WAMPO'S ELECTRIC VEHICLE (EV) NETWORK PLAN

2024

WICHITA AREA METROPOLITAN PLANNING ORGANIZATION

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COMMONLY USED TERMS & WAMPO TERMS

Advanced Metering Infrastructure (AMI) – is a two-way communication system to collect detailed metering information throughout a utility service industry.

Alternating Current (AC) – An electric current that reverses direction multiple times per second, used to offer fast charging.

Battery Electric Vehicle (BEV) – A vehicle that receives all its power from batteries and one or more electric motors.

Carbon Reduction Program (CRP) –The Carbon Reduction Program (CRP), a federal initiative, aims to alleviate traffic congestion and reduce carbon emissions by supporting projects that enhance transportation efficiency.

Charge de Move (CHAdeMO) – A charging standard for fast-charging stations.

Congestion Mitigation and Air Quality Improvement (CMAQ) – MAQ, a federal program administered by the U.S. Department of Transportation (USDOT), focuses on mitigating traffic congestion and improving air quality.

Direct Current (DC) – An electric current flowing in one direction only, used for fast-charging electric vehicles, regardless of which charging port is used (Tesla, CCS, or CHAdeMo).

Direct Current Fast Charger (DCFC) – Chargers that convert AC power or DC power to provide DC power straight to your EV's battery; the AC to DC conversion happens in the charging station before the electrons enter your vehicle.

Electric Vehicle (EV) – A vehicle propelled by one or more electric motors using energy stored in rechargeable batteries.

Federal Highway Administration (FHWA) – A federal organization that provides stewardship over the construction, maintenance and preservation of the nation's highways, bridges and tunnels.

Hybrid Electric Vehicle (HEV) – A vehicle powered by an internal combustion engine in combination with one or more electric motors that use energy stored in batteries.

Kilowatt (kW) – A unit of electrical power equal to 1000 watts.

Kilowatt-hour (kWh) – A unit of energy equal to 1 kilowatt of power sustained for one hour and is commonly used as a measure of electrical energy.

Megawatt (MW) – A unit of electrical power equal to 1 million watts.

Metropolitan Planning Area (MPA) – The boundary in which the transportation planning process must be carried out. The MPA is made up of the census defined urbanized area, plus the contiguous area expected to become urbanized within the next 20 to 25 years.

Metropolitan Planning Organization (MPO) – An organization created and designated to carry out the metropolitan transportation planning process. MPOs are required to represent localities in all urbanized areas with populations over 50,000, as determined by the US Census.

National Electric Vehicle Infrastructure (NEVI) Funding Program – Provides funding to states to strategically deploy electric vehicle (EV) charging infrastructure and to establish an interconnected network to facilitate data collection, access, and reliability.

Plug-in Electric Vehicle (PEV) – An electric vehicle containing a battery that can be recharged by plugging into an external source of power.

Plug-in hybrid Electric Vehicle (PHEV) – A hybrid electric vehicle containing a battery that can be recharged by plugging into an external source of power and by the onboard engine and generator.

Urbanized Area (UA) - A developed urban area with more than 50,000 people.

Electric Vehicle Plan

Executive Summary

WAMPO's Electric Vehicle Plan was developed to support the growing market of PEVs in the region by enabling municipalities and others to address immediate needs and long-term planning objectives so the WAMPO region will become an electric vehicle (EV) destination, corridor, and gateway.

The Electric Vehicle Plan outlines the first steps the region can take to support and encourage electric vehicle adoption. Delivers a comprehensive course of action to provide EV charging infrastructure and remove barriers to further EV adoption in the WAMPO region efficiently and effectively. This plan will serve as a starting point for private and public entities to grow familiarity with the opportunities and challenges with EV vehicles, charging infrastructure, and adoption.

The Electric Vehicle Plan supports the Metropolitan Transportation Plan 2050 and the Charge Up Kansas NEVI Plan, by advancing the use of EVs to improve air quality and fostering economic development. WAMPO has an opportunity to adapt to emerging technologies by closing EV charging infrastructure gaps and removing barriers to EV adoption.

Introduction

Background

The nation is beginning to significantly advance after the 2021 Federal Bipartisan Infrastructure Law (BIL) was enacted. It provides investments to help modernize infrastructure assets and support emerging technologies, including electric vehicles (EV). There will be long-lasting infrastructure and mobility improvements by developing a national network of EV chargers.

In Kansas, private industry has played a crucial role in establishing charging station infrastructure across the state. However, a majority of this infrastructure is not situated near Kansas' interstate system, and many existing stations do not adhere to NEVI (National Electric Vehicle Infrastructure) guidelines.

This chapter outlines Kansas' strategy for deploying NEVI-compliant charging infrastructure. It primarily addresses the current state of the infrastructure and identifies areas where corridor gaps still exist. While some locations may already meet NEVI compliance standards, numerous sites may require upgrades or new installations to establish NEVI-compliant corridors. The chapter also delves into the methodology employed by the Kansas Department of Transportation (KDOT) to identify suitable charging locations along the state's interstate system and the prioritization approach for expanding charging infrastructure along these corridors. Furthermore, the chapter provides a long-term forecast of the peak energy grid and charging site utilization to

guide future investments from available NEVI funds, considering a timeframe of three or more years from the time of the analysis.

Initially, states must spend NEVI Formula Program funds to build federally designated Alternative Fuel Corridors (AFCs). Full build out includes installing fast chargers every 50 miles within 1 mile of the AFC and providing at least four 150kW direct current fast chargers that are capable of simultaneously charging 4 EVs. Once the state's AFCs are fully built out, funding may be used on any public road or in other publicly accessible locations.

This initiative aims to provide a convenient, reliable, affordable, and equitable charging experience for all users; reduce greenhouse gas emissions; and put the U.S. on a path to net-zero emissions. Under the National Electric Vehicle Infrastructure (NEVI) Formula Program, the BIL will dedicate $5 billion in funding to make EV chargers accessible to all Americans for local to long-distance trips. State Departments of Transportation will be required to submit an EV Infrastructure Deployment Plan to unlock NEVI Formula Program funds.

Why EVs in Cities?

City and county officials have the chance to take bolder actions, enact changes more expeditiously, and attain significant outcomes more swiftly compared to their counterparts at the state and federal levels. Immediate advantages for cities include a reduction in emissions, lower operational expenses, and the aforementioned benefits tied to advancements in health, social equity objectives, economic growth, and energy security. Policies promoting transportation electrification can additionally contribute to other objectives, such as diminishing air pollution, hastening the integration of renewable energy, achieving decarbonization, and enhancing certainty regarding future fuel costs.

Cities have demonstrated the capability to be market leaders in EVs, buoyed by important policies that include financial incentives, High Occupancy Vehicle (HOV) access, high-level commitments, fleet policies, utility funding, charging rollout, and others. In 2018, top cities had market shares of 2.7%, nearly three times the nationwide average of 1.0%. Some cities had significantly higher EV uptake in 2018 and 2019. San Jose led the charge with 20-21%, followed by other California cities, Seattle, and Portland, ranging from 4% to 13%. Other cities with above-average EV uptake include Austin, Boston, Denver, Hartford, New York, Phoenix, and Washington, DC. City influence: Cities can help drive the adoption of aggressive policies (we detail the top ones in this report) and increase political pressure for policy action at higher levels (state, national, utilities, other cities, and international city platforms).

Local commitments to 100% (or nearly 100%) vehicle electrification for both government fleets and privately owned vehicles can galvanize strong policy action and send essential market signals. Cities can aim to commit to reaching 100% new EV purchases up to five years earlier than statewide and national targets, meaning cities can aim for 100% by 2030 for buses, light-duty fleets, and taxis, and by 2035 for trucks.

BENEFITS OF ELECTRICIFIED MOBILITY

Electrifying transportation opens doors to revolutionize mobility, offering eco-friendly and budget-conscious travel choices, all while advancing energy self-sufficiency.

A lack of general awareness and education, coupled with the higher initial prices of new electric vehicles, has contributed to misconceptions about the total cost of ownership. However, with substantially reduced maintenance costs and zero visits to the gas station, the long-term expenses associated with EVs are expected to decrease.

One energy sector fuel source (for electricity generation) is natural gas. Natural gas is becoming more popular and is a cleaner fuel source compared with coal-based electricity. At the same time, Missouri utilities are rapidly investing in renewable energy sources, which could further reduce an EV's carbon footprint.

The absence of diversity in transportation energy sources can result in an excessive dependence on particular energy providers. This vulnerability exposes the Wichita region to shifts in the global energy market, such as price fluctuations and availability. Electric vehicles (EVs), on the other hand, can be powered by a variety of energy sources.

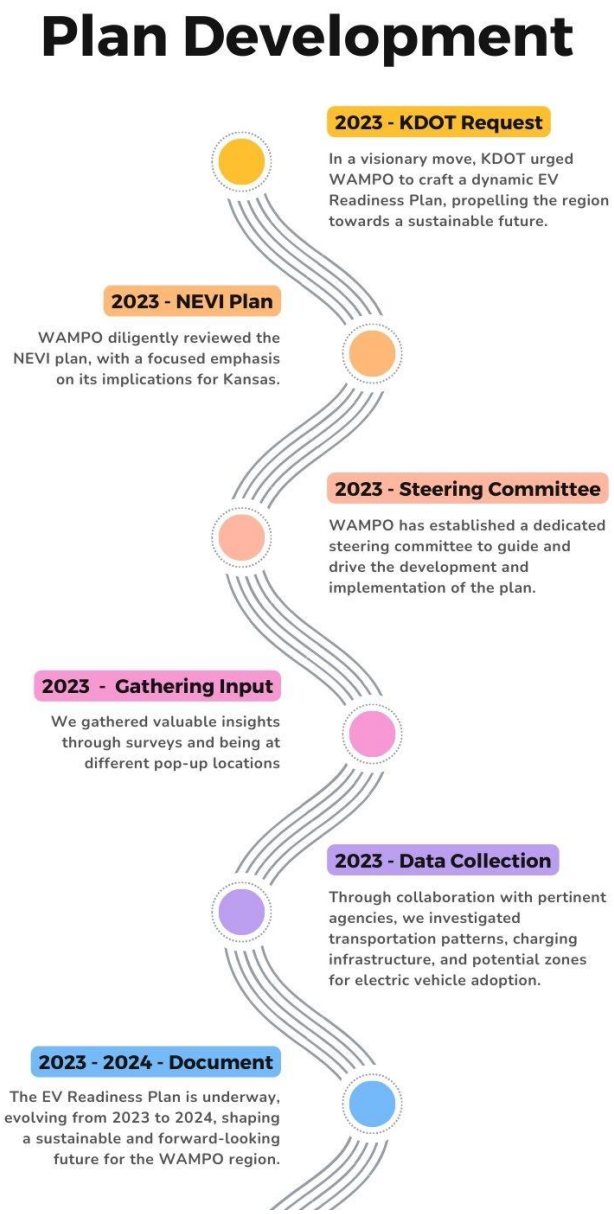
The automotive industry is among the primary sources of greenhouse gas emissions (GHGs).

Plan Development

The development of the WAMPO Electric Vehicle Plan represents a collaborative effort led by the WAMPO, with diverse stakeholders contributing their expertise. Engaging with representatives from Wichita engineers, Wichita Transit, Sedgwick County, Kechi City, Derby, Valley Center, Kansas Department of Transportation, environmental specialists, airport authorities, and workforce representatives, the planning process has garnered insights from multiple perspectives. Over several months, the dedicated efforts of these stakeholders have laid the groundwork for a comprehensive plan poised to capitalize on the expanding Electric Vehicle (EV) market for the benefit of the WAMPO region.

Through public forums, workshops, and surveys, the plan seeks to gather valuable input, fostering a sense of community ownership and ensuring that the strategies proposed align with the desires and concerns of the broader population.

Data collection and analysis form the bedrock of the plan's development. Collaborating with relevant agencies, the plan will delve into current transportation patterns, charging infrastructure, and potential areas for EV adoption. This empirical foundation will enable the formulation of informed strategies to harness the economic, environmental, and social benefits of electric vehicle integration in the WAMPO region.



In parallel, a thorough assessment of existing technology and infrastructure will pinpoint areas for improvement and expansion. Simultaneously, a review of local and state policies related to electric vehicles will help identify barriers or incentives. By proposing recommendations for policy changes and new initiatives, the plan seeks to create an enabling environment for the growth of the electric vehicle market in the region.

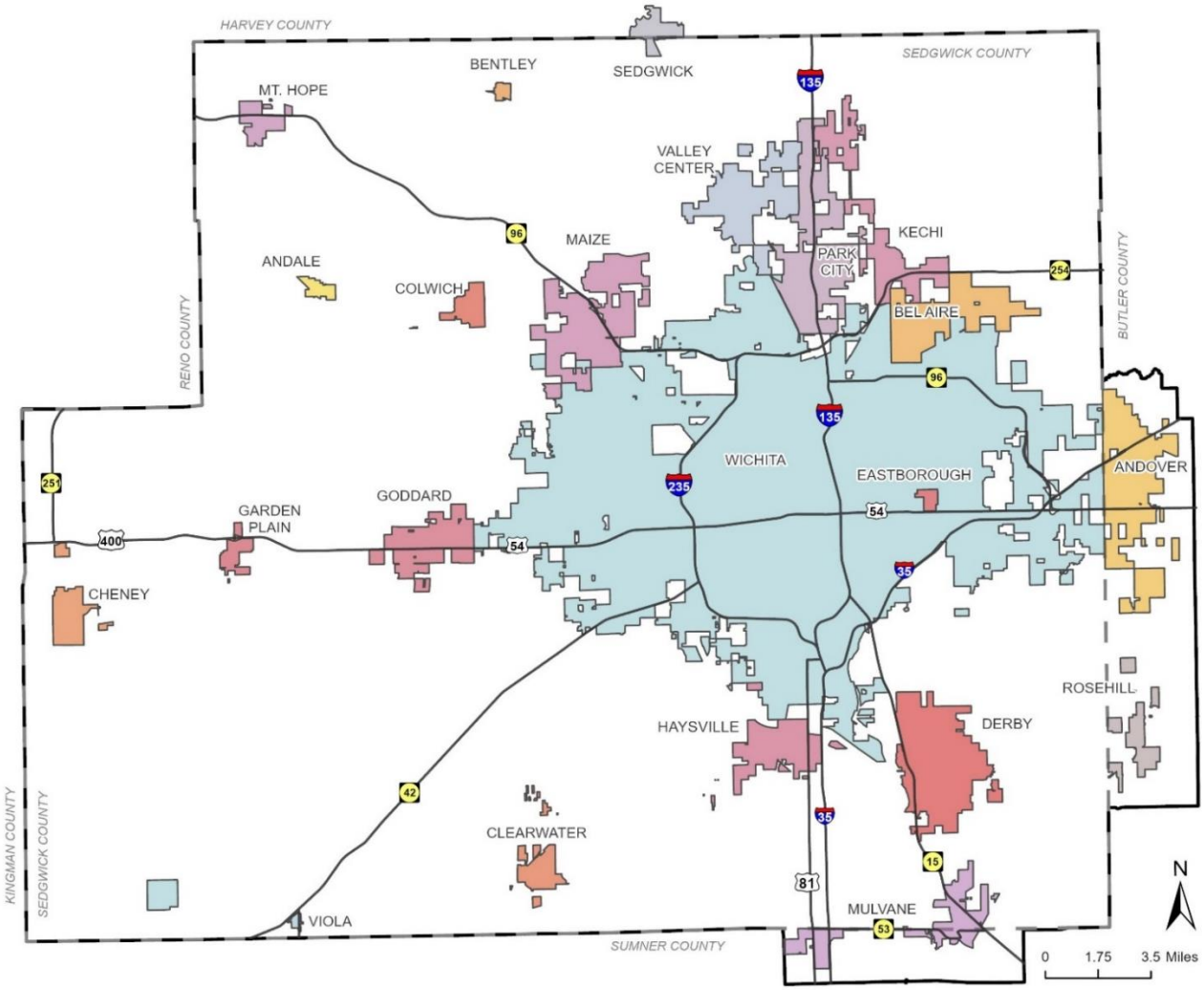
Financial modeling and funding strategies will be critical components, ensuring the feasibility and sustainability of the plan. By developing a comprehensive financial model and exploring diverse funding sources, including grants and public-private collaborations, the plan aims to secure the necessary resources for successful implementation.

Communication and education represent key pillars of the plan, fostering community awareness and understanding. Through targeted outreach efforts, educational materials, and workshops, the plan seeks to dispel myths surrounding electric vehicles and build public support for the initiative.

Study Area

The study area is the WAMPO region, as shown in **Map 1**. WAMPO is located South-Centrally, with numerous interstates and major highways that connect to all of Kansas. Drivers traveling within, to, and through the WAMPO region will all benefit from the EV infrastructure improvements.

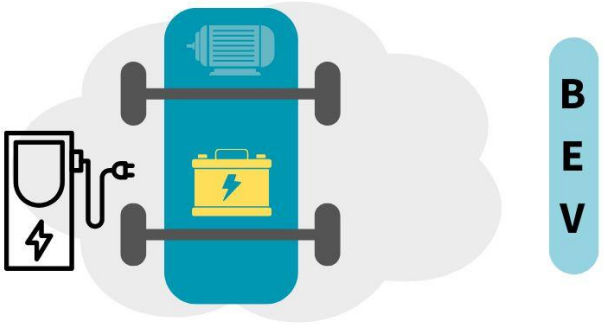
Map 1 - WAMPO Region



1.Electric Vehicles

Types of EVs

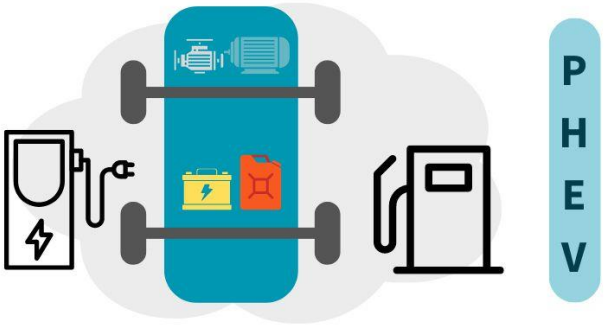
Electric vehicle technology is evolving as more models become available and affordable. Batteries are improving, which has helped the affordability of purchasing EVs with the supplemental of batteries from gas. Electric vehicles are a category of vehicles that use electricity as their primary source of power for propulsion. Unlike traditional internal combustion engine (ICE) vehicles that rely on gasoline or diesel for power, electric vehicles use electricity stored in batteries or generated onboard by fuel cells to drive electric motors. EVs are designed to reduce or eliminate the emissions of greenhouse gases and air pollutants associated with traditional vehicles. There are several types of electric vehicles, as mentioned in the previous response, including Battery Electric Vehicles (BEVs), Plug-in Hybrid Electric Vehicles (PHEVs), Hybrid Electric Vehicles (HEVs), Fuel Cell Electric Vehicles (FCEVs), and more. This section provides an overview of the types of EVs available and the current infrastructure available.



Battery Electric Vehicles (BEVs)

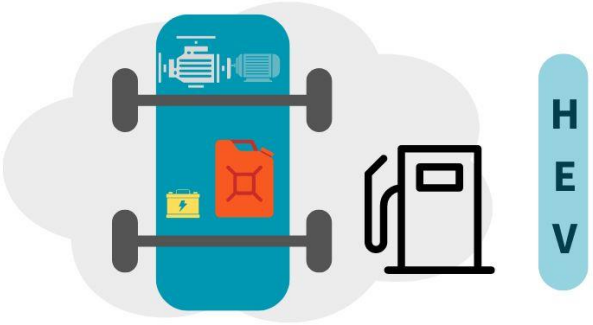
Fully powered by electricity; they have no internal combustion engine, and they produce zero tailpipe emissions. More efficient compared to hybrid and plug-in hybrids.

BEV technology runs entirely on a battery-powered electric drivetrain. The electricity is stored in a large battery pack which can be charged by plugging it into the electricity grid.



Hybrid Electric Vehicle (HEV)

Hybrid Electric Vehicle (HEV): The vehicle uses both the internal combustion (usually petrol) engine and the battery-powered motor powertrain. The petrol engine is used both to drive and charge when the battery is empty. These vehicles are not as efficient as fully electric or plug-in hybrid vehicles.



Plug-In Hybrid Electric Vehicle (PHEV)

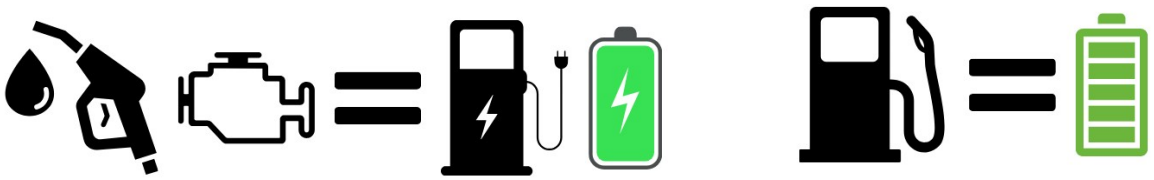
Plug-in Hybrid Electric Vehicle (PHEV): Uses both an internal combustion engine and a battery charged from an external socket (they have a plug). This means the vehicle's battery can be charged with electricity rather than the engine. PHEVs are more efficient than HEVs but less efficient than BEVs.

Fuel Cell Electric Vehicle (FCEV)

Electric energy is produced from chemical energy, for example, hydrogen. FCEVs are also known as zero-emission vehicles.

Charging Infrastructure

Gas-Powered Vehicles vs. EV



Conversions

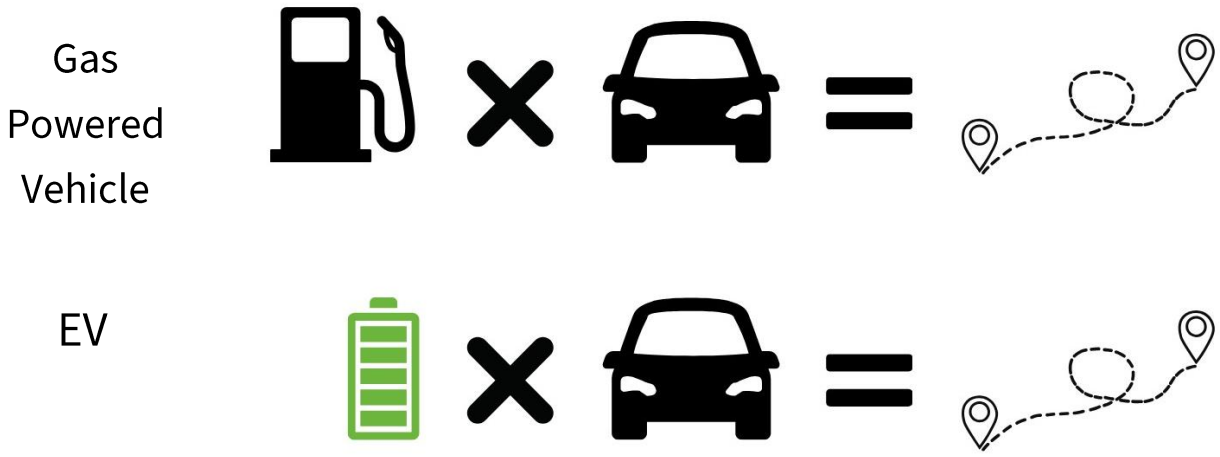
1.0 Horsepower ⟶ .75 kWh

1.34 Horsepower ⟵ 1.0 kW

1.0 Gallon ⟶ 33.4 kW

0.3 Gallon ⟵ 1.0 kWh

Electric Vehicle (EV)	Gas Powered Vehicle
• Energy Type (Electricity)	• Energy Type (diesel, gasoline, or natural gas)
• Efficiency (miles/kWh)	• Efficiency (miles/gallon)
• Distance (miles)	• Distance (miles)
• kWh (energy) * Miles/kWh (efficiency) = Miles (distance)	• Gallons (energy) * Miles/Gallon (efficiency) = Miles (distance)
• Battery capacity ranges from 30 kWh to 200 kWh for Battery Electric Vehicles (BEVs) and 10 kWh for Plug-in Hybrid Electric Vehicles (PHEVs)	



Charging Infrastructure

Charging equipment for PEVs is classified by the rate at which the batteries are charged. Charging times vary based on how depleted the battery is, how much energy it holds, the type of battery, and the type of charging equipment (e.g., charging level and power output).

Level 1 Charging

Charging an electric car with a Level 1 charger does not require any special equipment. You can plug your car into a regular 120-volt AC plug, though you will need to plug into a dedicated circuit that does not supply electricity to anything else in your house. Nearly all electric vehicles come with a cord that will fit a standard 3-prong outlet and the car. With L1, it will take about an hour of charging time to add a range of 3 - 5 miles to your vehicle. Because of the time needed, most people will charge their car this way when they are at home and overnight. Level 1 charging works well for plug-in hybrid electric vehicles (PHEVs) because they have smaller batteries.

Level 2 Charging

Level 2 chargers are the most common chargers used for daily charging. They are faster than L1 but require special equipment. With L2, you can get up to 60 miles of range per hour of charging time and can fully charge an empty battery in 4-10 hours. This allows for use in a public or work environment, as vehicles are often parked for extended periods.

Direct current fast charging (DCFC)

DC Fast charging is much faster than L1 and L2, which makes it preferable for drivers on the go. The fastest speed enables rapid charging along heavy-traffic corridors. DCFC equipment can charge an electric battery up to 80 percent in just 20 minutes to 1 hour. Most EVs have battery management systems to try to blunt any

negative effects of DC fast charging on their battery. However, compared to Level 1 and Level 2 charging, DC fast charging can put more strain on batteries.

2.Barriers to Adoption and Industry Trends

EV Adoption Barriers

Cost of Electric Vehicles

One of the barriers to electric vehicle adoption is the high cost compared to traditional gasoline vehicles. Shoppers often see EVs as too expensive. But in reality, the total cost of ownership for electric vehicles can be less than their traditional counterparts over time.

As the demand for electric vehicles increases, buyers must wait to get their new desired EV. The estimated wait is eight months. As automakers produce more EVs and the market matures, this will not be an issue.

Many consumers are unaware of the government incentives available for electric vehicle (EV) purchases, including subsidies and tax breaks offered by state governments and utility companies. To raise awareness about these incentives, EV industry leaders can utilize various strategies. In addition to running advertising campaigns and public education initiatives about EVs, they should also leverage social media platforms, webinars, and community events to inform the public about the increasing affordability of EVs and the available incentives.

Knowledge Barriers

Many people do not know the benefits of electric vehicles. Switching to electric vehicles (EVs) offers various environmental benefits such as decreased emissions and reduced air pollution. Additionally, it leads to cost savings due to cheaper fuel costs and lower maintenance requirements. To promote EV adoption, automakers and governments can invest in advertising campaigns and public education initiatives. Utilizing social media and digital marketing can also be effective in reaching new audiences and raising awareness about EVs.

Safety is a concern for many prospective buyers when considering electric vehicles (EVs), despite their comparable safety to gas-powered cars. Addressing this concern requires automakers and EV leaders to educate consumers about the safety features of EVs. Governments can also play a role by mandating safety regulations to ensure that all EVs meet the highest safety standards.

The limited availability of aftermarket support is a hindrance to the widespread adoption of electric vehicles (EVs). EV owners often face challenges in finding new car parts and qualified EV mechanics in their area. To address this barrier, automakers can invest in training programs to ensure an adequate number of qualified technicians are available to service EVs. Additionally, automakers should focus on researching and developing aftermarket parts specifically designed for EVs, while also increasing the availability of original equipment manufacturer (OEM) parts.

In the early days of electric vehicles, limited model options made it challenging for customers to find the right fit for their needs. Many still assume that only sports cars and sedans are available, but the EV market now includes a growing range of trucks, SUVs, and specialty vehicles. Despite a long road ahead for widespread adoption, continued investment from automakers and governments is increasing awareness of EV benefits. Government incentives make EVs more affordable, while greater awareness of available models provides customers with more options. With these efforts, the future holds a transportation revolution as gas-powered cars are replaced by clean and efficient electric vehicles.

Range Anxiety

Range anxiety is a major hurdle to EV adoption. This barrier is further aggravated by the longer charging times required to ‘refuel’ an electric vehicle compared to an ICEV. Public infrastructure is assumed to play a significant role in counterbalancing the fear, uncertainty, and doubt typically associated with new innovations; therefore, public charging infrastructure is believed to be able to relieve range anxiety (Maia et al, 2016; Chakraborty et al., 2019). According to regional experts, range anxiety remains one of the biggest barriers to electric vehicle adoption.

Charging Station Adoption Barriers

Another barrier to electric vehicle adoption is the need for more charging infrastructure throughout the US. People fear being stranded, not being able to make it from point A to point B without running out of power.

This is a valid concern for early models of EVs, modern electric vehicles now have ranges up to 400 miles per charge.

Infrastructure Investment Costs

Establishing a comprehensive charging infrastructure requires significant investment in terms of installation, maintenance, and operation. This cost is often a barrier for businesses or governments looking to expand charging networks.

Regulatory Challenges

The regulatory environment can pose barriers to charging station adoption. Regulations related to permits, zoning, and utility approvals can vary making it challenging for businesses to navigate and set up charging stations quickly.

Land Use and Zoning Issues

Finding suitable locations for charging stations, especially in densely populated urban areas, can be challenging due to zoning restrictions, limited available space, and concerns about land use conflicts.

Charging Standardization

Different EV manufacturers use various charging standards, creating a need for charging stations to accommodate multiple plug types and charging speeds. Standardization challenges can slow down the deployment of charging infrastructure.

Grid Compacity and Upgrades

As the number of EVs increases, the demand for the electricity grid grows. Some areas may require grid upgrades to support a higher concentration of charging stations, adding complexity and cost to the deployment process.

3.Public Engagement

Stakeholders Involved in Plan Development

The Wichita Area Metropolitan Planning Organization (WAMPO) Electric Vehicle Plan Steering Committee is a group composed of 16 members who work together to develop and implement a comprehensive plan for electric vehicle (EV) infrastructure and adoption in the Wichita area. The committee's primary goal is to facilitate the transition to electric vehicles by addressing various aspects, including charging infrastructure, policy recommendations, incentives, and public awareness.

The committee members are representatives from various organizations and stakeholders with expertise in transportation, energy, urban planning, and related fields. The steering committee includes individuals from

government agencies, utility companies, transportation departments, environmental organizations, community groups, and local businesses.

The steering committee's role involves setting the strategic direction for the electric vehicle plan, conducting research and analysis, identifying opportunities for funding and partnerships, engaging with the community, and making recommendations to the WAMPO board regarding EV-related policies and initiatives. They may also collaborate with other regional and state-level organizations working towards similar goals.

By bringing together diverse perspectives and expertise, the steering committee aims to develop a comprehensive and inclusive electric vehicle plan that addresses the unique needs and opportunities of the Wichita area. Their work can help pave the way for increased adoption of electric vehicles and their infrastructure, reduce greenhouse gas emissions, improve air quality, and promote sustainable transportation options in the region.

Overall, the steering committee plays a crucial role in ensuring the successful adoption of EVs by providing leadership, guidance, and coordination to support the development and implementation of an effective plan.

Meeting 1

The steering committee met on May 2nd, 2023. They discussed the items below:

Funding for EV charging stations originates from diverse sources, encompassing Charging & Fueling Infrastructure (CFI) Grants, Carbon Reduction Programs, and NEVI formula funding. The distribution of funds varies, with some directly allocated to applicants by the federal government and others routed through states before dissemination.

Concerns were voiced regarding the imperative for fire departments to be equipped to handle EV fires. While funding specifics for training were not identified, it was recommended that grant applicants highlight the need for training in their applications. WAMPO is committed to providing letters of support to member jurisdictions for their grant applications upon request.

A mandatory 20% local match is required for the grants, prompting discussions on the origin and contributors of the local match funding. Federal funds cannot be utilized for the local match requirement. Estimating costs for EV charging infrastructure proves challenging due to factors such as adherence to NEVI standards, with potential costs ranging from $750,000 to $1.2 million for compliant charging stations.

Suggestions arose to involve additional experts in steering committee discussions, such as technical representatives from Evergy and EV charging infrastructure manufacturers like Charge Point. Existing EV charging stations were highlighted at Eisenhower Airport, WSU Tech, and McConnell Air Force Base, with the Plug Share app recommended for locating EV charging stations nationwide.

KDOT possesses data on the number of EVs in Kansas and has agreed to provide access to this information. Deliberations encompassed the financial aspects of EV charging infrastructure, including considerations of

who foots the infrastructure bill and who reaps the generated revenue. The committee also explored efficient resource utilization and identified potential customers.

Proposed locations for EV charging stations spanned places of worship, YMCA facilities, medical facilities, sports arenas, major employers, downtown areas, park and ride locations, and various other settings. The committee outlined several visions and goals, aiming to position the WAMPO region as an EV destination, address implementation issues, locate shared-use charging spots, support electrical fleet transition plans, ensure accessibility and convenience, develop a fleet adoption plan, and promote innovation and economic development.

Meeting 2

The steering committee met on June 6th, 2023. We had two speakers, ChargePoint and Evergy, come and speak with the committee on EV infrastructure and energy capacity in the region.

ChargePoint presentation summary:

Manufacturers are increasingly shifting towards electric vehicle (EV) production due to climate change policies and the declining costs of lithium-ion batteries. It is projected that by 2030, over 50% of car sales in the US will be electric. Charging EVs differs from refueling internal combustion engine (ICE) vehicles, with EVs requiring multiple charges per day while parked. This necessitates the installation of chargers at various locations, such as homes, workplaces, retail centers, and recreational facilities. Different charger levels (1, 2, and 3) are needed based on expected dwell time. Pricing for EV charging can vary based on factors such as time of day, charge duration, kilowatt-hour consumption, and potential surcharges. Renovations or replacements of electrical panels and wiring may be necessary to accommodate EV charging, which can incur costs. Some cities are mandating EV compatibility in new developments to prepare for increased EV usage. To manage the strain on the power grid, differential pricing during peak usage and limits on simultaneous charger usage in specific areas can be implemented.

Evergy presentation summary:

Evergy discussed the expenses and services offered by Evergy in terms of grid fortification and fleet electrification. Evergy has a clear process for integrating electrification infrastructure into clients' facilities and provides incentives to encourage electrification in various settings, including public spaces, fleets, workplaces, and multifamily homes.

Meeting 3

The committee discussed various aspects of electric vehicle (EV) infrastructure planning, covering demographics, survey requests, incentives, funding, safety concerns, and additional information. Key points include:

Demographics and Survey Requests:

- Interest in demographic information, particularly the zip codes of respondents.

- Curiosity about the living locations of respondents driving 50+ miles, especially to grocery stores.
- Surprising responses about the number of people driving long distances for grocery shopping.
- Concerns about the high percentage (20%) of respondents stating, "does not apply."

Survey and Public Opinion:

- A need to analyze the responses to the survey question on driving 50+ miles, considering potential misunderstandings.
- Notable percentages of respondents are not planning to purchase an EV.
- Consideration of the public's preferences aligning with potential locations for EV chargers.

Charging Infrastructure:

- Emphasis on the need for higher-level chargers at grocery stores for meaningful charging.
- Discussions on the affordability and practicality of Level 2 chargers and the cost comparison between charging at home and grocery stores.

Regional and Political Considerations:

- Acknowledgment that Wichita is different from more liberal states and that considerations should be tailored to the local political landscape.
- Recognition of the need for guidelines and preparations for new developments in the city.

Safety Concerns and Fire Prevention:

- Significant concerns about the safety and practicality of EV chargers, particularly the risk of fires from vehicles with thermal runaways.
- Suggestions to explore regulations from other states with significant EV usage.

Funding and Incentives:

- Clarification that the state of Kansas does not intend to own or operate charging stations, with the responsibility falling on local municipalities and investors.
- Questions about WAMPO's plans for funding chargers and the potential for future discussions on grants.
- Emphasis on involving businesses hosting chargers in funding considerations.

The committee is actively considering various factors to develop a comprehensive plan for EV infrastructure in the region, including demographics, safety, funding, and incentives.

Community Input

The Wichita Area Metropolitan Planning Organization (WAMPO) and stakeholders see the public engagement process as a key part of creating the region's EV plan. This began with building a thorough public engagement and communications plan to guide the involvement process, as well as the development of a stakeholder list. The list was designed to engage a wide swath of agencies, organizations, utilities, businesses, and others who are part of WAMPO's EV ecosystem and consider equity and environmental justice factors.

Public Survey

WAMPO conducted a comprehensive survey spanning from June 25th to August 31st to gather vital insights for the electric vehicle infrastructure plan. This survey encompassed a total of 12 questions, with a remarkable 577 surveys completed by engaged participants. The majority of responses, 574 to be precise, were provided in English. Additionally, there were 2 surveys completed in Spanish and 1 in Vietnamese, showcasing WAMPO's dedication to inclusivity and ensuring diverse voices are heard. Throughout the public engagement phase of the plan, the dedicated WAMPO staff devoted a collective total of 147 hours to public outreach efforts, while 15.5 hours were dedicated to social media posts and email correspondence. Furthermore, 141.5 hours were spent at tabling events, underlining the organization's commitment to fostering a robust and well-informed community dialogue around electric vehicle infrastructure.

Table 1 - Public Outreach

Reach	Number of Staff Hours
Social Media Posts/Emails	15.5
Tabling Events	141.5

The survey was publicized in several methods, including:

- Via email to the WAMPO contact list
- On WAMPO's website
- Placing flyers in various government buildings
- Tabling events
- Website
- Public comment
- Social Media

Appendix A will provide the full Electric Vehicle Network Plan Survey Results.

4.Plan Vision and Goals

Committee Input

The WAMPO EV Plan vision and goals were developed by first reviewing the Transportation's NEVI Formula Program objectives and criteria for funding to deploy a network of EV chargers nationwide. Second, the project team conducted a review of the plan and developed Iowa DOT's adopted 2022 State Transportation Plan, Iowa in Motion,1 which delineates the state's transportation goals, system objectives, and guiding principles for the future.

Plan Vision

To transform WAMPO into a sustainable, forward-thinking, and environmentally conscious transportation hub, leading the way in electric vehicle adoption and reducing our carbon footprint. Our vision is a future where clean and accessible electric transportation options are the norm, improving air quality, reducing greenhouse gas emissions, and enhancing the quality of life for all residents.

Goals

1. **Infrastructure Expansion and Accessibility**
   - » Install a comprehensive network of electric vehicle charging stations throughout the Wichita region, ensuring convenient access for residents, visitors, and businesses.
   - » Prioritize the deployment of charging infrastructure in underserved communities, fostering equitable access to electric mobility.

2. **Incentives and Support**
   - » Work with agencies that are currently incentivizing EV infrastructure.
3. **Fleet Electrification**
   - » Collaborate with local businesses and government agencies to transition their fleets to electric vehicles, reducing emissions and showcasing the economic benefits of EV adoption, while working on implementing infrastructure at their entities.
4. **Education and Awareness**
   - » Launch a public awareness campaign to educate residents on electric vehicles and EV infrastructure.
   - » Create educational programs to go over the safety hazards electric vehicles may provoke.
5. **Clean Energy Integration**
   - » Collaborate with local utilities to expand renewable energy sources, ensuring that a significant portion of the electricity used for EV charging comes from clean, sustainable sources.
6. **Collaboration and Partnerships**
   - » Collaborate with neighboring regions, state agencies, and federal entities to align efforts, share best practices, and secure additional funding for electric vehicle infrastructure.

Charging Network Timeline

5.Regional EV Infrastructure Existing Conditions

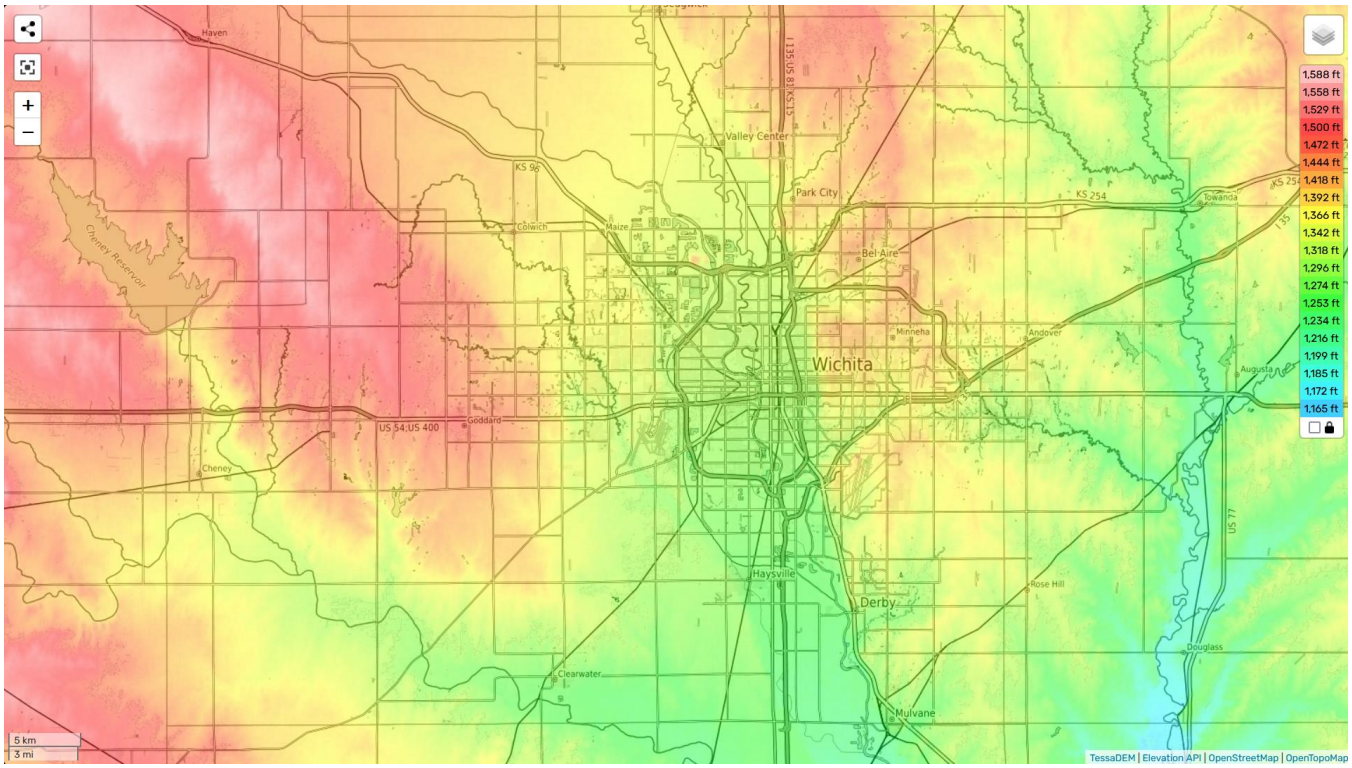
This overview of the existing conditions aims to inform the development of an EV plan by assessing various factors such as EV adoption rates, charging infrastructure, policy framework, and other relevant considerations. The information presented here will help stakeholders make informed decisions to support the growth and integration of EVs within the region.

State Geography, Terrain, Climate, and Land-use Patterns

Kansas is located on the great central plains between the Arkansas River and Platte River. The native landscape is primarily grass-covered prairie. It is a common misconception that Kansas is the flattest state in the nation, but the land gradually rises from east to west, and its altitude ranges from 684ft to 4,039ft.

As with traditional ICE vehicles, EVs consume more power when driving uphill. In the WAMPO region, similar to the state of Kansas, the elevation gradually increases from east to west. While Wichita, the most populous city in the region, maintains a relatively constant elevation with minor rises in the east, this particular change in terrain is unlikely to significantly impact the range of EVs.

Map 2 - WAMPO Region Elevation Map



A key advantage of EVs over ICE vehicles is their ability to recapture energy while coasting or braking, setting them apart in terms of optimal driving styles. EVs achieve peak fuel efficiency when frequently stopping during short trips, in contrast to ICE vehicles, which excel in constant cruising conditions. Due to the city's sprawling nature and the frequent commutes made by workers via highways, EV users on the outskirts of the city might find it necessary to charge more frequently.

The changing climate is a result of the Earth's warming. Since the late 1700s, there has been a 40 percent increase in carbon dioxide emissions caused by human activities. Additionally, there is a rise in other heat-trapping greenhouse gases. These combined factors have led to a warming of the Earth's surface and lower atmosphere by approximately one degree over the past 50 years. As the atmosphere warms, evaporation rates increase, leading to higher humidity levels, average rainfall, and a more frequent occurrence of heavy rainstorms in certain regions. However, it also contributes to drought conditions in other areas.

Wichita's average annual temperature was 58.0 degrees (F), 0.3 degrees warmer than average. The hottest daily temperature was 107 degrees (F) on July 19th, 2022, and the coldest was 5 below zero on December 22nd. Wichita had an annual precipitation of 30.53 inches, which has been the driest year since 2020.

Electric vehicles are well equipped to handle heat in the short term, allowing the most range per charge when outside temperatures are in the 80s. The majority of the range that is lost in heat is due to climate control systems to keep the driver and passengers comfortable. Though short-term heat exposure is not a problem for EVs, long-term exposure to temperatures over 85°F does lead to battery degradation. The degradation from long-term exposure would only be noticed after years of battery degradation due to extreme heat. Looking forward to the year 2050, we can see that Kansas will be an optimum location for EV battery longevity, with projections for the number of extreme heat days per year on the lower end of the spectrum and the average yearly temperature projected to be around 74°F in the WAMPO region.

Map 3 – Projected 2050 Heat Map-www.heat.gov

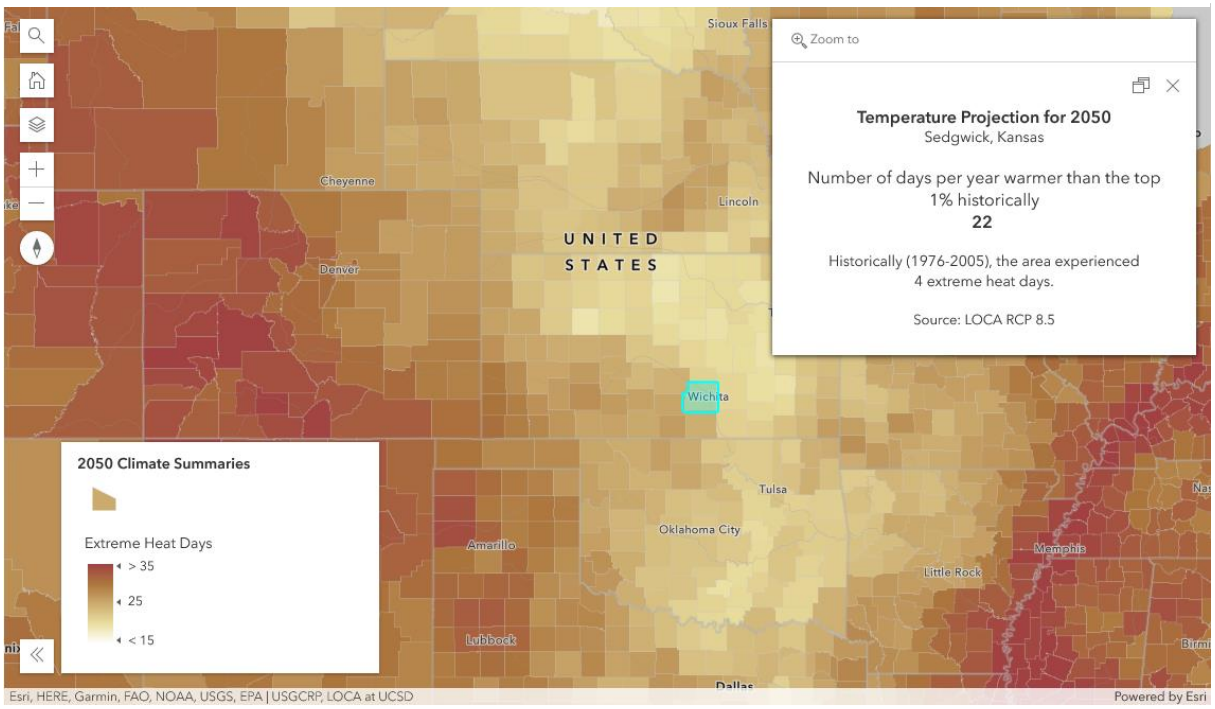
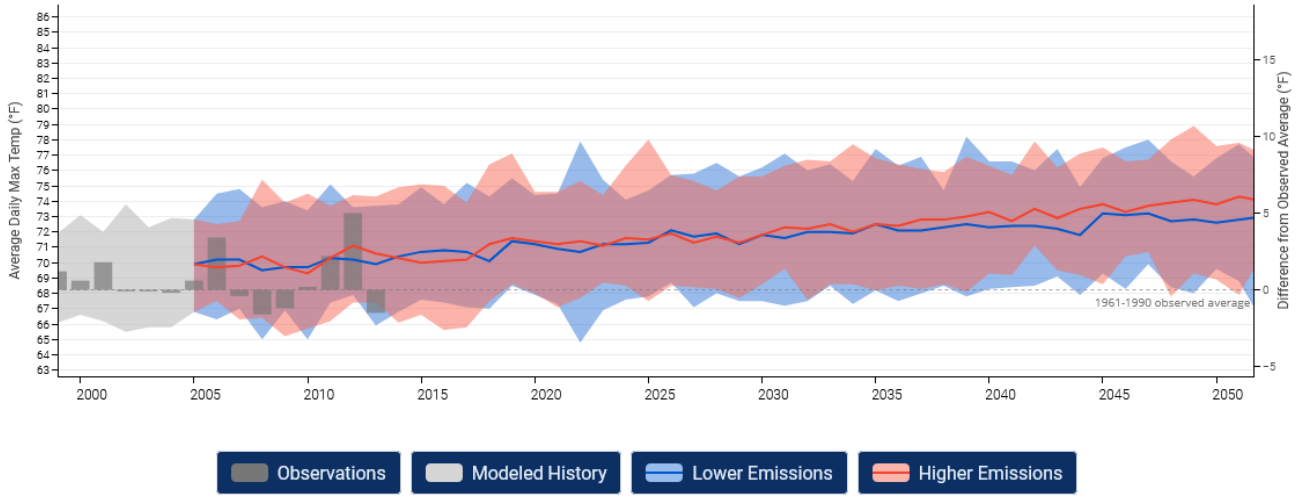


Table 2 - Average Daily Temperatures

Average Daily Max Temp (°F)	Average Daily Max Temp (°F)
2020s projection	**2050s projection**
Higher Emissions	Higher Emissions
— 71.5 — 68–75.5	— 74.3 — 70–78.5
Lower Emissions	Lower Emissions
— 71.3 — 67.4–75.5	— 73.3 — 68.4–77.8
1961–1990 observed average	**1961–1990 observed average**
- - 68.2	- - 68.2

Table 3 - Projection Yearly Temperatures - www.heat.gov



Utility Considerations

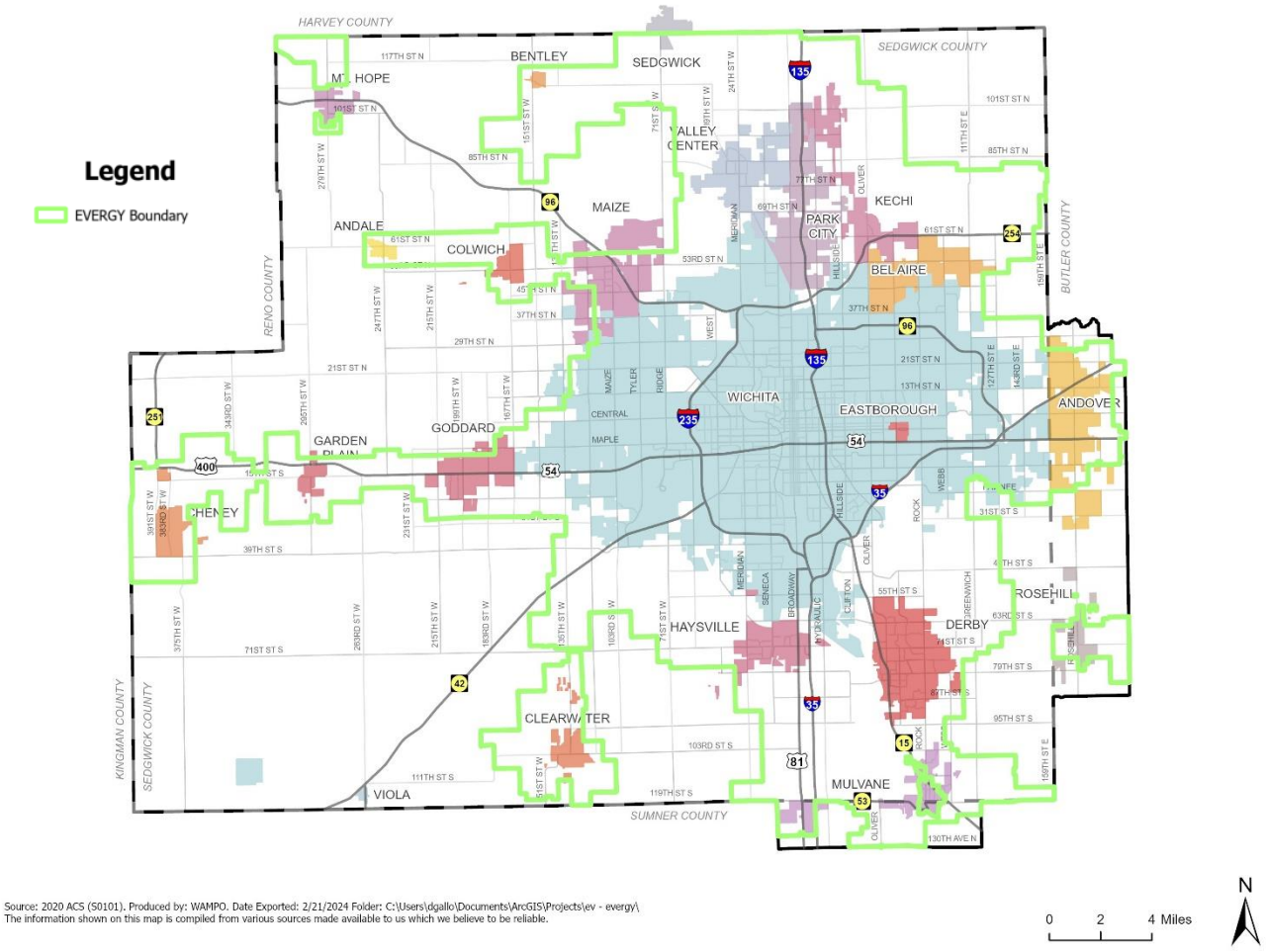
Creating an electrical utility network to support EV charging stations will require the cooperation and coordination of several utility providers. Evergy Energy services the WAMPO region. Other service providers include Kansas Gas Service and Black Hills Energy.

Natural gas providers play a role in the realm of EV chargers through various channels. Firstly, natural gas is a source of energy for power generation, and in regions where it forms a significant part of the energy mix, it indirectly contributes to the electricity that powers EV chargers. Additionally, these companies might diversify their investments to include EV charging infrastructure, aligning with the growing demand for electric vehicles. Some natural gas providers explore the opportunity to offer integrated solutions that encompass both natural gas and electricity services, adapting to the evolving energy landscape. Collaborations with utilities and active participation in initiatives supporting sustainable transportation further demonstrate their involvement in the transition to electric mobility. The degree of engagement varies based on regional energy policies, market dynamics, and the broader shift towards cleaner energy sources.

The utility grid connection is critical to the deployment of electric vehicle infrastructure in the WAMPO region. The NEVI charging station requirements clearly outline the minimum need for four 150-kilowatt (kW) chargers, each capable of simultaneous operation for a minimum peak load of 600 kW.

The requirement states that each charging facility needs to have a peak load capacity supported by the utility. Initially, the utilization of each site may be lower than the required 600 kW peak. This can pose financial challenges when installing large electrical service upgrades that might have minimal use until more electric vehicles (EVs) are available on the roads.

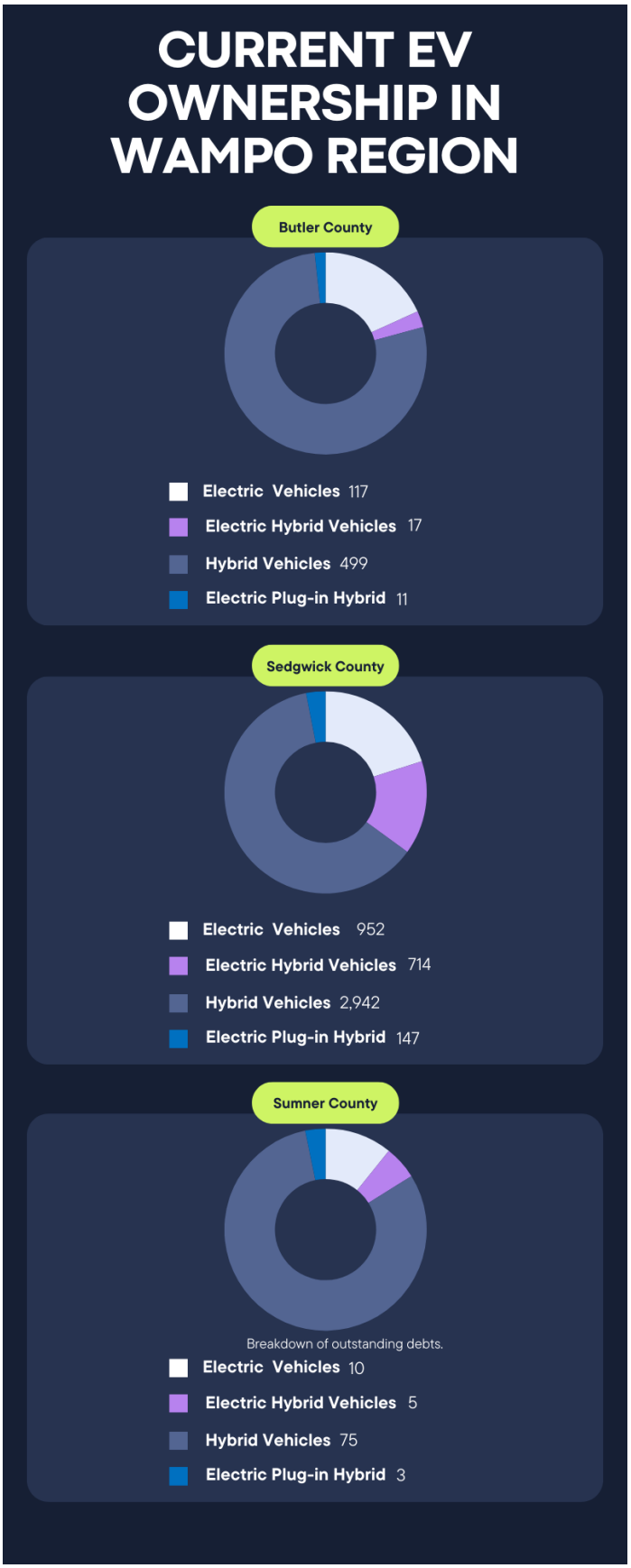
Map 4 - Evergy coverage in WAMPO Region



To meet the peak load requirements, most utilities are likely to install a 750 kilovolt-ampere (kVA) distribution transformer for a minimum NEVI (National Electric Vehicle Infrastructure) station. Sites with higher utilization or plans for future improvements, such as 350 kW chargers, may require even larger service upgrades. The specific utility service and design will be determined by each utility individually.

Current EV ownership in the WAMPO region

Electric vehicle ownership is growing in the region. As of April 30, 2023, there are currently 117 registered electric vehicles, 17 electric hybrid vehicles, 499 hybrid vehicles, and 11 electric plug-in hybrid vehicles in Butler County. Sedgewick County has 952 electric vehicles, 714 electric hybrid vehicles, 2,942 hybrid vehicles, and 147 electric plug-in hybrid vehicles registered. Sumner County has 10 electric vehicles, 5 electric hybrid vehicles, 75 hybrid vehicles, and 3 electric plug-in hybrid vehicles. (Kansas Department of Revenue)



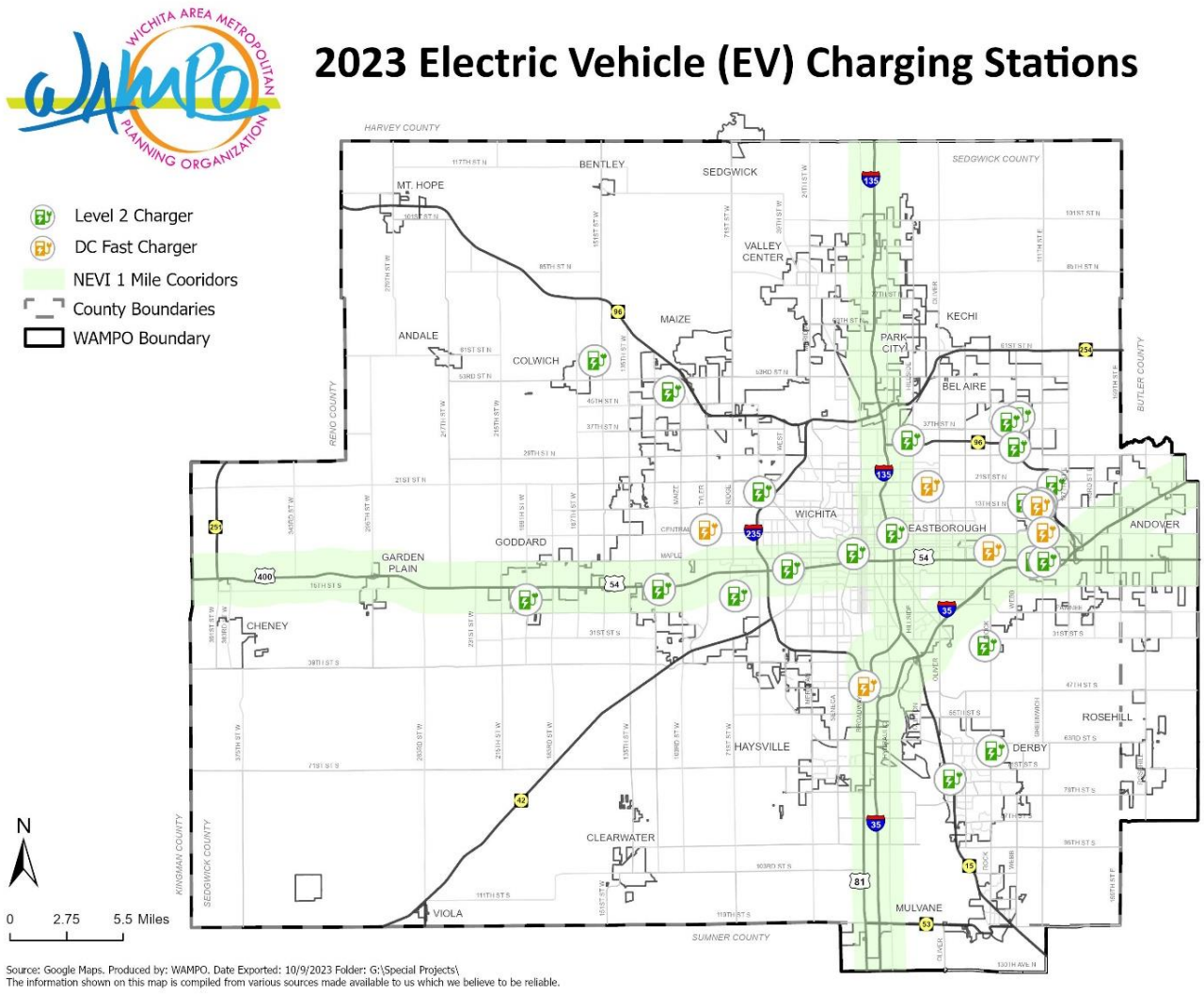
Current EV infrastructure in the WAMPO region

As of June 2023, there were 32 EV charging stations, 8 public level 1 stations, 18 public level 2 stations, and 6 DC level stations serving the WAMPO region. Locations and charging types are included on **Map 5**.

Finding public charging infrastructure

Drivers typically use mobile applications to locate public charging stations. EV drivers can find these charging locations by using several online resources. Additionally, each charging network (e.g. ChargePoint, PlugShare, Tesla, etc.) has its own web-based or mobile application to help its members find network-specific charging stations. Resources for locating public charging stations are provided further [insert table]. Locating charging stations during regional travel is a crucial resource for EV owners, especially for the WAMPO Region due to its growth.

Map 5- EV Charging Stations



Regional and Local Level Incentives

Electric Vehicle (EV) Charging Station Rebate

Evergy offers residential customers a $250 rebate for the purchase of a Level 2 EV Charger. Evergy offers an additional $250 rebate when customers sign up for an EV Time of Use (TOU) rate. To receive the additional rebate, Kansas Central region customers must enroll in either the EV Plan or the TOU Plan rate, and Kansas Metro region customers must enroll in the TOU Plan rate. For more information, including TOU rate option details, see the Evergy EV Charging Rebate website.

Commercial Electric Vehicle (EV) Charging Station Rebates

Evergy offers rebates to commercial and multifamily customers for the purchase and installation of EV charging stations. Customers may receive rebates of up to $2,500 per Level 2 EV charging station port and up

to $20,000 per direct current fast charging (DCFC) station. Maximum rebate awards are available in the following amounts:

Table 4 - Evergy Commercial EV Charging Station Rebates

Project Location	Max # of Level 2 Charging Station Ports per Location	Max # of DCFC Units per Location	Max Rebate Amount
Within 1 mile of a highway intersection	2	2	$45,000
Public	6	2	$55,000
Fleet	10	2	$65,000
Workplace	10	0	$25,000
Multifamily	10	0	$25,000

Information from afdc.energy.gov

Flex Fuel Grant Program

Flexible fuel vehicles are vehicles capable of running on a blend of gasoline and higher ethanol fuel blends such as E85 (85% ethanol and 15% gasoline). These vehicles are designed to be compatible with a range of fuel mixtures containing ethanol, which is a renewable and bio-based alternative fuel.

The key characteristic of flex fuel vehicles is their ability to automatically adjust their engine control systems to accommodate varying ethanol-gasoline blends. This flexibility allows drivers to use a range of fuel options, from traditional gasoline to ethanol blends like E85 or any combination in between.

The Kansas Corn Commission (KCC) offers fuel retailers grants to cover the cost of upgrading refueling stations to accommodate flex-fuel dispensers. The maximum grants are available in the following amounts:

Table 5 - KCC Flex Fuel Grant Program

Ethanol Blend Offered	Maximum Grant	Eligible Equipment
E15	$2,500 per pump; up to $50,000 per location	Dispensers and hanging hardware; signage and marketing materials
Multiple blends (e.g., E15, E30) and E38	$25,000 per blender pump; up to $75,000 per location	Dispensers (minimum UL 87A E25) and hanging hardware

Information from afdc.energy.gov

Electric Vehicle (EV) Infrastructure Support

Kansas utilities (Evergy, Kansas Gas Service, Kansas Corn Commission) joined the National Electric Highway Coalition (NEHC), committing to create a network of direct current fast charging (DCFC) stations connecting major highway systems from the Atlantic Coast to the Pacific of the United States. NEHC utility members agree to ensure efficient and effective fast charging deployment plans that enable long distance EV travel,

avoiding duplication among coalition utilities, and complement existing corridor DCFC sites. For more information, including a list of participating utilities and states, see the NEHC website.

Study of Electric Vehicle (EV) Charging Station Rates

The Legislative Coordinating Council, a standing committee of the Kansas State Legislature, authorized a study on Kansas utilities retail electricity rates. The study explored EV charging station rate design, EV charging station service deregulation, and the benefits of improving consumer access to EVs and EV charging station infrastructure. The study was submitted to the Kansas Corporation Commission in two parts on January 8, 2020*(PDF)*, and July 1, 2020*(PDF)*.

(Reference Kansas Statutes 66-1287)

Electric Vehicle (EV) and Hybrid Electric Vehicle (HEV) Fees

Beginning January 1, 2020, the annual registration fee for EVs is $100 and $50 for plug-in hybrid electric vehicles and HEVs. This is an extra cost, compared to registrations for gasoline-powered vehicles at $30. The justification for the fees is the loss of state revenue that typically comes in from gas taxes. Although electric vehicles comprise less than 0.5 percent of all vehicles in operation, they are increasing in number, to 2.4 percent of new vehicle registrations in the first half of calendar year 2021.1 To make up for traditional motor fuel tax revenue not received for these vehicles, an increasing number of states — 30 to date — have imposed separate fees on electric vehicles, hybrid-electric vehicles, or both. This memorandum summarizes these fees on passenger vehicles and provides additional information on them. The states with these fees were identified using information from the National Conference of State Legislatures (NCSL).

(Reference Kansas Statutes 8-143)

6.Regional Recommendations

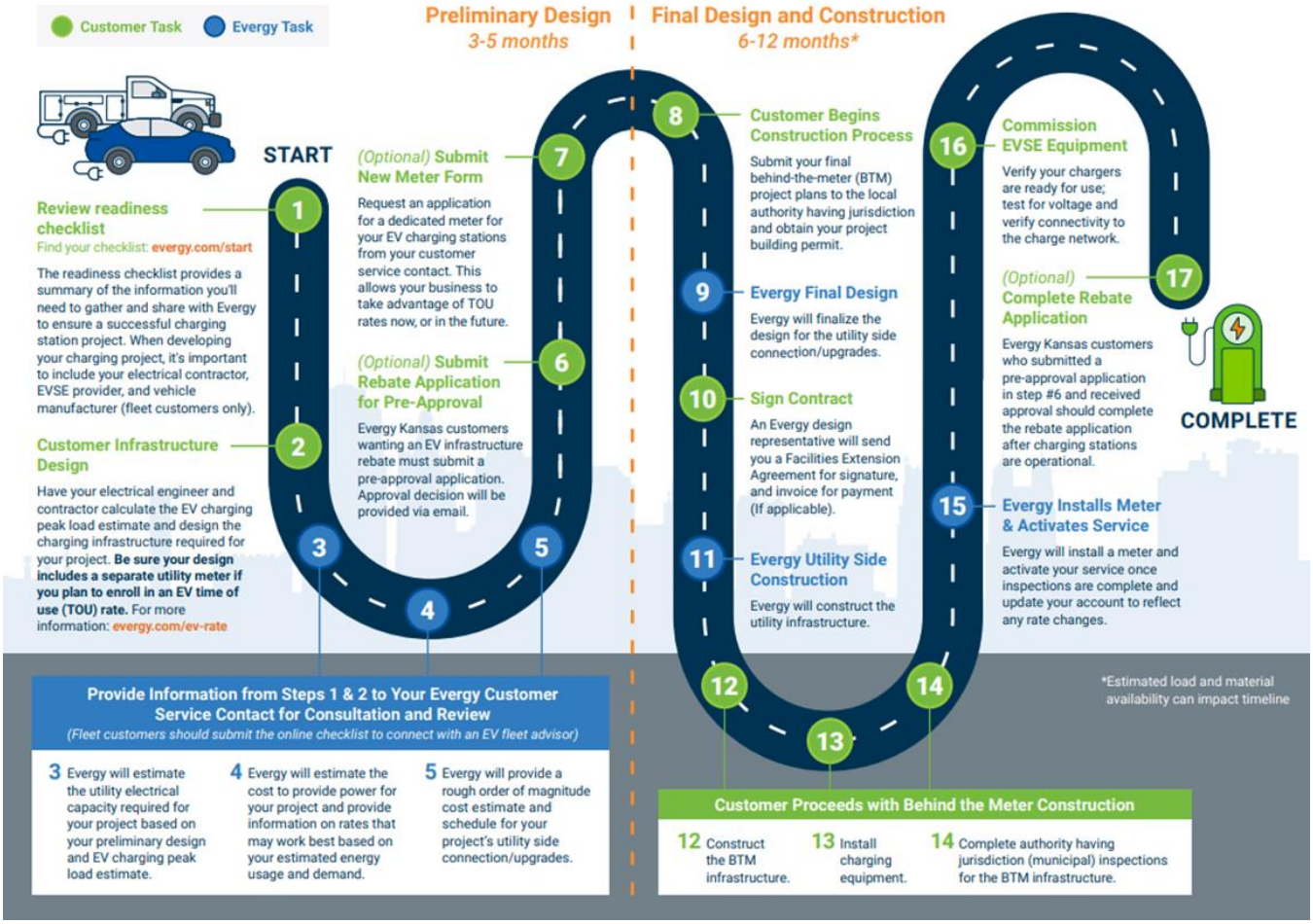
Grid Capacity and Considerations

Evergy is a utility company serving 1.6 million customers in Kansas and Missouri. The company emphasizes a people-first approach and aims to advance energy solutions while providing reliable and safe energy. Almost half of the power generated by Evergy comes from emission-free sources, reflecting a commitment to environmental sustainability.

Evergy's transportation electrification strategy involves creating innovative partnerships, customer-centric solutions, and facilitating infrastructure to accelerate electric vehicle adoption. They aim to increase access for disadvantaged communities, lower the cost of EV ownership, reduce carbon emissions, improve air quality, and keep electricity bills competitive for all customers.

Evergy supports transportation electrification by providing expertise in establishing charging networks, sharing operational knowledge about electric vehicles, offering grid interconnection support, assisting with fleet electrification, and implementing a rebate program to incentivize the adoption of electric vehicles.

Evergy's infrastructure planning and grid management involve short-term and long-term planning. In the short term (1-5 years), they focus on addressing evolving grid distribution requirements. In the long term, their planning organization is dedicated to understanding load growth trends linked to Electric Vehicle penetration, distributed generation resources, and emerging customer trends. They prioritize capital investments using an Electric Vehicle Propensity model and incorporate managed charging solutions into their strategies.



Evergy's incentives to support public charging and qualifying projects can be utilized Evergy's incentives alongside federal grants and tax rebates.

Figure 1 - Evergy Incentives

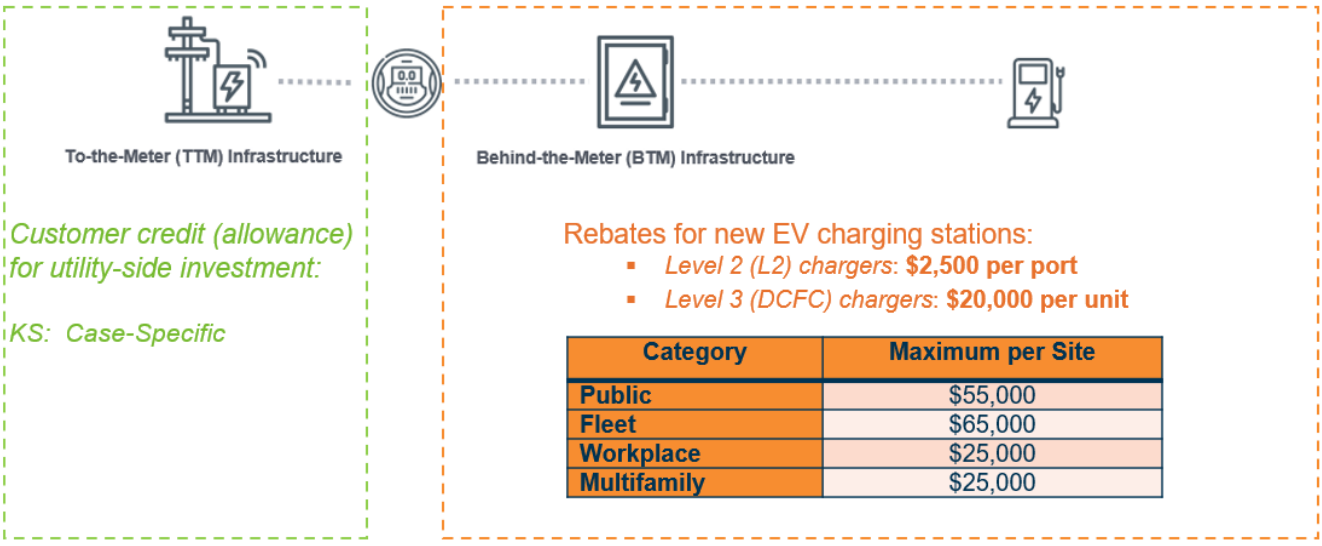


Table 6 - Evergy Business EV Rate

Business EV Rate - Evergy Kansas Central		
Customer charge (per month)	**$118.40**	
Facility charge (per kW of facility demand per month)	**$3.069**	
Time of Use *Energy charge per pricing period per kWh*	**Summer**	**Winter**
On-peak *2 - 8 pm*	$0.22062	$0.14360
Off-peak *6 am - 2 pm and 8 pm - 12 am*	$0.07879	$0.04787
Super off-peak *12 - 6 am*	$0.01559	$0.01184
Optional		
Carbon-free Energy Option Charge (per kWh)	**$0.00250**	

Table 7 - Evergy Transit EV Rate

Electric Transit Service Rate - Evergy Kansas Central	
Basic service fee	**$29.00**
Time of Use *Energy charge per pricing period per kWh*	
On-peak *6 am - 6 pm*	$0.14139
Off-peak *6 pm - 6 am*	$0.02072

Fuel Corridors

In WAMPO, the fuel corridors are strategically positioned along major highways to provide convenient access for motorists. These corridors are notably located along key routes such as I-135, I-235, US-54, and K-96. Each of these highways boasts a considerable number of gas stations, contributing to the accessibility of fueling options for residents and travelers alike.

Specifically, I-135 is lined with 24 gas stations, offering a variety of choices for drivers along this important interstate. Similarly, I-235 features 18 stations, providing a network of fueling options for those utilizing this highway. US-54, another significant route in the area, hosts 23 gas stations, further enhancing the availability of fuel along its path. Additionally, K-96, with 8 stations, contributes to the overall network of fuel corridors in the WAMPO region.

These numbers illustrate the well-distributed presence of gas stations along these major highways, ensuring that individuals navigating through WAMPO have ample opportunities to refuel during their journeys. It's important to note that the figures provided may be subject to change, and for the most accurate and current information, utilizing navigation apps or contacting local authorities is recommended.

Table 8 - Fuel Corridors

I-135	I-235	US-54	K-96
24	18	23	8

Increasing EV Adoption in Underserved Communities

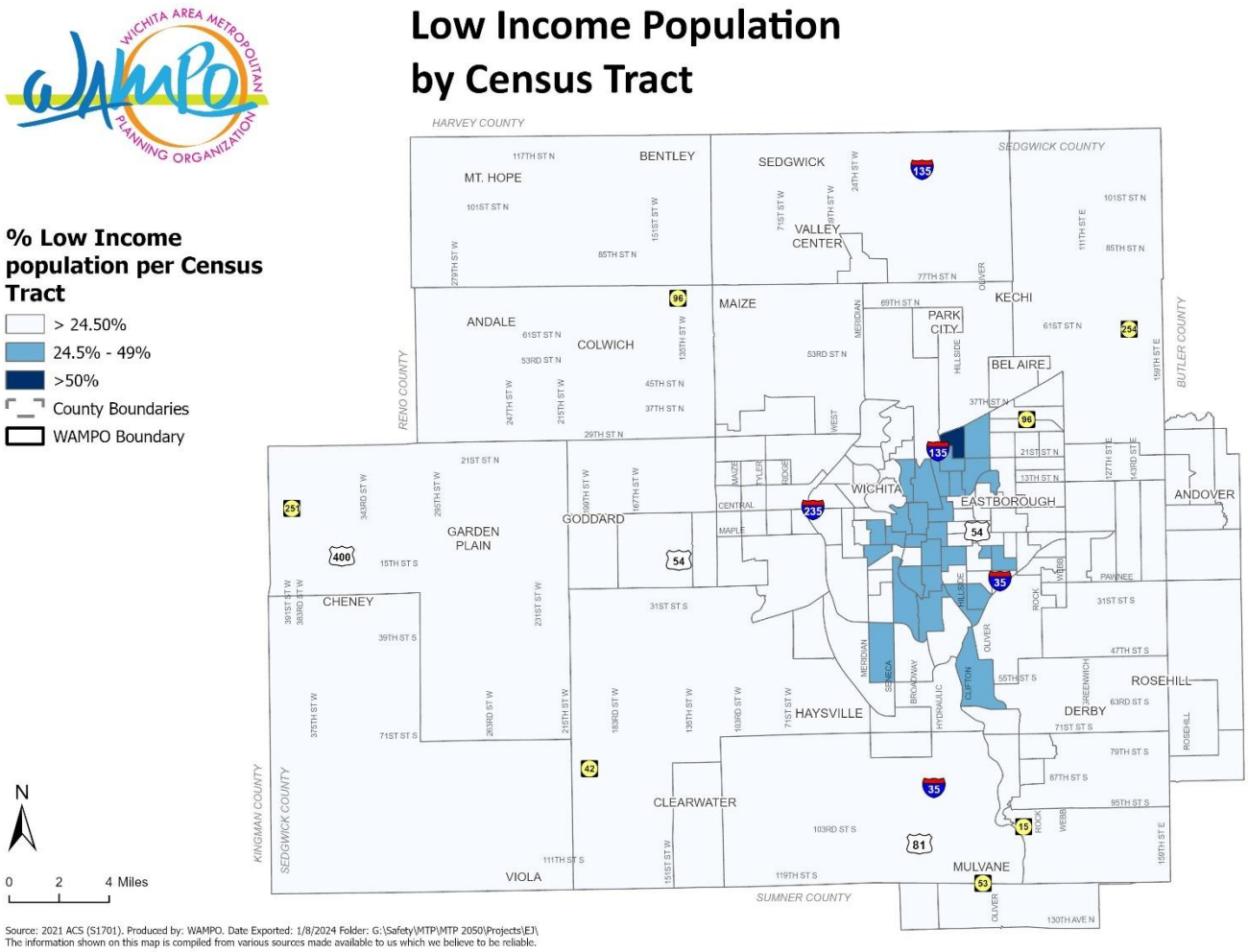
Underserved communities stand to benefit significantly from the widespread adoption of EVs. However, several challenges must be addressed to ensure equitable access to this sustainable mode of transportation.

One critical aspect is the development of robust EV infrastructure tailored to the specific needs of these communities. By strategically placing charging stations in accessible locations, such as community centers, shopping areas, and public spaces, residents can overcome the perceived obstacles of range anxiety, promoting more widespread adoption of EVs.

Financial barriers often hinder EV adoption in underserved communities, where residents may face economic challenges. The integration of charging stations into existing community facilities, coupled with sustainable practices like solar-powered infrastructure, further enhances the overall accessibility and environmental impact of EV adoption in underserved areas.

The map below shows low-income areas in the WAMPO region.

Map 6 – Low-Income Population



EV Charging Infrastructure Deployment

Funding Sources

The rapid growth of EVs has brought about an urgent need to expand the supporting infrastructure, ensuring a seamless transition towards sustainable transportation. Fortunately, various funding sources, both at the federal and state levels, play a crucial role in bolstering EV infrastructure development. In this exploration, we delve into key programs, including the Congestion Mitigation and Air Quality Improvement (CMAQ), Congestion Reduction Program (CRP), National Electric Vehicle Infrastructure (NEVI), Climate Reduction Pollution Grant, and several other federal and state initiatives that contribute to the advancement of EV infrastructure.

Congestion Mitigation and Air Quality Improvement (CMAQ): CMAQ, a federal program administered by the U.S. Department of Transportation (USDOT), focuses on mitigating traffic congestion and improving air quality. Within this program, funding is allocated to projects that contribute to the reduction of vehicle emissions, making it an essential source for EV infrastructure initiatives. EV charging stations strategically placed in high-traffic areas are eligible for CMAQ funding, fostering the development of a cleaner transportation network.

Carbon Reduction Program (CRP): The Carbon Reduction Program (CRP), a federal initiative, aims to alleviate traffic congestion and reduce carbon emissions by supporting projects that enhance transportation efficiency. Funding from CRP can be directed towards the installation of EV charging stations, promoting the integration of electric vehicles into mainstream transportation systems. This program serves as a catalyst for reducing dependence on traditional fossil fuels and encourages the adoption of cleaner alternatives, contributing significantly to carbon reduction goals.

National Electric Vehicle Infrastructure (NEVI): NEVI, a federal program designed to accelerate the deployment of EV infrastructure, plays a pivotal role in shaping the nation's electric mobility landscape. By providing grants and incentives, NEVI supports the establishment of a robust charging network, ensuring that EV users have convenient access to charging stations. This program contributes to the overall sustainability goals and reduces barriers to widespread EV adoption.

Climate Reduction Pollution Grant: As part of the broader effort to combat climate change, the Climate Reduction Pollution Grant is a funding source that specifically targets projects aimed at reducing pollution and greenhouse gas emissions. Investments in EV infrastructure, such as charging stations powered by renewable energy, align with the objectives of this grant, creating a synergy between sustainable transportation and environmental conservation.

Federal and State Programs: Beyond these specific programs, various federal and state initiatives supplement the funding landscape for EV infrastructure projects. States often offer grants, tax incentives, and subsidies to businesses and municipalities committed to expanding their electric vehicle charging

infrastructure. Federal support through agencies like the Environmental Protection Agency (EPA) and the Department of Energy further amplifies the financial backing available for such initiatives.

In the quest for a cleaner and more sustainable transportation future, the availability of diverse funding sources is paramount. The combination of federal programs like CMAQ, CRP, NEVI, and specialized grants such as the Climate Reduction Pollution Grant, alongside a multitude of state-level initiatives, creates a comprehensive network that supports the growth of EV infrastructure. This collaborative effort ensures that the transition to electric mobility is not only feasible but actively encouraged, marketing a significant step towards a more sustainable and environmentally friendly transportation network.

7.Implementation

As part of the implementation, WAMPO can implement the strategies for EV infrastructure by:

Identifying EV Charger Service Providers and Station Owners: WAMPO can organize regular industry forums, inviting stakeholders such as EV charging technology companies, energy service providers, and potential station owners. By fostering a collaborative environment, WAMPO can understand the needs and interests of these entities. Establishing a digital platform or a dedicated section on its website to showcase potential partnerships and investment opportunities would facilitate ongoing engagement.

EV Station Data Collection and Sharing: To enhance data collection, WAMPO can collaborate with local utilities and tech companies specializing in smart grid solutions. Installing advanced metering infrastructure (AMI) and sensors at EV charging stations can provide real-time data on usage patterns. WAMPO could work towards creating a centralized data-sharing platform, ensuring data privacy while allowing stakeholders access to relevant information for planning and optimizing charging infrastructure.

Resilience and Emergency Evacuation: In partnership with emergency management agencies and utility companies, WAMPO can develop a comprehensive resilience plan for EV infrastructure. This may involve integrating backup power solutions such as battery storage or generators at critical charging stations. Public awareness campaigns could inform residents about the role of EV charging stations in emergency situations and evacuation plans.

Snow Removal and Seasonal Needs: Collaborating with local municipalities, WAMPO can advocate for standardized protocols for snow removal around EV charging stations. This might include incorporating heating elements into the station design to prevent ice buildup. Working with local weather services, WAMPO can also establish early-warning systems to address seasonal challenges promptly.

Labor Safety Training and Installation Standards: WAMPO can partner with relevant industry associations and vocational training institutions to develop safety training programs for workers involved in EV infrastructure installation and maintenance. Regular workshops and certification programs can ensure that the workforce is well-equipped with the latest safety standards and installation techniques.

Promoting Public Awareness: Beyond traditional media, WAMPO can leverage social media platforms, community events, and educational initiatives to raise awareness about the benefits of EV infrastructure. Collaborating with schools and universities for educational programs can also help instill a sense of environmental responsibility and awareness among the younger population.

Incentive Programs: WAMPO can actively engage with state and federal agencies to advocate for incentive programs that encourage investments in EV infrastructure. This may involve collaborating with financial institutions to create attractive financing options for businesses and municipalities looking to install charging stations. Regularly updating stakeholders on the availability of these incentives can further drive interest and investment.

Public-Private Partnerships: Facilitating public-private partnerships involves actively connecting potential partners, streamlining regulatory processes, and fostering an environment conducive to collaboration. WAMPO can establish a dedicated team or liaison to work closely with private entities, ensuring that the strengths of both sectors are maximized for successful EV infrastructure development and operation.

By implementing these detailed strategies, WAMPO can position itself as a catalyst for sustainable and resilient EV infrastructure development in Wichita. This comprehensive approach addresses technical, regulatory, and community aspects, ensuring the successful integration of EVs into the local transportation ecosystem.

Adoption

As EV adoption continues to gain momentum in the WAMPO region, it becomes imperative for local authorities in Wichita and the surrounding counties (Sedgwick, Butler, and Sumner) to proactively address the evolving landscape of transportation. The surge in EV popularity brings with it the necessity to develop comprehensive codes and regulations specifically tailored to the unique requirements of EV infrastructure.

As the WAMPO region embraces cleaner and more sustainable transportation options, the local governments should consider establishing guidelines for the installation, maintenance, and expansion of EV charging stations. These codes could encompass aspects such as zoning regulations to designate suitable locations for charging stations, standardized technical specifications for charging equipment, and guidelines for ensuring accessibility and inclusivity in the deployment of EV infrastructure.

Furthermore, collaboration between local municipalities and private stakeholders is essential to foster a supportive environment for EV infrastructure development. Incentives and policies that encourage businesses and property owners to install charging stations can play a crucial role in accelerating the growth of the charging network. This collaborative approach ensures that the WAMPO region keeps pace with the increasing demand for EV infrastructure, contributing to a more sustainable and environmentally friendly transportation ecosystem.

In addition to addressing the immediate needs of EV infrastructure, forward-thinking regulations should also account for future advancements in electric vehicle technology. By staying adaptable and responsive to emerging trends, Wichita and the surrounding counties can position themselves as leaders in sustainable urban development and transportation planning. Overall, the development of codes and regulations for EV infrastructure is a proactive step towards fostering a greener and more resilient transportation network in the WAMPO region.

Recommended Locations

Identifying strategic locations for EV charging stations is crucial for ensuring widespread accessibility and convenience for EV owners. To establish a comprehensive network, it is recommended to prioritize key locations where people spend significant amounts of time. One essential location is airports, where travelers may need to charge their EVs during extended periods of parking. Installing charging stations at airports not only caters to the needs of EV owners but also encourages sustainable practices in the travel industry.

Shopping malls and shopping centers represent another ideal setting for EV charging stations. These high-traffic areas allow EV users to charge their vehicles while engaging in leisure activities or running errands. By integrating charging infrastructure into commercial spaces, local businesses can contribute to the growth of the EV market while enhancing the overall shopping experience for customers.

Sport complexes and entertainment venues also present excellent opportunities for EV charging stations. Attendees of events and games often spend extended periods at these locations, making it practical to provide charging options. This ensures that individuals can enjoy recreational activities without worrying about the range limitations of their electric vehicles.

In addition, multi-unit housing and residential areas with high-density populations should be considered for EV infrastructure. Residents without personal charging capabilities at home can benefit from conveniently located charging stations within or near their residential complexes. Big employers and corporate campuses are also prime candidates for EV charging installations, supporting employees who commute using electric vehicles.

Furthermore, places where people are likely to spend over an hour, such as popular tourist attractions or scenic viewpoints, should be equipped with Level 2 chargers. These locations cater to both local and visiting EV owners, allowing them to explore and enjoy their surroundings without concerns about battery range.

By strategically placing EV charging stations in these diverse locations, communities can foster a supportive environment for EV adoption while promoting sustainability and accessibility for all users. This approach contributes to developing a robust and interconnected charging infrastructure that meets the evolving needs of the growing electric vehicle market.

Housing Units

The data on total housing units and their distribution in various categories provides valuable insights into housing trends in different geographic areas. In the United States, there are a total of 143,772,895 housing units. Among these, 88,115,057 units, constituting 39% of the total, are one-unit detached houses. This indicates a significant portion of the housing landscape in the U.S. is comprised of single-unit detached dwellings, reflecting a common housing preference.

Turning our focus to the state of Kansas, there are 1,292,571 total housing units. Out of these, 926,960 units, representing 28% of the total, are categorized as one-unit detached houses. While the percentage is slightly lower than the national average, it still underscores the prevalence of standalone homes as a housing choice within the state.

Zooming further in the WAMPO (Wichita Area Metropolitan Planning Organization) Region, which encompasses Wichita and its surrounding areas, there are a total of 250,017 housing units. Of these, 176,533 units, or 29% of the total, are one-unit detached houses. This data suggests a housing landscape in the WAMPO Region that aligns with the broader trend in the state, with a notable share of residents preferring single-unit detached homes.

Table 9 - Housing Units

	Total Housing Units	Housing Units: 1 unit, detached	% not 1 unit, detached
United States	143,772,895	88,115,057	39%
Kansas	1,292,571	926,960	28%
WAMPO Region	250,017	176,533	29%

In summary, the breakdown of housing units in the U.S., Kansas, and the WAMPO Region reveals variations in housing preferences and provides a foundation for understanding the diversity in housing structures across different geographic scales.

8.Civil Rights

When planning and implementing electric vehicle (EV) infrastructure, it's important to consider civil rights to ensure that the benefits and burdens of the infrastructure are distributed fairly and equitably. Here are some civil rights considerations for EV infrastructure:

Equitable Access:

Ensure that EV infrastructure is accessible to all communities, regardless of income, race, or socio-economic status. Avoid creating "charging deserts" where certain communities lack access to charging stations.

Environmental Justice:

Consider the environmental impact of EV infrastructure, especially in terms of air quality and emissions reductions. Ensure that communities, particularly marginalized or low-income communities, benefit from the environmental advantages of EVs.

Community Engagement:

Involve local communities in the planning and decision-making processes related to EV infrastructure. Solicit input from residents to understand their needs and concerns and work collaboratively to address any potential negative impacts.

Affordability:

Consider the affordability of electric vehicles and charging infrastructure for all income levels. Explore options for subsidies, incentives, or low-cost charging solutions to make EVs and charging accessible to a broad range of individuals.

Job Opportunities:

Ensure that the development and maintenance of EV infrastructure creates job opportunities for local residents. This can contribute to economic development and help address social equity concerns.

Non-Discrimination:

Implement policies and practices that prohibit discrimination based on race, gender, ethnicity, or any other protected characteristic in the deployment and use of EV infrastructure.

Education and Outreach:

Conduct outreach and educational programs to raise awareness about the benefits of EVs and charging infrastructure in all communities. This helps address potential disparities in knowledge and access.

Transportation Equity:

Consider the broader transportation needs of communities, including those without access to personal vehicles. Explore solutions such as public transportation integration, ride-sharing initiatives, and alternative mobility options.

Public Spaces and Amenities:

Ensure that the placement of charging stations and other EV infrastructure does not negatively impact public spaces or amenities that are important for the well-being of local communities.

Policy Alignment:

Align EV infrastructure development with broader social and economic policies that promote equity and inclusion. Consider the intersectionality of various factors, such as race, income, and gender, in policy development.

Data Privacy:

Address concerns related to data privacy, particularly when collecting and storing information about EV users. Implement robust data protection measures to safeguard individuals' privacy rights.

Accessibility:

Design EV infrastructure to be physically accessible to individuals with disabilities, ensuring that charging stations and related facilities comply with accessibility standards.

By incorporating these civil rights considerations into the planning, implementation, and management of EV infrastructure, stakeholders can contribute to a more just and equitable transition to electric mobility. This approach helps ensure that the benefits of EVs are shared by all members of society.

9.Cyber Considerations

Implementing an Electric Vehicle (EV) Plan in the WAMPO region requires careful consideration of various cyber-related aspects. The key considerations are charging infrastructure security, data privacy, vehicle-to-grid security, over-the-air updates, manufacturer security practices, training and awareness, incident response and recovery, and collaboration with cybersecurity experts.

Securing electric vehicle (EV) infrastructure is crucial to ensure the reliable and safe operation of these systems. Here are some cyber considerations for electric vehicle infrastructure:

Authentication and Authorization:

Implement strong authentication mechanisms to control access to EV charging stations, ensuring that only authorized users can initiate charging sessions.

Use secure authorization protocols to verify the identity of users and devices before granting access to EV infrastructure.

Data Encryption:

Encrypt communication between EV charging stations, backend servers, and mobile applications to protect sensitive information, such as user credentials and transaction data, from unauthorized access.

Network Security:

Secure the network infrastructure to prevent unauthorized access and potential attacks. This includes securing Wi-Fi, cellular, or other communication channels used by EV charging stations and related systems.

Firmware and Software Updates:

Regularly update and patch firmware and software in EV charging stations to address vulnerabilities and protect against potential cyber threats. Ensure a secure and well-managed update process.

Monitoring and Intrusion Detection:

Implement monitoring and intrusion detection systems to detect and respond to suspicious activities or security breaches promptly. This includes monitoring network traffic, user behavior, and system logs.

Physical Security:

Ensure physical security measures are in place to protect EV charging infrastructure from tampering or unauthorized access. This includes secure enclosures and access control systems.

Privacy Protection:

Implement measures to protect user privacy, including the secure handling and storage of personally identifiable information (PII). Comply with relevant data protection regulations.

Blockchain Technology:

Consider using blockchain technology to enhance the security and transparency of transactions within the EV infrastructure. Blockchain can help ensure the integrity of transaction records and prevent fraud.

Incident Response Plan:

Develop and regularly test an incident response plan to effectively respond to and mitigate cybersecurity incidents. This plan should include procedures for identifying, containing, eradicating, recovering, and learning from security incidents.

Vendor Security Assessment:

Assess the security practices of vendors providing EV infrastructure components, including charging stations, backend servers, and software. Ensure that third-party components meet security standards.

Regulatory Compliance:

Stay informed about and comply with relevant cybersecurity regulations and standards for electric vehicle infrastructure. This may include standards set by industry organizations and governmental bodies.

Employee Training:

Train employees and stakeholders involved in the operation and maintenance of EV infrastructure on cybersecurity best practices, including how to recognize and respond to potential threats.

By addressing these considerations, stakeholders can contribute to the development of a secure and resilient electric vehicle infrastructure that protects users, data, and the overall functionality of the system.

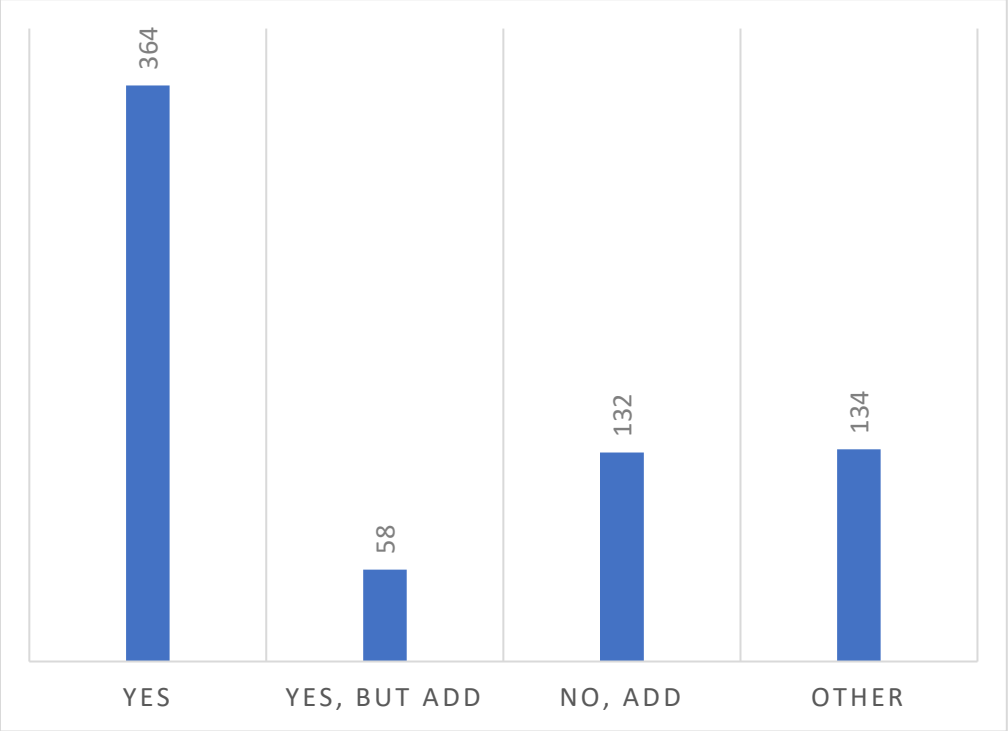
APPENDIX A

Electric Vehicle Network Plan Survey Results

WAMPO conducted a comprehensive survey spanning from June 25th to August 31st to gather vital insights for the electric vehicle infrastructure plan. This survey encompassed a total of 12 questions, with a remarkable 577 surveys completed by engaged participants. The majority of responses, 574 to be precise, were provided in English. Additionally, there were 2 surveys completed in Spanish and 1 in Vietnamese, showcasing WAMPO's dedication to inclusivity and ensuring diverse voices are heard. Throughout the public engagement phase of the plan, the dedicated WAMPO staff devoted a collective total of 147 hours to public outreach efforts, while 15.5 hours were dedicated to social media posts and email correspondence. Furthermore, 141.5 hours were spent at tabling events, underlining the organization's commitment to fostering a robust and well-informed community dialogue around electric vehicle infrastructure.

Survey

Question 1: Do you agree with the following mission statement for the Electric Vehicle Plan? "The WAMPO region will become an EV destination, corridor, and hub."



We received over 123 responses and the common themes were:

1. **Skepticism and Resistance:** Many individuals express skepticism about the feasibility, affordability, and readiness of electric vehicles (EVs) in their region. Some are resistant to the idea of transitioning away from traditional fossil fuel vehicles.

2. **Infrastructure Concerns:** Infrastructure is a recurring concern, with several respondents mentioning the need for extensive upgrades to the electric grid and charging infrastructure. Some believe this should be driven by private investment rather than government intervention.

3. **Environmental Impact:** Concerns about the environmental impact of EVs, particularly related to lithium battery production and the source of electricity (coal and gas), are mentioned. Some argue that EVs may not necessarily reduce the carbon footprint.

4. **Public Transportation:** Many respondents emphasize the importance of investing in and improving public transportation as an alternative to personal vehicles, including buses, streetcars, and trains.

5. **Cost and Accessibility:** The affordability of EVs and the accessibility of charging stations are common concerns. Some believe that EVs are too expensive for the average person in their region.

6. **Freedom of Choice:** Several respondents stress the importance of individual choice and not mandating the use of EVs.

7. **Safety and Reliability:** Safety concerns related to EVs, including battery explosions, are mentioned. Some doubt the reliability of EV technology.

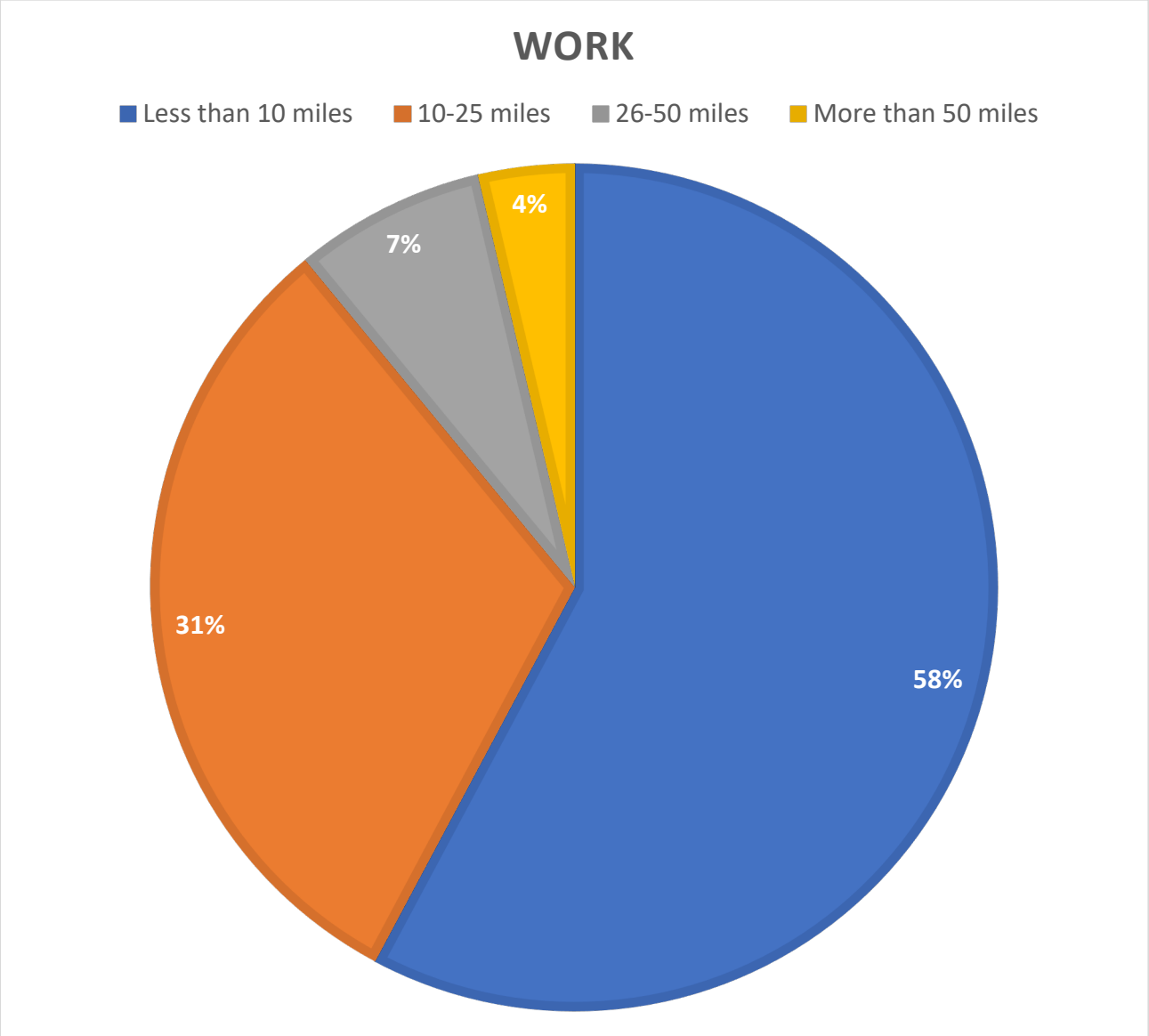
8. **Regional Factors:** Some respondents question the suitability of their region for becoming an EV destination, citing factors like population density and lack of interest from visitors.

9. **Support for Alternative Fuels:** A few respondents express support for alternative fuels like gasoline and ethanol.

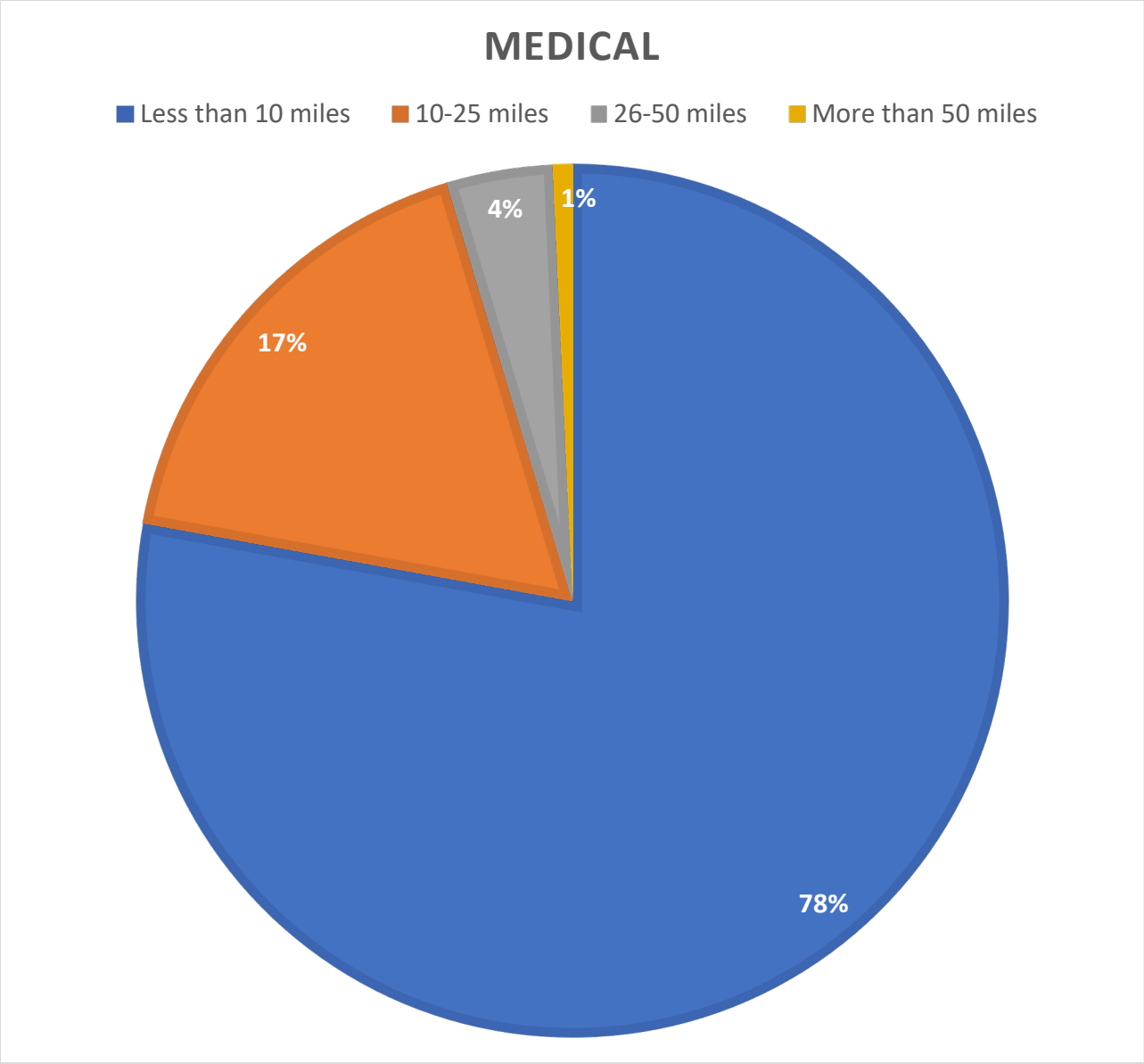
10. **Lack of Vision or Mission:** Some individuals believe that the plans lack a clear mission or action-oriented approach, focusing more on vision statements.

Overall, the comments reveal a range of opinions and concerns regarding the adoption of electric vehicles in the WAMPO region, with varying levels of support and resistance.

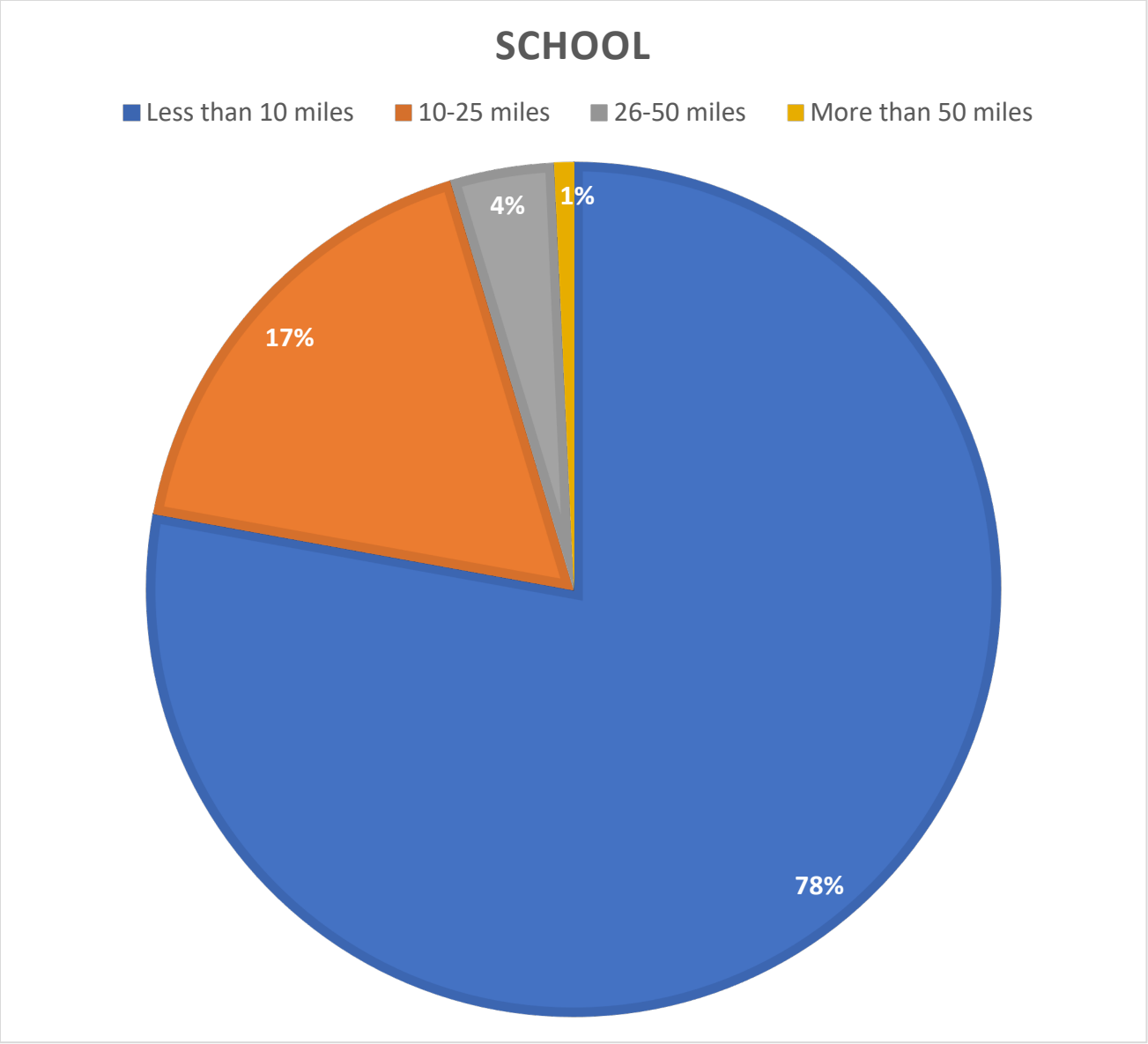
Question 2: If you drive to work, the grocery store, recreational activities, or medical appointments, etc., approximately how far is your longest trip (one-way)?



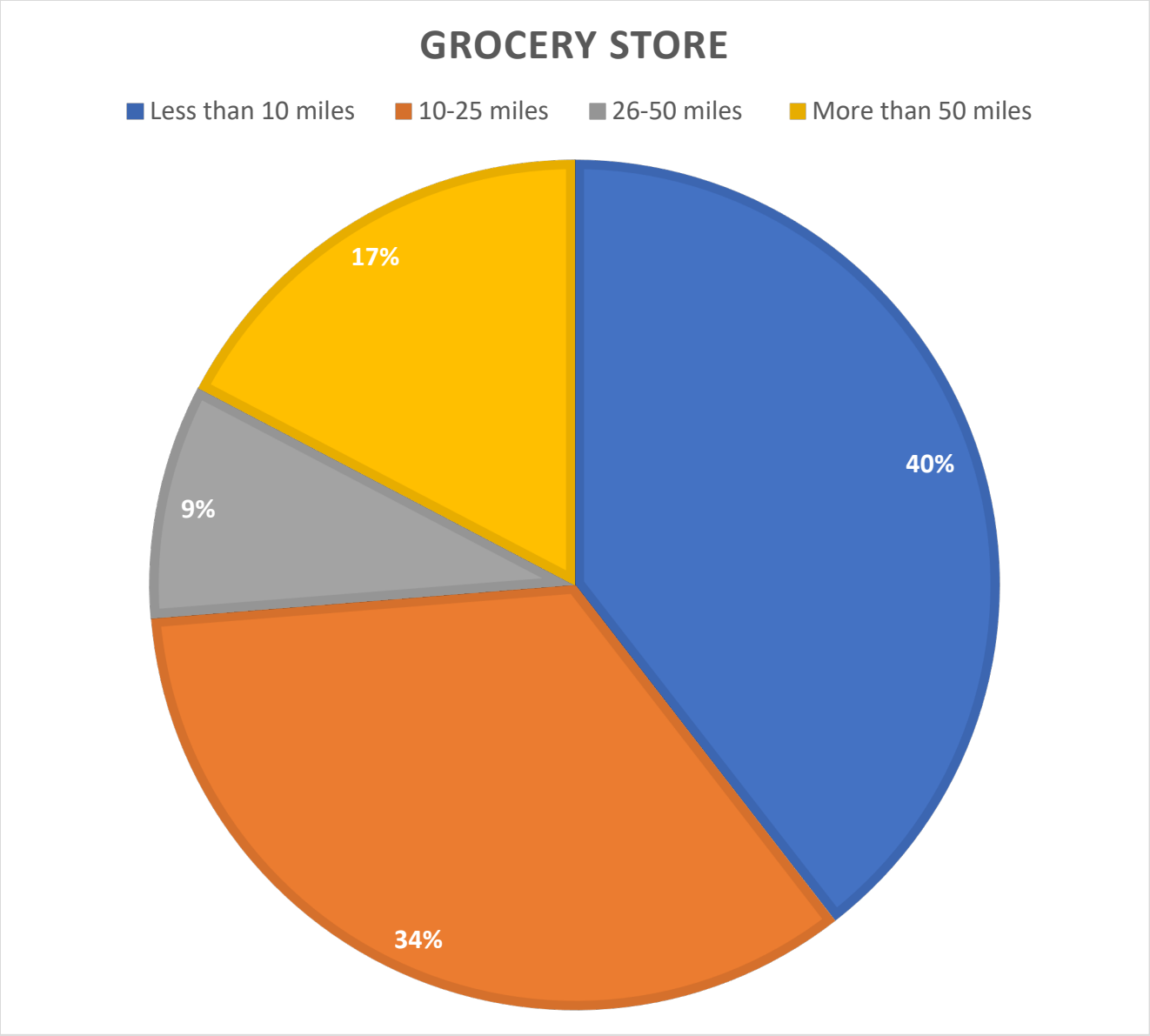
83 Skips


MEDICAL
Less than 10 miles
10-25 miles
26-50 miles
More than 50 miles
78%
17%
4%
1%

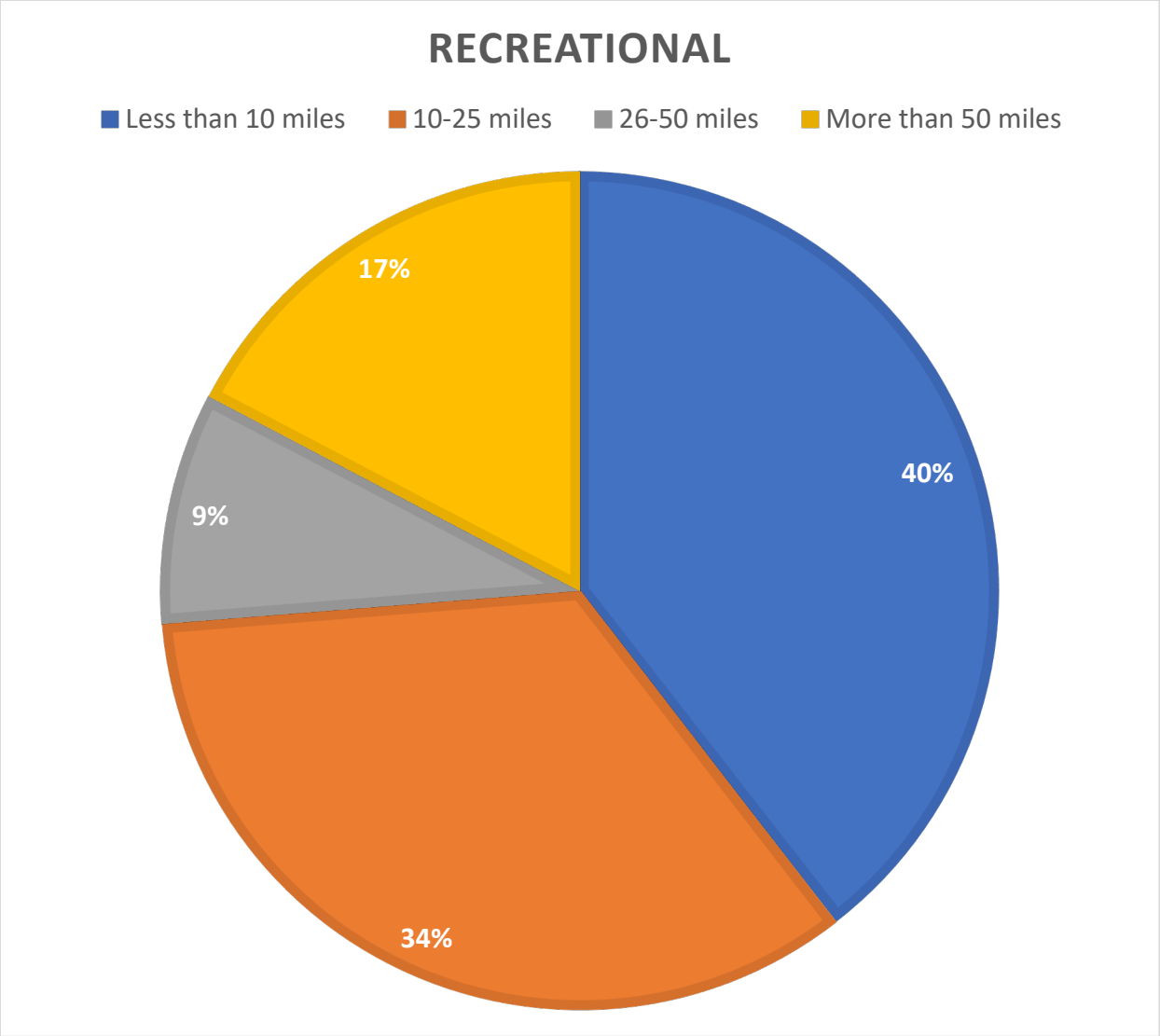
293 Skips


SCHOOL
Less than 10 miles
10-25 miles
26-50 miles
More than 50 miles
4%
1%
17%
78%

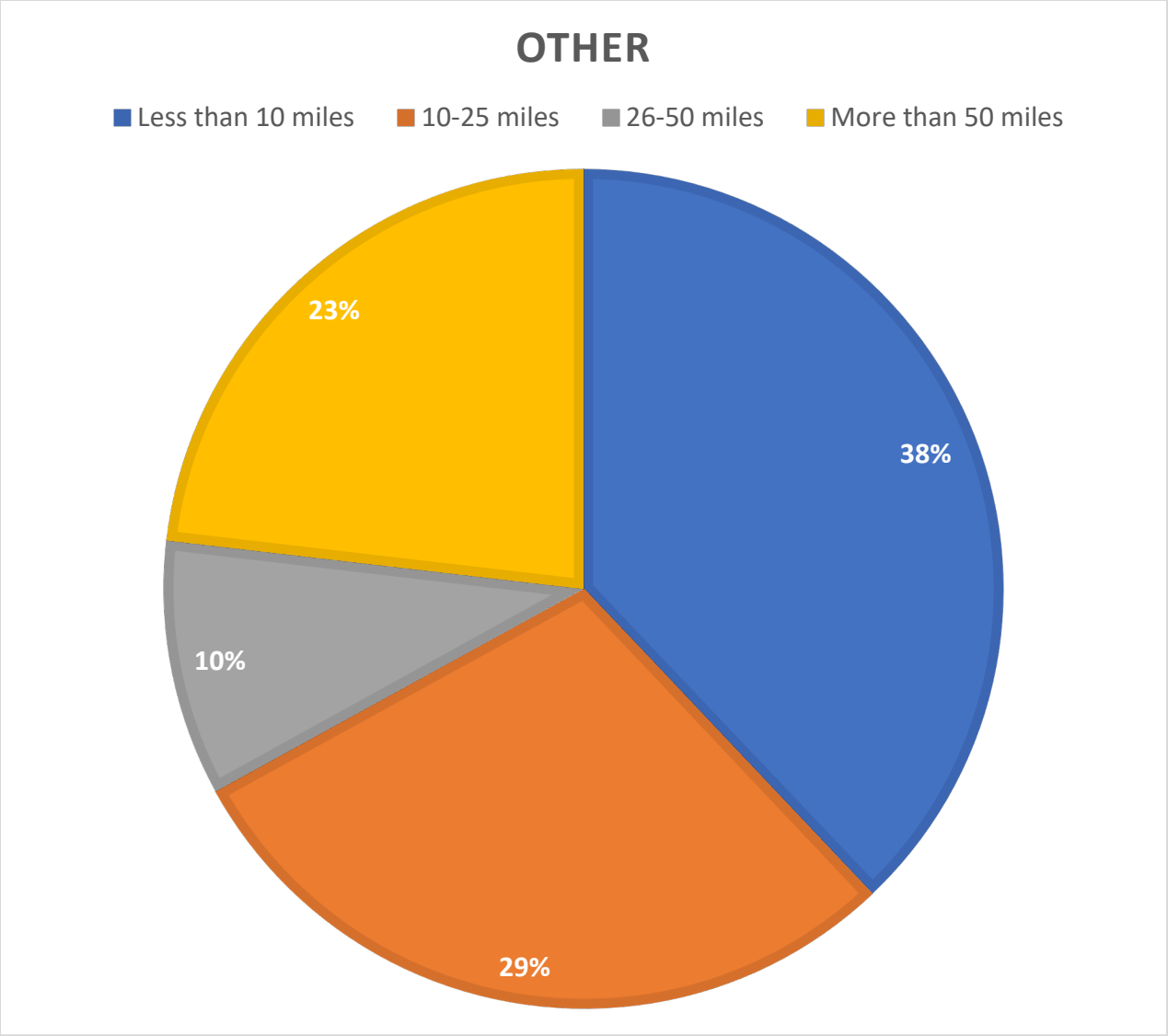
293 Skips


GROCERY STORE
Less than 10 miles
10-25 miles
26-50 miles
More than 50 miles
40%
34%
9%
17%

60 Skips

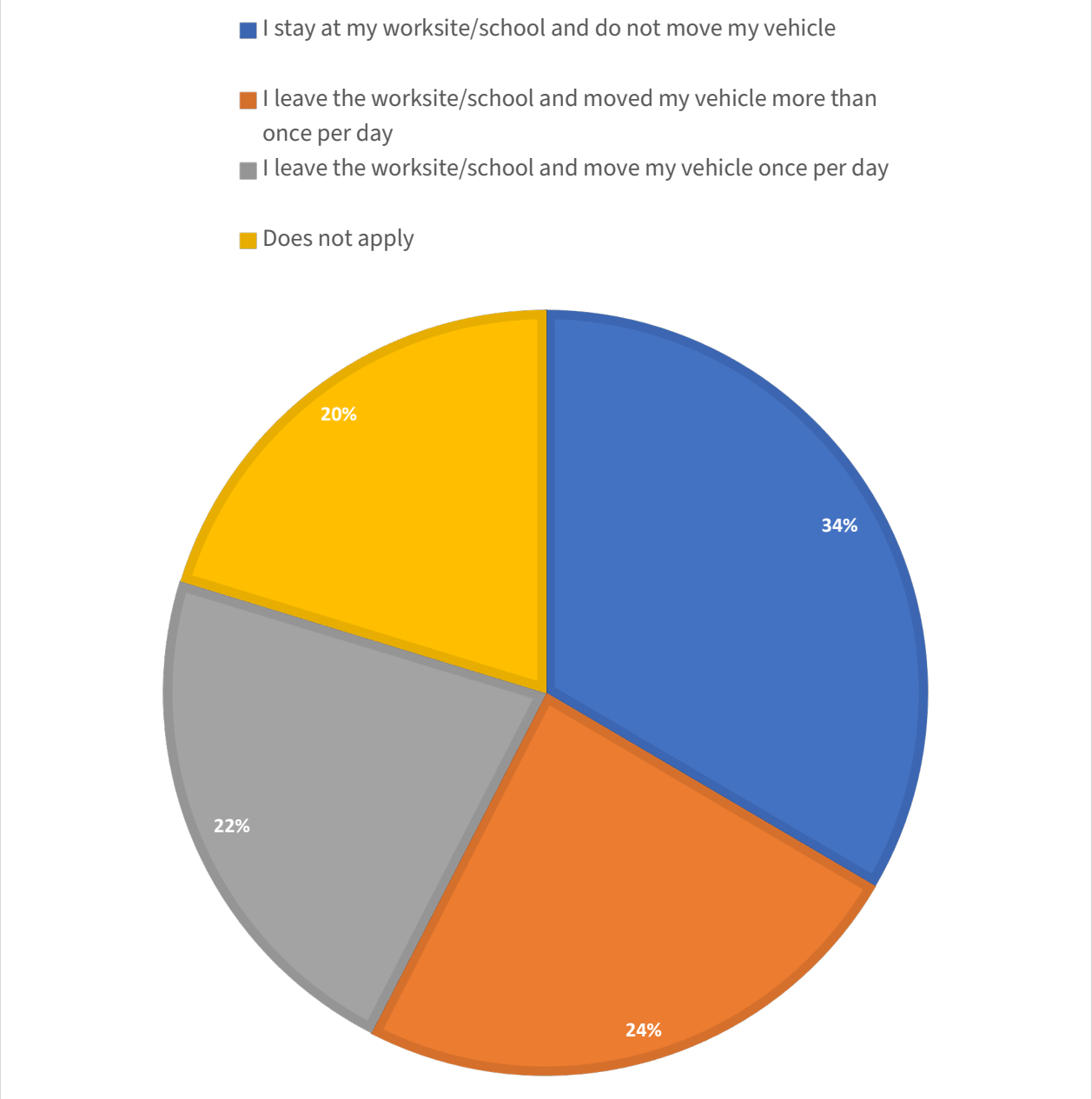

RECREATIONAL
Less than 10 miles
10-25 miles
26-50 miles
More than 50 miles
40%
34%
9%
17%

60 Skips

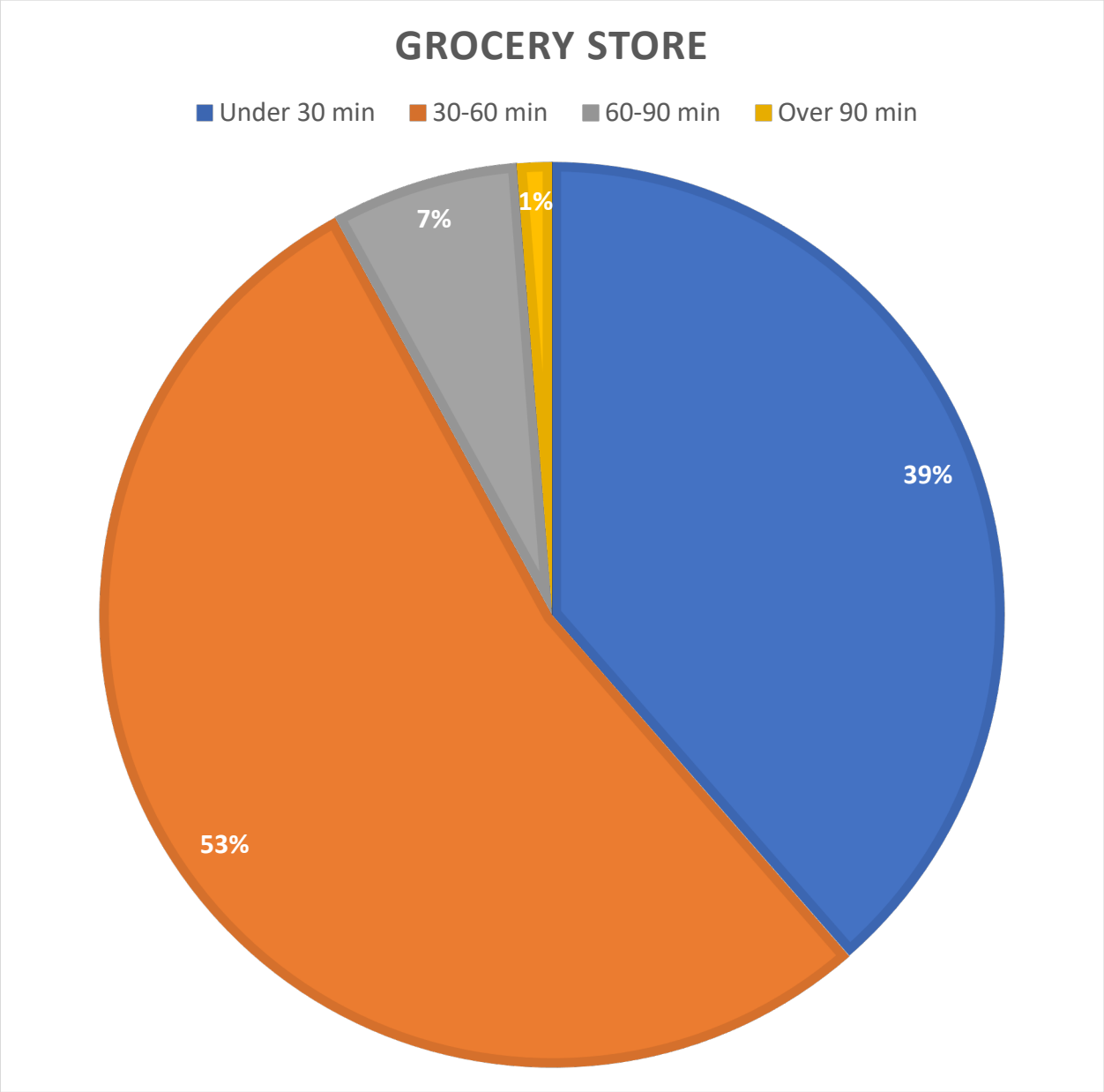

OTHER
Less than 10 miles
10-25 miles
26-50 miles
More than 50 miles
23%
38%
10%
29%

370 Skips

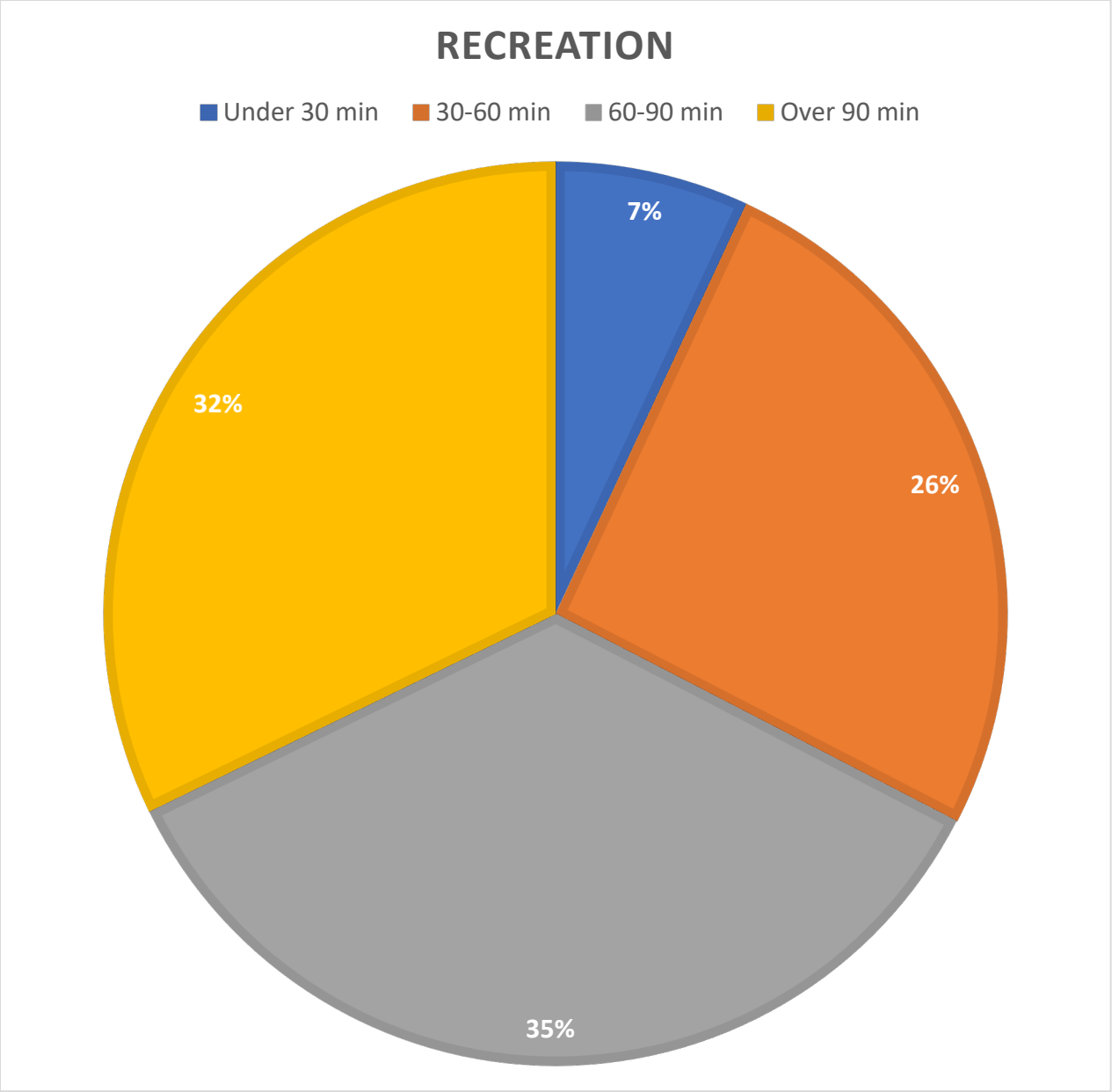
Question 3: Throughout the workday/school day, what is your usual travel pattern?



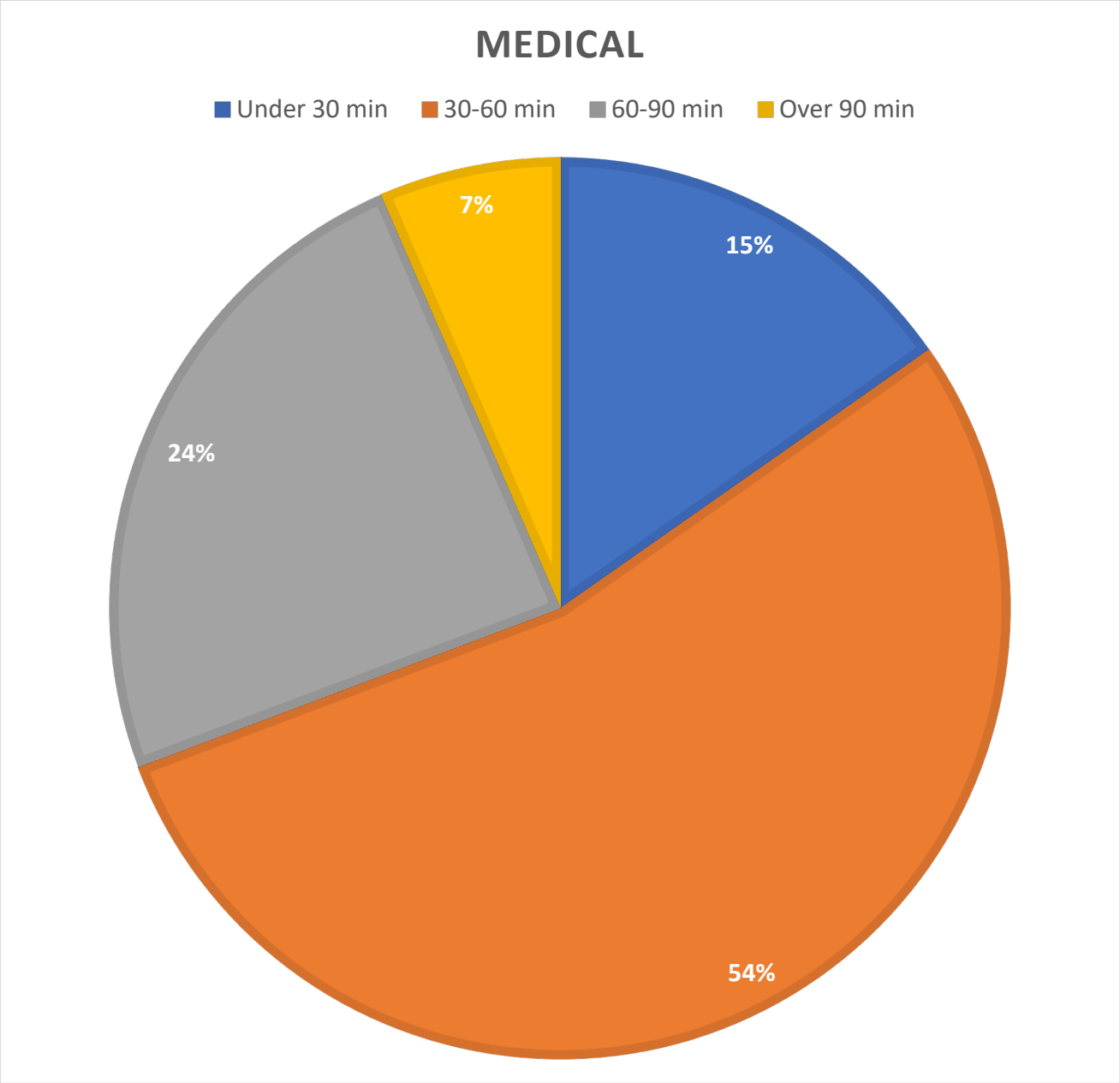
Question 4: Other than work/school, when going to the grocery store, recreational activities, etc., how long do you stay at the location/facility?



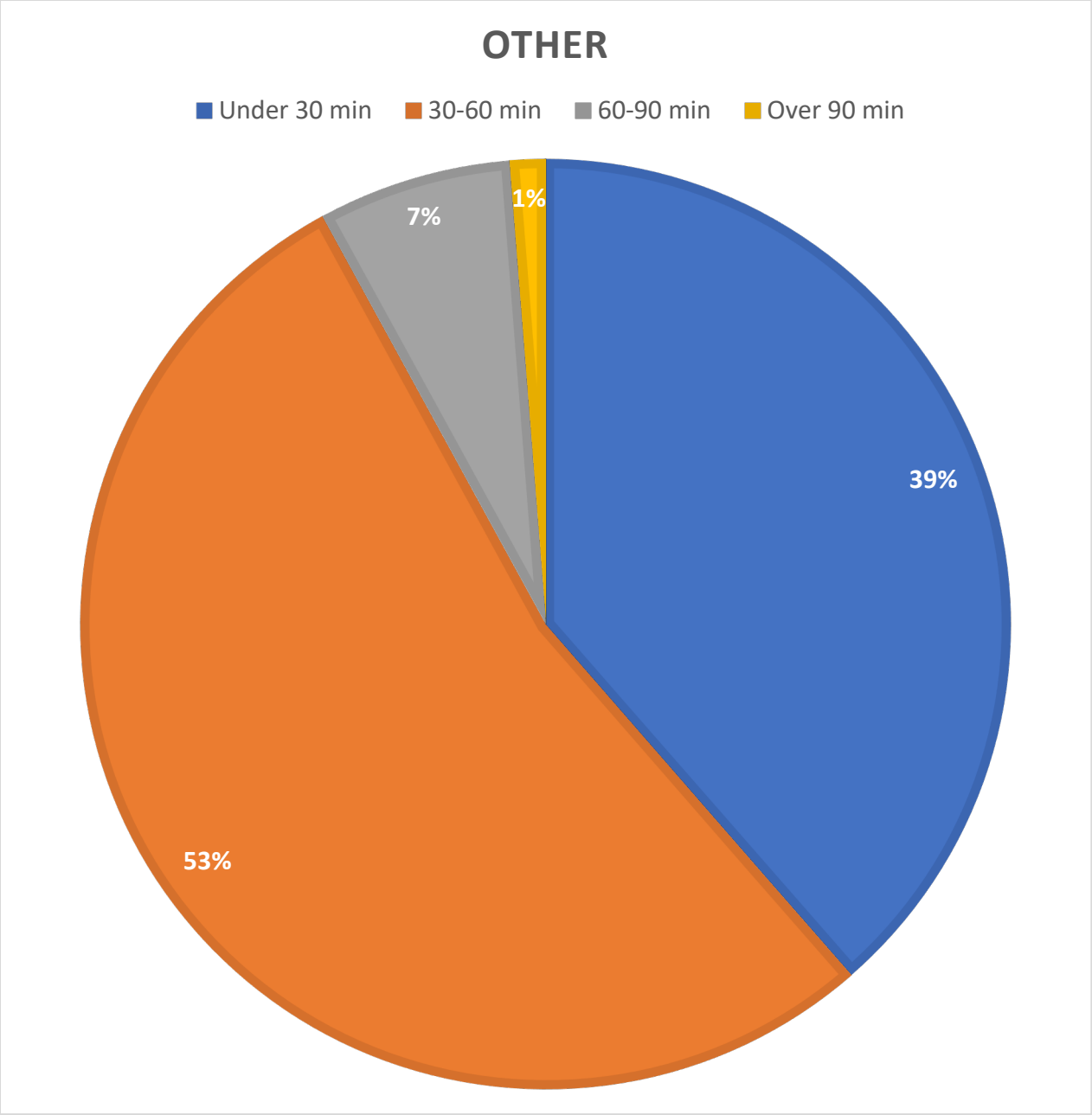
11 Skips


RECREATION
Under 30 min
30-60 min
60-90 min
Over 90 min
7%
26%
35%
32%

43 Skips

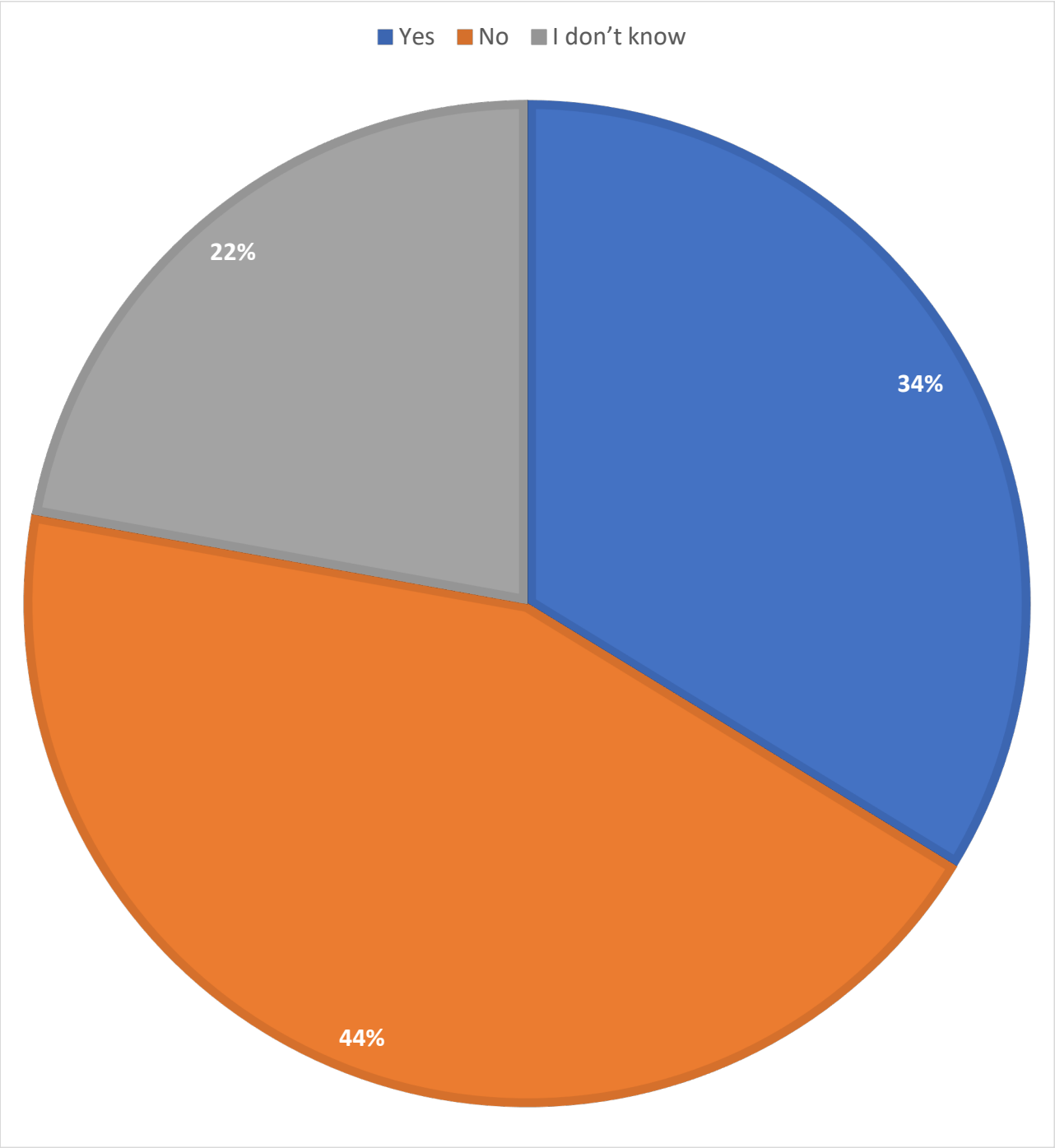


53 Skips

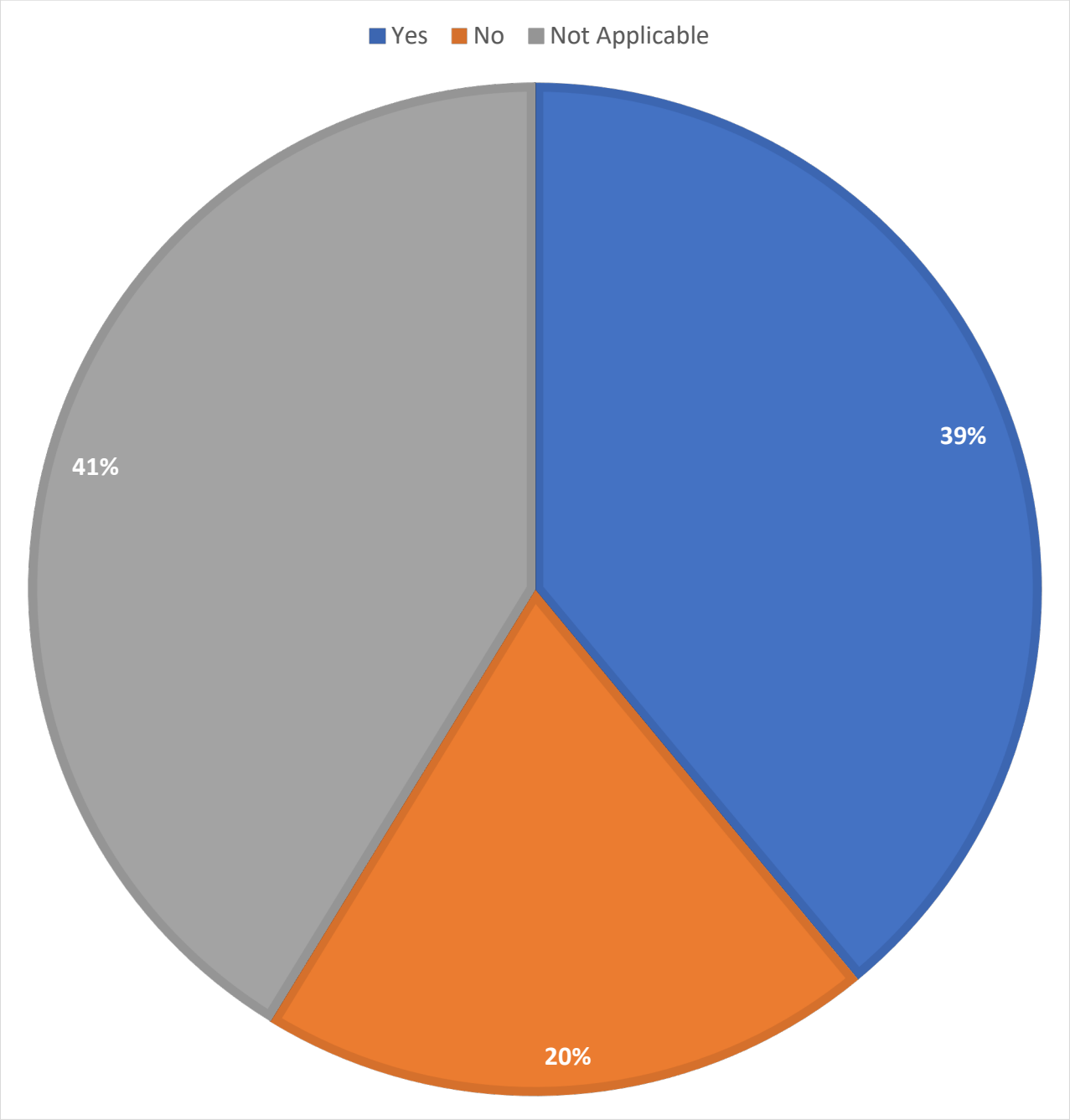


11 Skips

Question 7: Are you able to charge an electric vehicle at home?



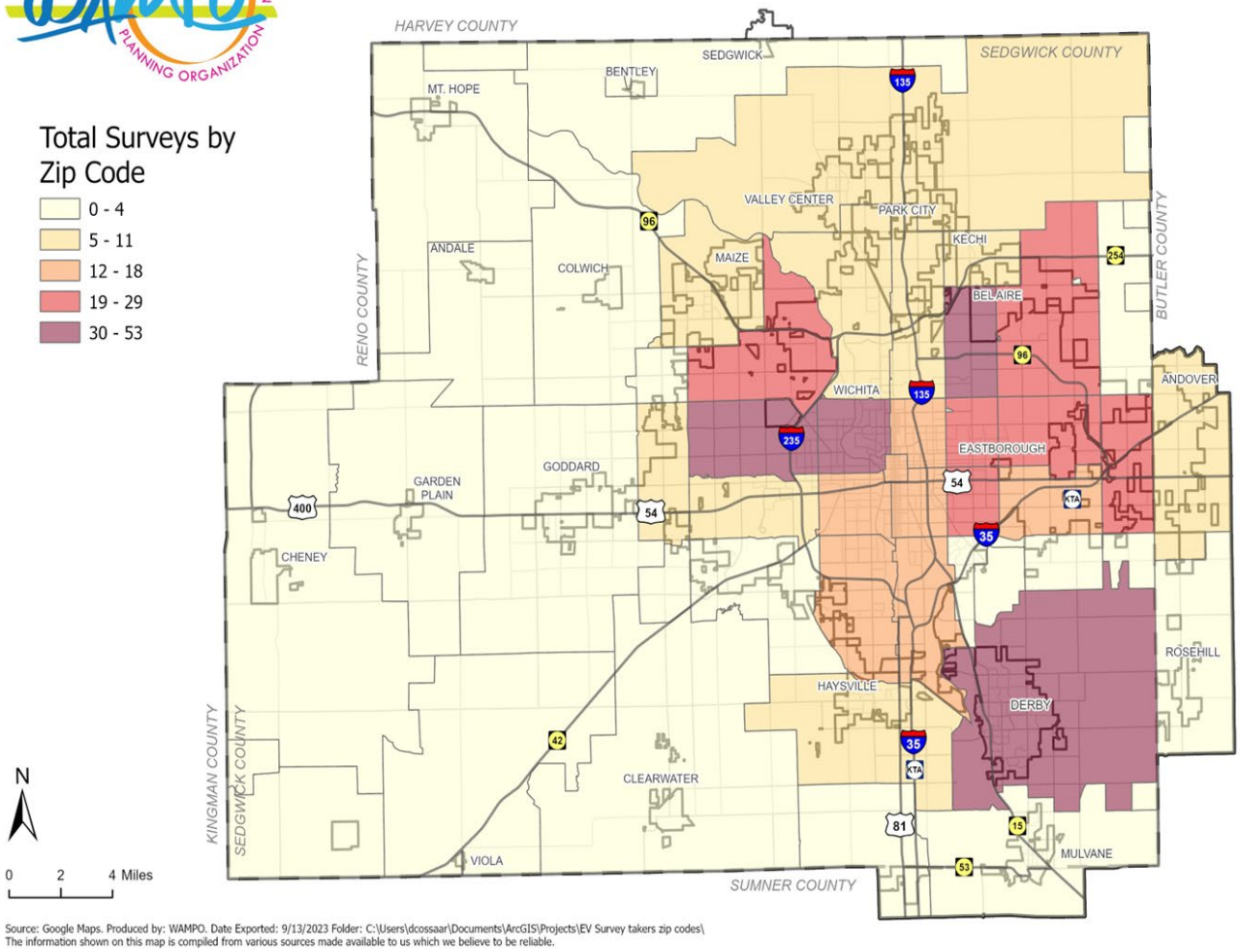
Question 8: If your employer either has installed or will install electric vehicle charging stations at your place of work, will you use them?



Question 9: Where would you most like (an) electric vehicle charging station(s) to be installed?

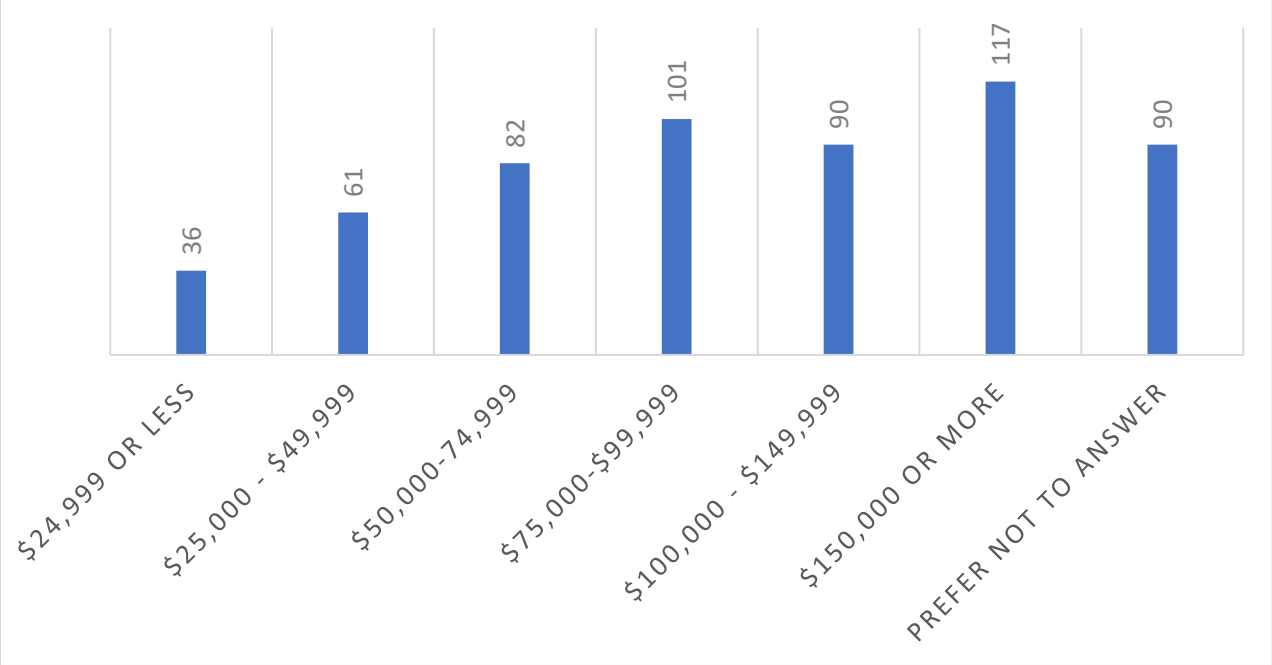
Question 10: What is your home ZIP code?

2023 Electric Vehicle Surveys by Zip Code



Source: Google Maps. Produced by: WAMPO. Date Exported: 9/13/2023 Folder: C:\Users\dcossaar\Documents\ArcGIS\Projects\EV Survey takers zip codes\
The information shown on this map is compiled from various sources made available to us which we believe to be reliable.

Question 11: What is your household income?



Conclusion

The majority of the region would like to see the WAMPO region become an EV destination, corridor, and hub. The people would like to see EV infrastructure at grocery stores, downtown, gas stations, entertainment/recreational areas, libraries, and transit centers. 67% of people are not buying electric vehicles because there is not enough supporting infrastructure. 44% of people are not able to charge at home therefore having to rely on charging elsewhere.