Lot	4 hr(s) - \$1 Then - \$1.00/hr
<b>Center Park Garage</b> 1120 N St, Lincoln 68508	Public	24 hours daily	2		2	ChargePoint	J-1772	Garage	4 hr(s) - \$0.25/hr Then - \$1.00/hr
<b>Lumberworks Garage</b> 700 N St, Lincoln 68508	Public	24 hours daily	2		2	ChargePoint	J-1772	Garage	4 hr(s) - \$0.25 Then - \$1.00/hr
<b>West Haymarket Green</b> 335 N 8th St B, Lincoln, NE 68508	Public	24 hours daily	6		6	ChargePoint	J-1772	Garage	\$1.00/hr
<b>Graduate Lincoln</b> 141 N 9th St, Lincoln, NE 68508	Private	24 hours daily	2		2	Tesla	Tesla	Hotel	
<b>Haymarket Parking Garage</b> 848 Q St, Lincoln 68508	Public	24 hours daily	2		2	ChargePoint	J-1772	Garage	4 hr(s) - \$1 Then - \$1.00/hr
<b>Market Place Garage</b> 1111 Q street, Lincoln 68508	Public	24 hours daily	2		2	ChargePoint	J-1772	Garage	4 hr(s) - \$1 Then - \$1.00/hr
<b>Market Place Parking</b> 925 Q St, Lincoln 68508	Public	24 hours daily	2		2	ChargePoint	J-1772	Parking Lot	\$1.25/hr
<b>Carriage Park Garage</b> 3140 N St, Lincoln 68510	Public	24 hours daily	2		2	ChargePoint	J-1772	Garage	4 hr(s) - \$0.25 Then - \$1.00/hr
<b>Cornhusker Square Garage</b> 1128 L St, Lincoln 68508	Public	24 hours daily	2		2	ChargePoint	J-1772	Garage	4 hr(s) - \$1 Then - \$1.00/hr
<b>University of Nebraska - Lincoln College of Business</b> 730 N 14th St, Lincoln 68588	Public	24 hours daily	4		4	EV Connect	J-1772	University	\$1.50/hr
<b>*Charging Infrastructure in Lincoln area as of 11/01/2022.</b>			<b>111</b>	<b>26</b>	<b>137</b>				

# APPENDIX

CITY OF LINCOLN 2021-2027 CLIMATE  
ACTION PLAN SUMMARY AND  
SUMMARY OF EV RELATED ITEMS

# B



**CITY OF LINCOLN 2021-2027 CLIMATE ACTION PLAN SUMMARY- SUMMARY OF EV RELATED ITEMS**

**CLIMATE RISKS**

Out of the 12 identified climate risks identified, the following three are most directly tied to transportation electrification and EV adoption.

- 1 Auto-Reliant Transportation System
- 2 Reliance on Fossil Fuels
- 3 Public Awareness

**STRATEGIC VISION**

All three components of Lincoln’s strategic climate vision are affected by transportation electrification and EV adoption.

- 1 Reduce net greenhouse gas emissions 80% by 2050 (relative to 2011 levels).
- 2 Be resilient to climate hazards.
- 3 Integrate climate resilience through City actions and ordinances.

**ACTION AREAS**

Out of the 8 identified action areas, the three are directly tied to transportation electrification and EV adoption.

Out of the 120 identified initiatives, the following are most directly tied to vehicle electrification and EV adoption.

Action Areas	Initiative Number	Initiative	Continuing or New Initiative (C/N)	Pending Approval / Funding Allocations / Regulatory Approval (Y/N)
<b>TRANSITION TO LOW-CARBON ENERGY</b>	1	Continue incentive-based (residential, commercial, or industrial) programs promoting the installation of renewable energy systems. Incentives may include offering rebates on purchasing equipment, attractive net metering pricing, tax incentives, height allowances, setback, and area-based incentives, expedited permitting, and others.	C	N
	4	Continue green recognition program (via Health Department) that promotes and awards local businesses and leaders in energy efficiency who prioritize sustainable practices.	C	N
	6	Conduct an emissions-reduction analysis of key initiatives. Include an evaluation of net benefits of organic waste diversion from the landfill alongside the landfill gas alternatives analysis (referenced below).	N	Y
	8	Create relevant performance metrics for measuring progress toward the 80 by 2050 goal.	N	N
	10	Investigate the return-on-investment potential associated with energy efficiency measures, renewable sources of energy, greenspace, and natural landscapes for major City facility projects, including the Central Library project, Multimodal Transit Center, and Bus Facility.	N	N
	11	Increase energy efficiency and the use of renewable energy in municipal operations. Achieve 100% net renewable/carbon neutral by 2035... Create a policy that requires an evaluation of energy efficient investments as well as conversion to sources of renewable energy (including analyses for net zero energy buildings) when funding... purchasing/replacing vehicle fleet	N	Y



# APPENDIX B

Action Areas	Initiative Number	Initiative	Continuing or New Initiative (C/N)	Pending Approval / Funding Allocations / Regulatory Approval (Y/N)
<b>BUILD A DECARBONIZED AND EFFICIENT TRANSPORTATION SYSTEM</b>	25	Continue to support and plan for a transportation system that accommodates the safe operation of autonomous, electric, and connected vehicles.	C	N
	28	Continue to transition City fleet to alternative fuels.	C	N
	29	Convert City fleet to 100% electric/renewable by 2040 (technology will have to be available to support the goal). <ul style="list-style-type: none"> <li>• Establish a policy to replace City vehicle fleet with cleaner, renewable fueled vehicles.</li> <li>• Initiate a comprehensive asset management plan for City fleet, to include an analysis of adequate funding levels and healthy replacement schedules.</li> <li>• Explore lease-to-own purchasing to help finance cleaner, renewable fuels when procuring all fleet assets.</li> <li>• Centralize the administration of City fleet services following a peer review and analysis of combined fleet systems.</li> <li>• Increase investment in alternative fuel vehicles and fueling stations.</li> <li>• Partner with the Nebraska Community Energy Alliance (NCEA) and LES to install additional charging infrastructure.</li> <li>• Share telemetry information for all City vehicles to gather data on usage patterns to analyze and inform decision-making; Drive cycles and usage patterns will also help determine alternative fuel vehicle targets.</li> <li>• Create a City-employee car and equipment sharing program populated with a variety of assets.</li> </ul>	N	Y
	30	Strengthen Public Transit <ul style="list-style-type: none"> <li>• Update the Transit Development Plan</li> <li>- Evaluate expansion opportunities such as an on-demand shared ride service to fill gaps.</li> <li>- Evaluate new technologies including driver assist, autonomous vehicle, and electric charging.</li> <li>- Complete a financial analysis and model for fare adjustments, including "Fare Free" service.</li> <li>- Continue analysis of service expansion, route efficiencies, multiple transfer stations.</li> <li>• Fund a public education campaign to increase bus ridership; partner with education campaigns that focus on alternative modes of transportation.</li> <li>• Transition transit fleet 100% to electric/renewable/alternative fuels by 2040.</li> </ul>	N	Y
	32	Designate priority parking for alternative-fuel vehicles in all municipal parking areas.	N	N
	34	Electric Vehicles <ul style="list-style-type: none"> <li>• Complete an inventory and create a public platform to inform citizens on where EV and alternative fueling stations are located across the city.</li> <li>• Investigate an Electric Vehicles (EV) carsharing program as a public-private partnership.</li> <li>• Pursue and promote grants that can be used for rebates to residents who purchase EVs and charging stations with partners such as Nebraska Community Energy Alliance (NCEA), Lincoln Electric System (LES) and the Nebraska Environmental Trust (NET).</li> </ul>	N	N

# APPENDIX B

Action Areas	Initiative Number	Initiative	Continuing or New Initiative (C/N)	Pending Approval / Funding Allocations / Regulatory Approval (Y/N)
ALIGN ECONOMIC DEVELOPMENT GOALS WITH CLIMATE REALITIES TO ENSURE A THRIVING ECONOMY	40	Research investments in renewable energy (rather than fossil fuels)	N	N
	42	Assess the feasibility and cost of a dedicated electric shuttle circulating between college campuses or other areas in Lincoln.	N	Y
ENGAGE RESIDENTS IN CO-CREATING A CLIMATE SMART FUTURE.	120	<ul style="list-style-type: none"> <li>• Following an assessment of current City environmental education programs, create a “Climate-Smart Future” education and community relations program. Consider the following:</li> <li>• Promote climate smart practices such as, use of electric vehicles, conversion of lawns to native grasses, vegetable gardens, and/or drought-tolerant landscaping</li> <li>• Continue to promote EV education and incentives to encourage the adoption of EVs</li> </ul>	N/C	N/Y

# APPENDIX

EXAMPLES OF BEST PRACTICES FOR  
EV REGIONAL PLANNING & PERMITTING



# EXAMPLES OF BEST PRACTICES FOR EV REGIONAL PLANNING & PERMITTING

## Regional Planning for Public Charging Stations

Planning for regional charging infrastructure is necessary to establish a cohesive and interconnected charging network. Such planning efforts include assessing priority locations, establishing optimal land use, providing access, and understanding driver behavior. For a network of chargers that most effectively meets driver needs, charger locations must be placed strategically.

Understanding local land uses and the driving behavior of PEV owners helps identify optimal locations for charging stations and the appropriate type of charging station required. **Table 10** describes the different types of charging stations and the applications for which they are best suited.



TABLE 10 | Charging Station Types and Applications

CHARGING STATION	USER PROFILE	TYPICAL VENUES	CHARGING TIME	MILES/HOUR CHARGE
Level 1	Parked for 6 to 8 hours	Streets/Meters	1 to 2 hours	3 to 7
		Parking Garages	2 to 10 hours	
		Cultural & Sports Centers	2 to 5 hours	
		Airports (long term) & Hotels	8 to 72-plus hours	
Level 2	Parked for 2 to 4 hours	Shopping Centers	0.5 to 2 hours	10 to 60*
		Airports (short term)	< 1 hour	
		Streets/Meters	1 to 2 hours	
		Parking Garages	2 to 10 hours	
		Cultural & Sports Centers	2 to 5 hours	
		Airports (long term) & Hotels	8 to 72-plus hours	
Direct Current Fast Charging (DCFC)	Parked for 15 to 60 minutes	Shopping Centers	0.5 to 2 hours	175 to 500*
		Airports (short term)	< 1 hour	
		Gas Stations and Convenience Stores	<0.5 hours	
		Highways & Commuting Roads	< 0.5 hour	

\*Depending on vehicle onboard charger.

## Permitting for Residential Single-Family Charging Station Installations

**Table 11** contains recommended supporting documents for residential charging station permit applications based on research into best practices throughout the country.

**TABLE 11 | Recommended Supporting Documents for Residential Charging Station Permits**

SUPPORTING DOCUMENTATION	DESCRIPTION
<b>Plot Plan</b>	Identify the complete layout of existing parking spaces and the proposed location of charging station parking space(s) with respect to existing buildings and structures
<b>Electrical Load Calculations</b>	Load calculations estimate whether an existing electrical service will handle the extra load from a residential charging station and the necessary wiring methods based on the National Electrical Code (NEC).
<b>Electrical Plans</b>	Single-line diagrams showing the system, point of connection to the power supply, and charging station.
<b>Charging Station Information</b>	The charging station manufacturer's installation instructions and charger specifications.

## Permitting for Residential MUD Charging Station Installations

MUD is a generic term for a variety of multi-unit residence types including apartment buildings, attached and detached housing units within a community, mobile home communities, and others. Installing charging stations at MUDs presents several unique challenges. **Table 12** summarizes the barriers to charging station installations at MUDs.

*Table 12 | Barriers to Charging Station Installations at Multi-Unit Dwellings*

BARRIER	DESCRIPTION
<b>Cost</b>	Installation costs can range anywhere from \$2,000 to \$10,000. A building that has sufficient panel capacity and existing conduit running from the panel to the Plug-in Electric Vehicle (PEV) parking space will likely only incur charging station, permit and electrician installation/assessment costs, resulting in a lower-cost installation. On the other hand, a building with limited panel capacity, no conduit, and a parking space located a significant distance from the electrical panel will likely incur higher installation costs.
<b>Power Supply</b>	Transformers supplying power to multifamily buildings typically have 10 percent to 15 percent excess capacity, or overhead, which is enough to sustain a few electric vehicles. However, as PEV adoption grows and vehicles are equipped with higher charging loads, these transformers may be insufficient to handle a wide-scale conversion of electric vehicles.
<b>Proximity to Metering Equipment</b>	Service panels for multi-unit dwellings (MUDs) can be located substantial distances from where the charging station is to be installed.
<b>Parking</b>	Parking is not standard across MUD building types. In some MUDs, parking is bundled into the rent or sale price of the unit. In other buildings, parking is unbundled or paid for separately. Unbundled parking spaces can be assigned on a first-come, first-served basis, or they can be unassigned. A charging station tied to a bundled parking space could be added value to a future tenant; however, a charging station on an unbundled or unassigned spot may pose challenges for assigning costs to individual owners. Choice of spaces also must address issues with proximity to metering equipment as addressed above.
<b>Electricity Rates and Meters for Common Areas</b>	Parking garages/lots are typically on a common meter. This means electricity provided in parking garages and other common areas is paid by the property manager or Homeowners Association (HOA) and then billed to residents through HOA fees or rent. This creates a challenge in allocating charging costs to individual owners.
<b>Homeowner Associations (HOAs)</b>	HOAs cannot prohibit or restrict the installation of a PEV charging station. Senate Bill 880 codified this and other provisions for charging installations in common areas. However, HOA boards may still resist installations. Lack of information regarding charging station installations remains a significant barrier.

## APPENDIX C

Best practices and recommendations to help address barriers to charging station installations at MUDs have been organized from similar EV readiness plans from around the country and are included below:

### ***Determine Demand for EV Charger Installations***

Property owners can survey residents to gauge their interest in purchasing a PEV. The survey results will help determine the number of charging stations and/or amount of conduit to install and in what layout(s), while also identifying demand for Level 1 and 2 versus DCFC charging.

### ***Allocate Costs***

It is important to establish how EV charger installation, operations, maintenance, insurance, and electricity bills will be paid. How costs are allocated will depend on how the chargers are installed. Potential options include the following:

- **Chargers in assigned spots:** Individual meters are installed for each charging station where the resident can cover the actual charger cost, billing, insurance, and maintenance of the unit. Installation costs for the meters, panel upgrades, and conduit can either be covered by **management or the resident, or the cost can be shared.**
- **Common area chargers for residents only:** Building management installs charging stations in common areas and recoups costs from residents through a billing system in the charger if permitted by state law.
- **Common area chargers for residents and the public:** Building management installs charging stations in public common area and recoups costs from residents and the public through a billing system in the charger.

### ***Site EV Chargers***

Property owners should determine if the existing power supply is adequate or if a meter or panel upgrade is needed to accommodate the proposed charging stations. If an upgrade is required, the property owner should consider the capacity needed to accommodate additional PEV chargers in the future. Property owners should contact the local jurisdiction's building/planning department to discuss any permits or requirements that should be considered when siting chargers.

### ***Provide Power Supply for EV Chargers***

The closer the charging station is to the power supply, the lower the installation costs will be. Additionally, installation costs will increase if a panel meter installation upgrade is necessary. The power supply needs for Level 1 and Level 2 charging stations are as follows:

- **Level 1: Dedicated branch circuit with NEMA 5-15R or 5-20R receptacle.**
- **Level 2: Dedicated branch circuit hardwired to a permanently mounted charging station with 240VAC/single phase, 4 wire.**

