Eau Claire

Electric Vehicle Roadmap

CITY OF EAU CLAIRE ELECTRIC VEHICLE ROADMAP

Downtown Eau Claire, Inc. Photo

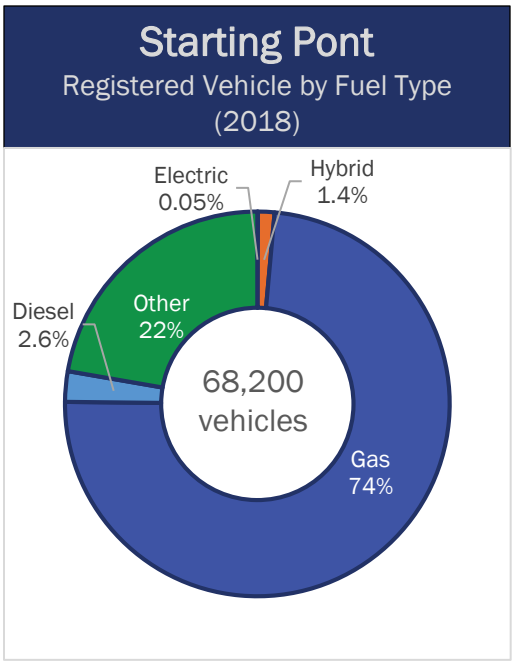
Our Commitment

In Wisconsin, climatologists at the University of Wisconsin-Madison have observed temperatures increasing, on average, 2.8°F over the last 50 years and are predicting a total of a 6.3°F increase by 2050. As a result, communities in Wisconsin are experiencing more frequent extreme storms such as heavy flooding. To mitigate impacts of climate change and in alignment with recent climate reports from the International Panel on Climate Change (IPCC), Eau Claire City Council adopted a resolution on March 13, 2018 to achieve community carbon neutrality by 2050. To support the community's carbon neutrality efforts, this roadmap aims to **convert 10% of all vehicle miles traveled in Eau Claire to electric vehicles by 2030**.

About this Plan

A team of stakeholders including City staff, Xcel Energy representatives, and regional transportation planning experts from the Metropolitan Planning Organization collaborated to create this electric vehicle (EV) roadmap. This roadmap provides a detailed plan to demonstrate, lead, and support the community's transition to non-carbon transportation.

This roadmap is a sub-plan of the City's Renewable Energy Action Plan. Some strategies contained herein originated in the public development of this larger master plan and are cross-referenced in both plans.



Our Priorities

The EV Roadmap has three focus areas, with opportunities for the entire community to participate in the evolution to non-carbon transportation.

Modeling the Way

This focus area addresses goals and strategies that municipal operations will prioritize and use to move forward with fleet and transit electrification as well as the installation of necessary infrastructure to support operations. In demonstrating electric vehicle transition, the City can learn, exhibit, and lead the way in the community.

Leading Department: Community Services

Target: By 2030, 15% of the City's fleet vehicles will be made up of EVs.

Building a Strong Foundation

This focus area will guide the City's efforts to develop a foundation for EV growth in the community - through development, support, and partnerships - to identify and boost installation of publicly available charging infrastructure.

Leading Department: Engineering

Target: By 2030, 160 public charging stations will be operating in Eau Claire.

Sowing the Seeds for Transition

This third focus area supports the increase in electric vehicle adoption by spreading awareness, education, and acceptance of EVs throughout the community and surrounding areas.

Leading Department: Community Development

Target: By 2030, at least 8,000 of the registered vehicles in Eau Claire will be EVs.

Electrify America Superchargers Eau Claire, WI 2019 (City of Eau Claire)

By achieving this plan's goals, we will:

Reduce gasoline consumed by over **3 million gallons** each year.

Prevent **30,000 MT CO2e** from being released into the atmosphere – the equivalent of planting almost **500,000 trees** per year (US Environmenal Protection Agency, 2019).

Summary of Strategies by Focus Area

Modeling the Way		Building a Strong Foundation		Sowing the Seeds for Transition	
Strategy	Timing	Strategy	Timing	Strategy	Timing
M.1 Reallocate/realign budget/funding sources	2020	**B.1** Map existing infrastructure and potential siting locations	2020 – 2025	**S.1** Increase awareness with education events	2020
M.2 Explore on-demand micro-transit	2020	**B.2** Conduct an economic analysis	2021	**S.2** Encourage dealership ride-and-drive events	2021
M.3 Promote anti-idling policy	2020 – 2030	**B.3** Work with large entities and employers to host EV charging stations.	2021 – 2030	**S.3** Add EV information to the City website and social media	2020
M.4 Install municipal fleet EV chargers	2020 – 2030	**B.4** Identify local travel corridors	2023	**S.4** Provide education on permitting process	2020
M.5 Update purchasing policy to support EVs	2020	**B.5** Incorporate ADA compliance into public charging station design	2021	**S.5** Assist and recognize local businesses that offer workplace charging	2022-2025
M.6 Plan charging sites for municipal fleets	2020	**B.6** Establish and enforce parking rules for EV parking spots with charging stations	2021	**S.6** Organize public group buys	2026 - 2030
M.7 Develop EV training for maintenance staff	2020 – 2030	**B.7** Establish budget for EV charging station installation and upkeep	2020 – 2030	**S.7** Include EVs in minimum required parking spaces	2022-2023
M.8 Provide safety training for EMS	2020 – 2030	**B.8** Provide training for electrical contractors	2021	**S.8** Support adoption of state building code to require EV-ready construction	2020-2030
M.9 Develop a fleet electrification plan	2020 – 2030	**B.9** Install public charging stations	2020 - 2030	**S.9** Leverage TIF funding to require EV ready construction	2020
M.10 Develop a time-of-use charging plan for municipal fleets	2025				

ACKNOWLEDGEMENTS

Thanks to the following organizations and individuals for participating in developing this EV Roadmap over the second half of 2019.

City of Eau Claire EV Roadmap Planning Team

The planning team was formed from a varied group of city staff, representatives from the Metropolitan Planning Organization, and Xcel Energy staff.

City Staff

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- Dan Epstein, Xcel Energy Community Facilitator
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- Julie Thoney, Xcel Energy
- Larry Loverude, Xcel Energy
- Ann Schell, West Central WI Chippewa Valley MPO
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Xcel Energy®

PARTNERS IN ENERGY
An Xcel Energy Community Collaboration

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TABLE OF CONTENTS

INTRODUCTION

Why an EV Roadmap?

On December 12, 2015 at the United Nations Framework Convention on Climate Change (UNFCCC), the Paris Agreement was reached to "combat climate change and to accelerate and intensify the actions and investments needed for a sustainable low carbon future" (UNFCCC, 2019). In support of this effort, the Intergovernmental Panel on Climate Change (IPCC) published a report in 2018 identifying potential solutions to keep global temperature change below 1.5°C and the important role that cities have in the urban transition. Among other strategies, the IPCC states that "the transport sector must reduce its final energy use by 30% and must supply the majority of energy with low carbon fuels like electricity, hydrogen, and biofuel by 2050 in order to limit global warming to less than 1.5°C and mitigate the worst impacts of climate change" (IPCC, 2018).

In Wisconsin, climatologists at the University of Wisconsin-Madison have observed temperatures increasing an average of 2.8°F over the last 50 years and are predicting a total of a 6.3°F increase by 2050. As a result, communities in Wisconsin are experiencing more frequent extreme storms such as heavy flooding. To mitigate impacts of climate change, and in alignment with the UNFCCC and IPCC, Eau Claire City Council adopted a resolution on March 13, 2018 to:

1. Achieve municipality and community carbon neutrality by 2050 with incremental drawdown targets of 30% by 2030 and 60% by 2040 as shown in Figure 1.
2. Obtain 100% renewable energy by 2050 for the municipality and city

Eau Claire is working to develop the Renewable Energy Action Plan (REAP) to identify ways to reach the 2050 goals. In order to address transportation emissions under the REAP, this EV roadmap has been created with identified focus areas and strategies for integrating EVs into the municipal fleet and resident vehicles.

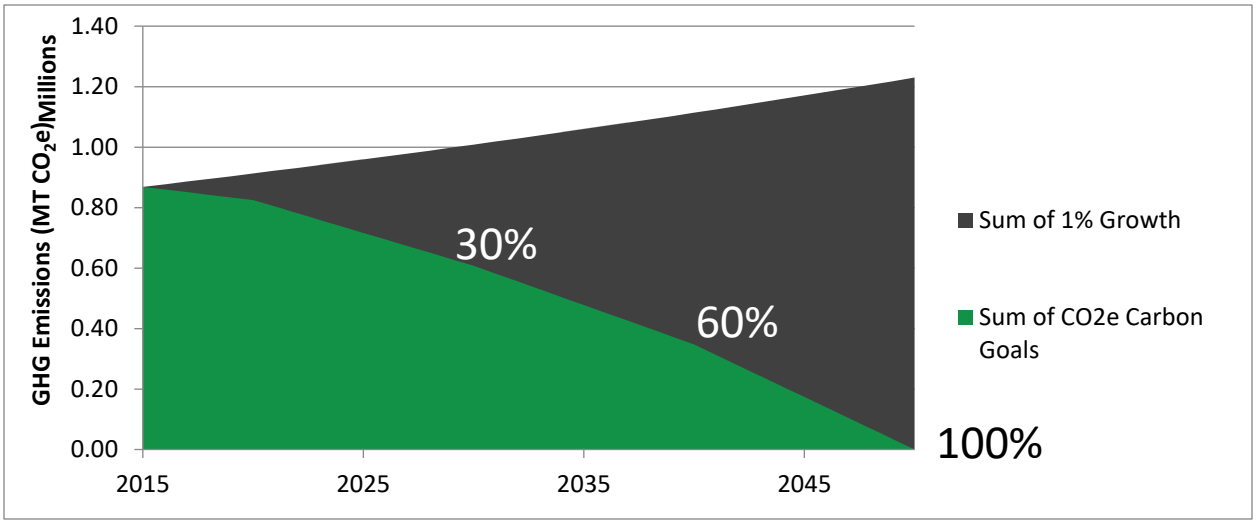


Figure 1: City Emissions Reduction Goals

Electric Vehicles 101

Since electric vehicles (EVs) are an emerging technology that is rapidly changing, it is important to build a common understanding of the technology and terminology used in this report. This section explains the basics of currently available types of vehicles and charging stations and the associated uses, barriers, and benefits.

Light-Duty Vehicle Basics

EV refers to any vehicle that uses an electric motor. An EV can have a fully electric motor or can contain an internal combustion engine (ICE) that supports the electric motor. The travel range of each of the three basic types of EVs are outlined in **Table 1** and are described in more detail in the following sections.

Table 1. Comparison of Types of Electric Vehicles

Electric Vehicle Type	Power Source	Travel Range
Battery Electric Vehicle (BEV)	Electric Motor	80 – 345 miles
Plug-in Hybrid Electric Vehicle (PHEV)	Electric Motor + Gasoline Engine	350 – 600 miles
Hybrid Electric Vehicle (HEV)	Electric Motor + Gasoline Engine	350 – 600 miles

Battery Electric Vehicle (BEV)

A BEV is an all-electric vehicle that does not require gasoline and, thus, has no tailpipe emissions. BEVs are fueled by plugging into charging stations. Energy is stored in the battery, to be used when the car is running. Distances a BEV can travel on a single charge range from 80 to 345 miles, with longer distances promised in the future through continual advancements in battery technology. Recharging can take between 30 minutes and 12 hours, depending on the type of charger, the size of the battery, and the level of depletion in the battery (Drive Change. Drive Electric., 2019).

Plug-In Hybrid Electric Vehicle (PHEV)

A PHEV provides a combination of both an electric motor and a gasoline engine and produces less tailpipe emissions than a traditional ICE. PHEVs use energy from the electric motor until the battery charge is fully depleted (which can occur between 15 to 50 miles), at which point, the gasoline engine takes over. The distance a PHEV can travel on a single charge and a full tank of gasoline ranges between 350 and 600 miles. The battery is charged similarly to the BEV (through a plug) and the fuel tank is filled by traditional gasoline at a gas station (Drive Change. Drive Electric., 2019).

Hybrid Electric Vehicle (HEV)

Similar to the PHEV, an HEV has both an electric motor and a gasoline engine. In an HEV, the gasoline engine is used to power a generator, which powers the electric motor. The benefit of this system is that the ICE can run at a constant speed which greatly increase the vehicle's fuel efficiency compared to traditional ICE vehicles. However, the battery cannot be charged by an external electricity source, which means the vehicle always needs to rely on the gasoline engine.

Heavy-Duty Vehicle Basics

Heavy-duty vehicles include a wide array of battery electric buses (BEBs), special purpose equipment, mowers, and other industrial vehicles. The technology for alternative battery heavy-duty vehicles is rapidly changing. BEBs are probably the most commercially available heavy-duty vehicles, currently. BEBs can reduce air and noise pollutants within a community while also reducing operating costs. Similar to BEVs, a BEB is all-electric, meaning it is fueled by energy stored in a battery, does not require diesel fuel, and does not produce tailpipe emissions. Many transit and school bus manufacturers are developing BEBs, in addition to traditional diesel buses. BEBs can travel 50 to 300 miles on a single charge, depending on the use of the bus (McCutcheon-Schour & Whitaker, 2017). Short-range BEBs have small batteries and can be charged quickly, while extended-range BEBs have large batteries that typically need to be charged overnight. Charging infrastructure for BEBs are substantial investments and should be coordinated with the utility. Fuel and maintenance cost savings often outweigh upfront costs, over time, due to the frequent use of transit and school buses. **Table 2** summarizes BEB characteristics and costs.

Table 2. Battery Electric Bus Overview (McCutcheon-Schour & Whitaker, 2017)

	Short Range	Extended Range
Range (Miles)	50-70	160-300
Battery Capacity (kWh)	94-126	324-440
Max Charging Rate (kW)	240-325	80-120
Mile Replenished in 5 min	12	5
Estimated Total Charging Time (0-100%)	<1 hour	<4.5 hours
Vehicle Costs	$780,000	$730,000-850,000
Charger Costs	$350,000	$8,000-$40,000

Charging Stations

EV charging stations are separated into three categories, based on the speed at which the vehicle is charged: Levels 1, 2, and 3. Level 3 chargers are also known as DC fast chargers. The sections below detail the appropriate application for each type of charger.

Residential Charging Stations

Residents have two options for charging at home. Level 1 chargers use standard 120-volt AC outlets and can take 8 to 12 hours to fully charge a depleted battery. Level 2 chargers require a 240-volt AC outlet and can fully charge a depleted battery in 4 to 6 hours. Residents can charge during off-peak hours to reduce the impact on the grid. **Table 3** provides a brief explanation, along with pros and cons of both types. All currently available EVs can use either charger type.

Table 3. Residential Electric Vehicle Charging Types

	Level 1	Level 2
Electric Current (AC)	120 volts; 20 amps	208/240 volt; 30 amps
Charging Rate	2 to 5 miles range, per hour charged	10 to 20 miles range, per hour charged
Benefits	• Uses standard residential wall outlet • Little to no investment in infrastructure is required	• Quicker charging • Some models have available Wi-Fi controls to allow residents to take advantage of time-of-day electric rates • In the case of multifamily housing, the controls could be managed by a property manager.
Drawbacks	• Slower charging rate, but usually sufficient for residents who charge overnight	• Requires 240 Volt outlet or hardwired charger • Electrician likely required to install • Higher infrastructure cost investment
Estimated Costs	Low to no cost	$500 to $2,000 (US DOE, 2019)

Commercial Charging Stations

Commercial Level 2 and Level 3 chargers are most appropriate for commercial applications, since the EVs are generally parked for shorter periods of time than in residential applications. Level 2 chargers are the same as the residential chargers and often have the option to include two charging ports at one station. Level 3 (DC fast chargers) require an industrial DC outlet with 480 volts and can charge batteries in 20 to 30 minutes. Many commercial chargers also come equipped with software that allows the user to control when vehicles are charging and may facilitate payment in public applications. **Table 4** shows the advantages and disadvantages of Level 2 and Level 3 chargers.

Table 4. Levels 2 and 3 Charging Infrastructure

	Level 2	Level 3 (DC Fast Charger)
Electric Current	208/240 volt; 30 amps (AC)	480 volts DC
Charging Rate	10 to 25 miles range per hour charged	Up to 180 miles range per hour charged
Benefits	• More economical than Level 3 • Safe for long-term use	• Fastest charging option available
Drawbacks	• Slower charging	• Expensive to purchase and install • Can cause degradation to EV batteries with frequent use
Estimated Costs	$500 to $5,000 (US DOE, 2019)	As high as $50,000

Tesla Superchargers Eau Claire, WI 2019 (City of Eau Claire)

Benefits of EVs

EVs have both environmental and economic benefits. By replacing ICE vehicles with EVs, transportation-related Greenhouse Gas (GHG) emissions are significantly reduced and air quality is improved. As the need for imported petroleum to support transportation decreases through the integration of EVs, domestically available fuel sources can shift into focus, resulting in energy independence and domestically regulated fuel prices. Furthermore, individual consumers will experience lower fuel and maintenance costs with the transition to EVs, as well as continued advancements in battery and charging technologies. The sections below provide additional details regarding the benefits of EVs.

Reduce GHG Emissions

EVs can significantly decrease GHG emissions associated with on-road transportation, which overtook electricity generation as the largest source of GHG emissions in the US in 2017 (Environmental Protection Agency, 2019). The amount of emissions reduction depends on the electricity generation fuel mix of the local electricity grid. National trends suggest that electric utilities are improving emissions from electricity generation at a faster rate than fuel economy is improving in ICE vehicles. EV charging can be paired with residential roof-top solar, commercial solar parking structures, and community solar to further reduce associated GHG emissions. Xcel Energy has goals to reduce carbon emissions 80% by 2030 and to be carbon free by 2050 (Xcel Energy, 2019). By transitioning to cleaner energy sources, Xcel Energy is supporting its customers in reaching their own community goals of achieving carbon neutrality.

Air Quality

Traditional ICE vehicles use contributes to Ozone and fine particulate ($PM_{2.5}$) air pollutants, especially along heavily traveled routes. These pollutants have been linked to respiratory problems such as asthma, cardiopulmonary disease, and premature death for people with chronic exposure. These pollutants are significantly reduced in the case of HEVs and PHEVs and eliminated in BEVs. A study of the Houston area found that moderate to complete vehicle electrification would reduce Ozone by 1 to 4 ppb and $PM_{2.5}$ by 0.5 to 2 μgm^{-3}. This

change was estimated to prevent 114 to 246 premature deaths annually, significantly reduce asthma exacerbation by 7,500 cases, and reduce school loss days by 5,500 (Pan, et al., 2019).

Energy Independence and Cost Stability

Over 65% of the petroleum imported to the US in 2018 was used for transportation fuel. Transitioning to EVs shifts the fuel source to more domestically available sources such as coal, nuclear, natural gas, and renewable energy. Integration of EVs is an important strategy for reducing dependence on fuel imports and isolates transportation costs from the volatile petroleum market (Office of Energy Efficiency and Renewable Energy, 2018). **Figure 2** illustrates the fluctuations in gasoline and diesel prices compared to electricity prices from 2000 to 2019.

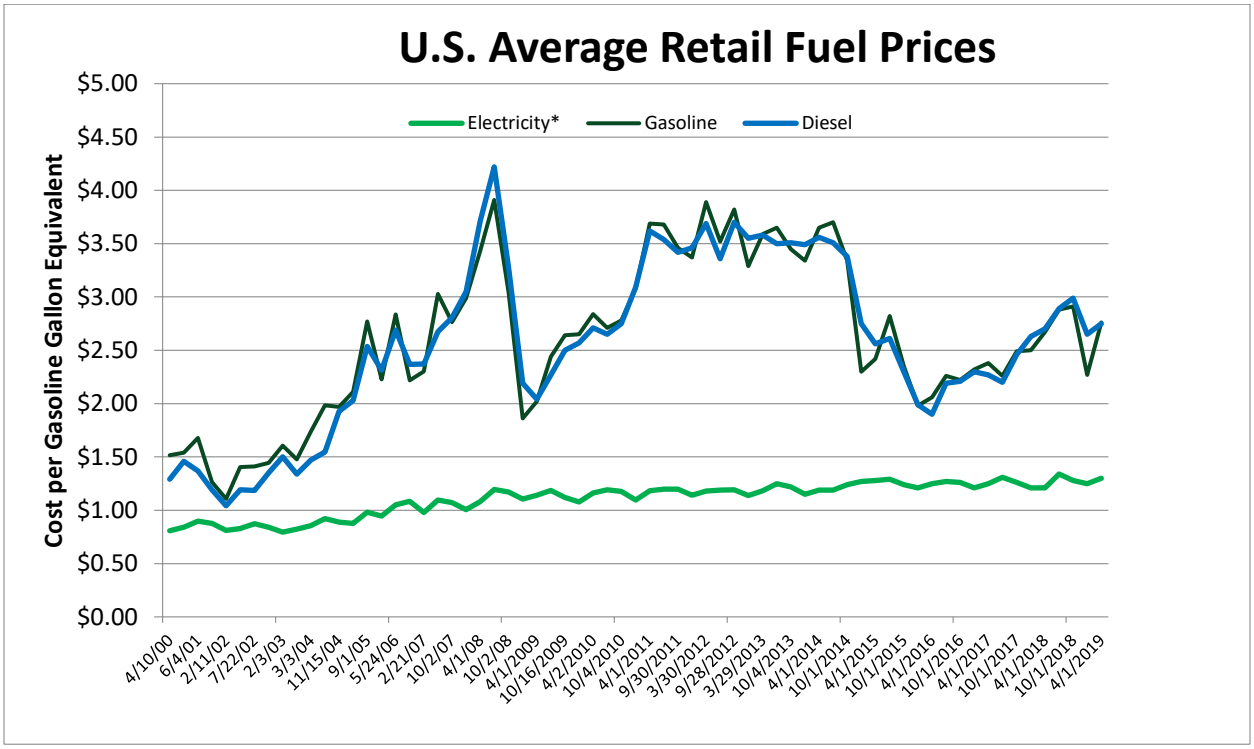


Figure 2. US Average Retail Fuel Prices. Adapted from: (Office of Energy Efficiency and Renewable Energy, 2019)

Lower Fuel & Maintenance Costs

While cost savings vary based on vehicle type, driving patterns, and geographic region, the average driver spends about half as much money in fuel and maintenance costs by driving an EV compared to driving a traditional ICE (Office of Energy Efficiency and Renewable Energy, 2019). The average US household spends about 13% of their annual income on transportation costs; while low-income households spend an average of 29% of their annual income on transportation costs (Institute for Transportation And Development Policy, 2019). The transition to EVs would result in significant savings for the individual consumer.

BASELINE

Baseline data establish a starting point that can be used as a comparison to track progress toward established goals. Social and economic factors such as population growth, demographics, housing, and industry employers provide information on how the community is expected to progress into the future, along with potential opportunities for targeted outreach and partnerships. Vehicle data utilized include the types of vehicles registered in the community, with associated fuel types and the average vehicle miles traveled (VMT) per resident. This data was used to inform goal and target setting conversations as well as to help identify strategies to meet these goals. Existing charging infrastructure and municipal policies provide a view into Eau Claire's EV readiness. Baseline data are based on 2018 values unless otherwise noted.

Community Characteristics

The City of Eau Claire, Wisconsin was incorporated in 1872. As shown in **Figure 3**, Eau Claire is situated in northwest Wisconsin - about 85 miles east of Minneapolis, Minnesota - and has a continental climate with warm summers and extremely cold winters. Eau Claire is located in both Eau Claire County and Chippewa County, and encompasses an area of about 34 square miles. Eau Claire sits on the confluence of the Chippewa and Eau Claire Rivers and is skirted by Interstate 94 on the southwestern border. Eau Claire's cold climate increases concerns about the battery performance in EVs on especially cold days

Figure 3: Area map of the City of Eau Claire

Population and Demographics

The 2010 population of Eau Claire was recorded at almost 66,000 people, with nearly an even split between male and females (US Census Bureau, 2018). The population is projected to exceed 78,000 people by 2030, with a 1% annual average growth rate (City of Eau Claire, 2015). Eau Claire's population makeup is more than 90% Caucasian, 5% Asian, and 2% African American; and, the average age of residents is 31 years (US Census Bureau, 2018). Eau Claire is home to the University of Wisconsin-Eau Claire, Chippewa Valley Technical College, and Immanuel Lutheran College - which provide the community with an independent and supportive culture as young people continue to move to Eau Claire for

higher education, with many remaining there after earning their degree (City of Eau Claire, 2019).

Housing and Economics

More than 50% of Eau Claire housing is made up of detached single-family homes, with most of the total housing units owner-occupied (US Census Bureau, 2018). This provides Eau Claire optimistic potential for EV adoption, as national EV ownership statistics suggest that single-family homeowners are more likely to purchase EVs as early adopters than are residents who live in multi-family developments. This is likely due to the ability to install home charging in a single-family home and the potential financial independence of homeowners (Singer, 2017).

The top economic industries in Eau Claire include (Economic Development Division, 2019):

- Healthcare
- Retail
- Manufacturing
- Education
- Technology

Commuting Characteristics

In Eau Claire in 2017, almost 80% of residents commuted to work alone in a personal vehicle, with about 70% of residents working within city limits (US Census Bureau, 2018). With most residents working within city limits, range anxiety (the fear of running out of battery power before reaching the desired destination or charging station) should not be a major concern.

The average vehicle miles traveled (VMT) per resident in 2018 was over 10,500 miles. **Figure 4** shows the average annual miles traveled per household by census block (Center for Neighborhood Technology, 2019). Due to the available resources and walkability of Eau Claire's downtown, residents living near downtown drive less than those in outlying areas. This information can help identify priority locations for public charging stations. For example, overlaying the information in **Figure 4** with local zoning maps would show census blocks that contain households with higher average annual miles traveled and multi-family developments - which could benefit from nearby public charging stations if at-home charging is not an option.

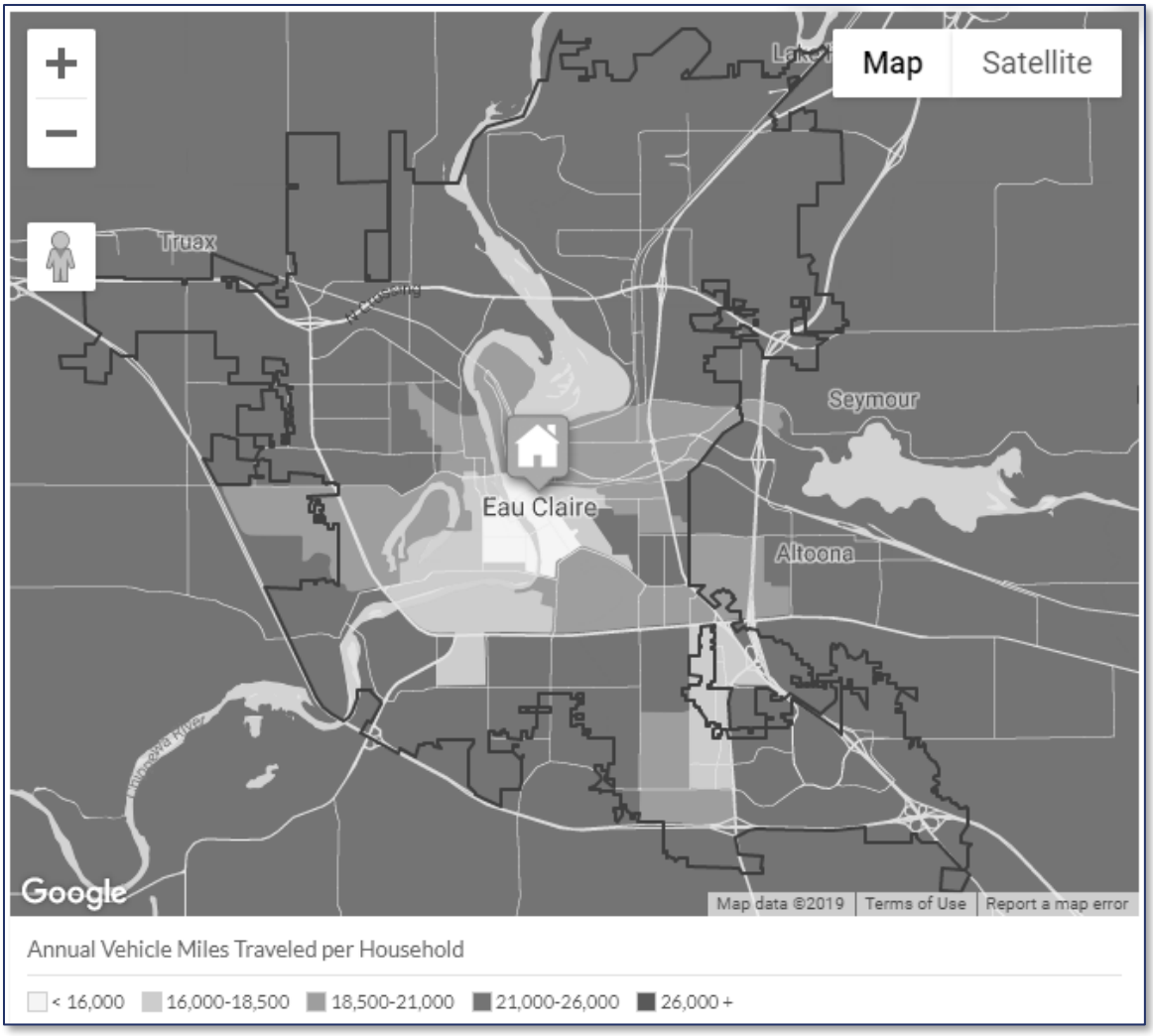


Figure 4: Annual Miles Traveled per Household (Center for Neighborhood Technology, 2019)

Vehicles

In 2017, EVs made up 4% of national light-duty vehicles and are projected to increase to 19% of total light-duty vehicles by 2050 under current trends in technological improvements and population growth (US EIA, 2018). National vehicle sales and registration from 2017 suggest that about 6% of passenger vehicles and 7% of trucks, SUVs, and vans are replaced each year, which provides a window of opportunity for transitioning to EVs (Davis & Boundy, 2019).

As of 2018, both Wisconsin and the City of Eau Claire recorded that fewer than 1% of total vehicle registrations were made up of EVs. As seen in Figure 6, most vehicle registrations in Eau Claire in 2018 were gasoline or diesel ICE vehicles, which shows that Eau Claire has many opportunities for converting to alternative fuels. While EV registration in 2018 was negligible, there are a significant number of hybrids (HEVs) - which may demonstrate a desire within the community to become more fuel-efficient.

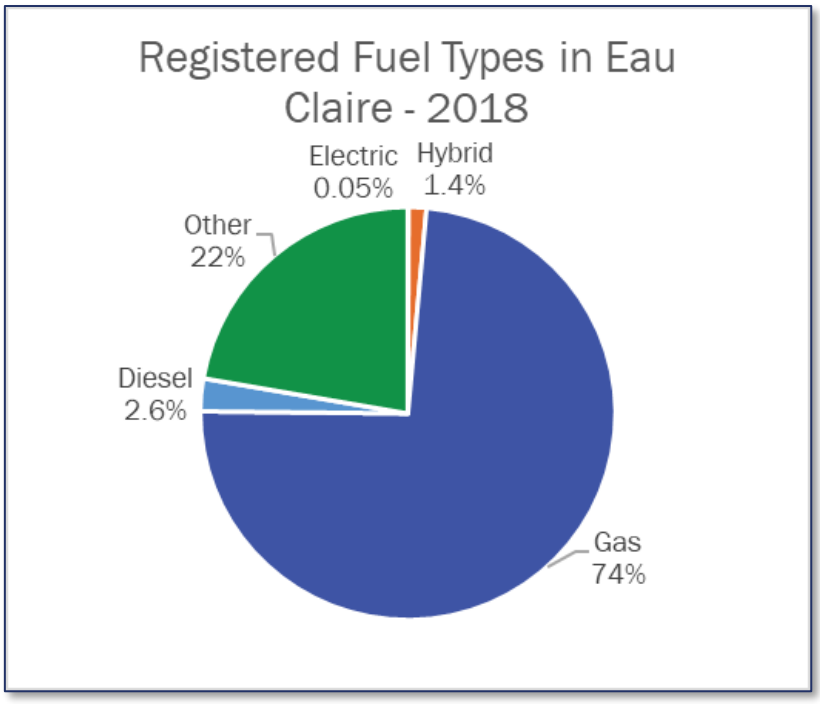


Figure 6 Registered Vehicles by Fuel Type in Eau Claire for 2018

Registration by vehicle type in Eau Claire in 2018 is shown in Figure 5. Light-duty passenger vehicles made up over a third of vehicle types, while about half were heavy trucks, pickups, vans, and SUVs. Most BEVs on the market today are light-duty passenger vehicles, while some van models and SUV models are available in PHEVs, which limits the EV transition options for Eau Claire. However, EV models continue to evolve with promises for more vans and SUVs and new heavy trucks and pickups.

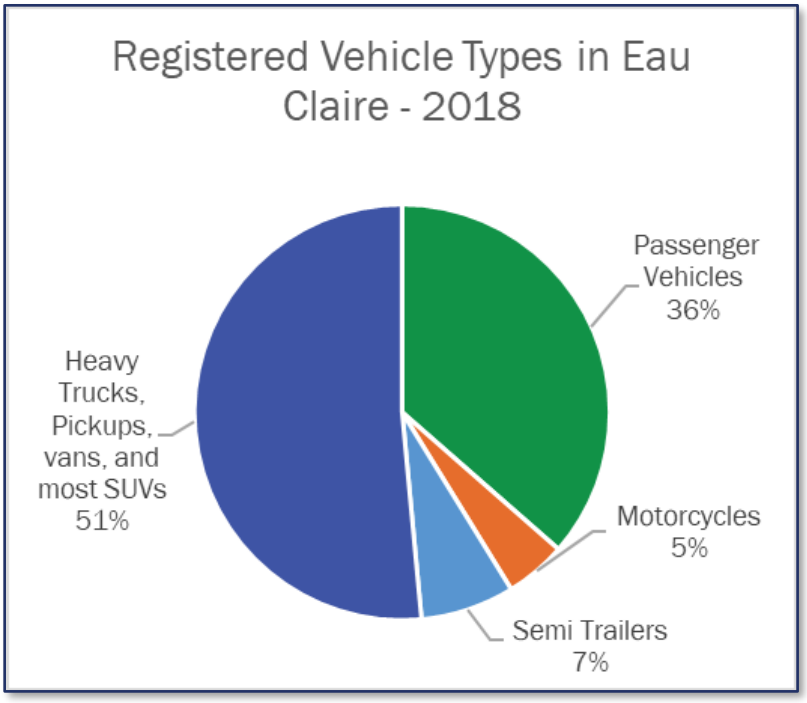


Figure 5: Registered Vehicle Types in Eau Claire for 2018

GHG Emissions

In 2015, emissions from on-road transportation in Eau Claire made up about 34% of the total community GHG emissions, which was the second highest source of GHG emissions behind commercial energy. GHG emissions building energy use are expected to be reduced through the energy efficiency efforts of the community's REAP, and through decreasing electricity emissions factor as Xcel Energy works toward its carbon free goal. As a result, total GHG emissions in 2030 are projected to be reduced by one third compared to 2015. Almost 50% of the GHG emissions in 2030 are predicted to be from transportation and mobile sources, as illustrated in Error! Reference source not found..

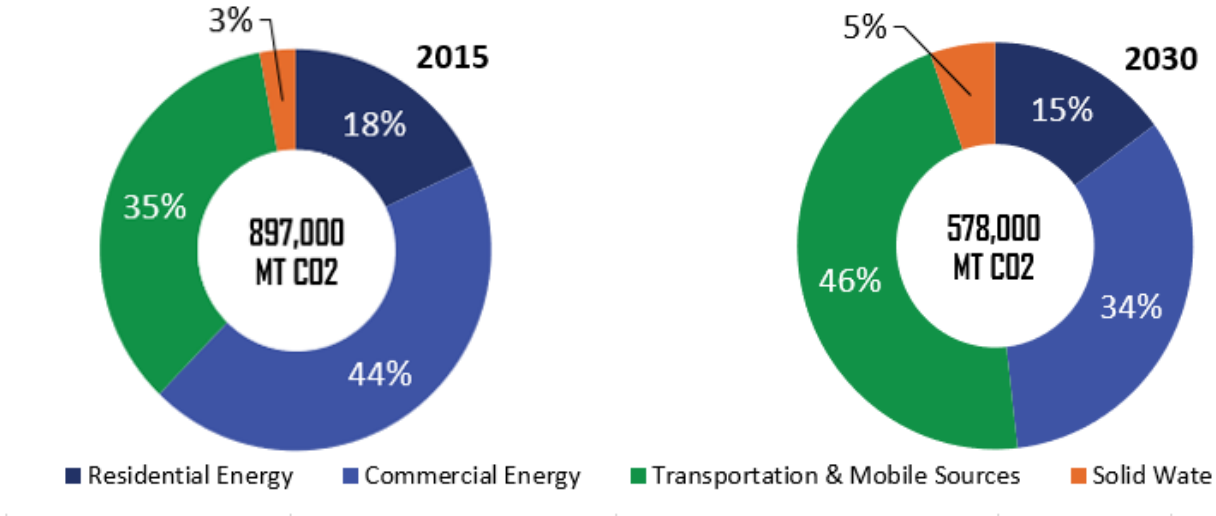


Figure 7: Eau Claire Baseline and Projected GHG Emissions by Sector

These projections illustrate the need for this EV roadmap to strategize how Eau Claire will significantly reduce transportation and mobile source GHG emission in order to reach the City's carbon reduction goals. Based on typical driving patterns and the current electricity emissions factor, replacing an ICE vehicle with an EV would reduce GHG emissions by about 72% (see Appendix A for assumptions and calculation methodology). Average annual GHG emissions per household, related to transportation based on housing location within the community, are presented in **Figure 8.** As discussed previously, residents who live closer to downtown, on average, amass fewer VMT and contribute fewer transportation-related GHG emissions annually compared to those who live farther from downtown. This map can be used to help target community outreach efforts, encouraging residents with the highest household transportation emissions to transition to EVs (providing the greatest impact).

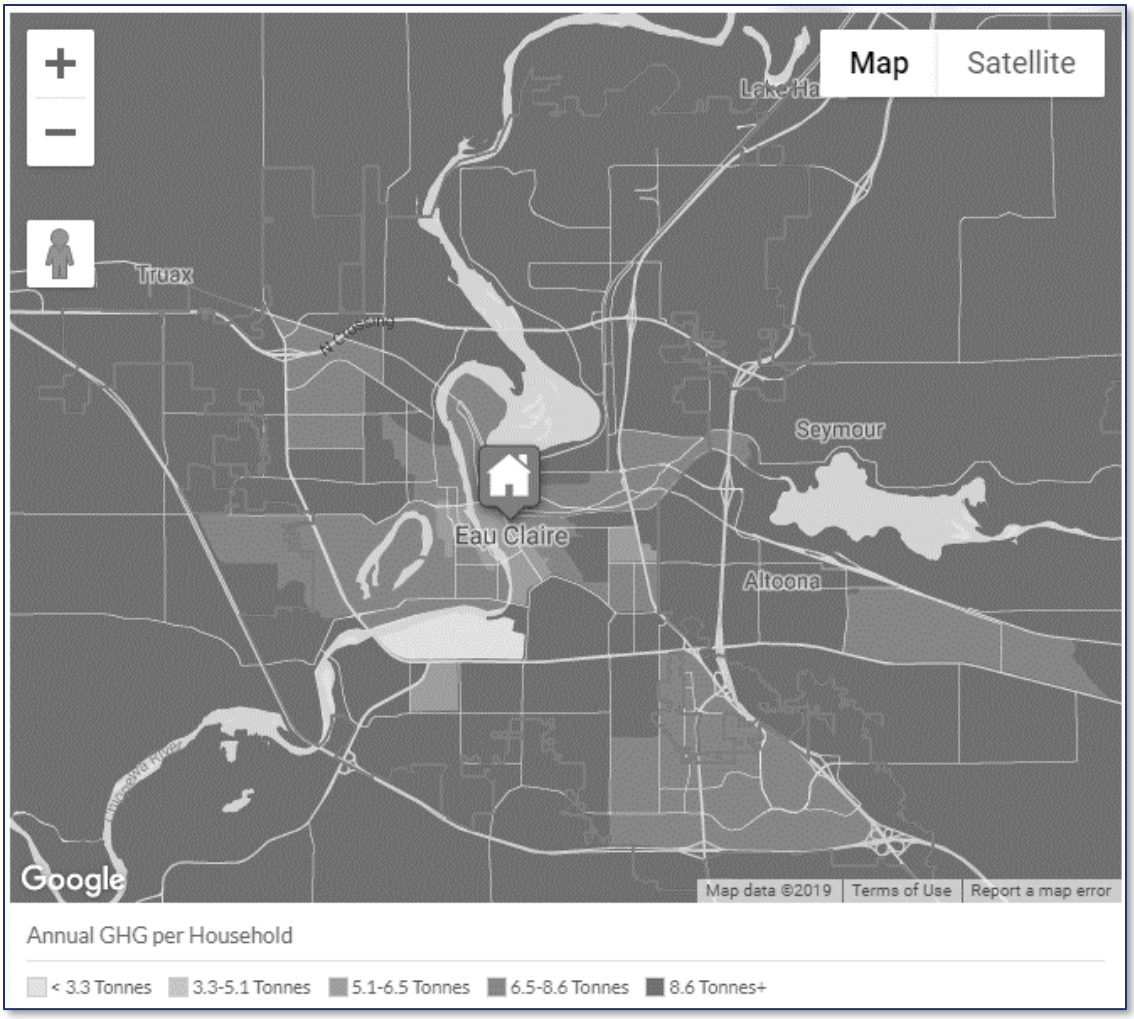


Figure 8: Annual GHG per Household from Transportation (Center for Neighborhood Technology, 2019)

Charging Infrastructure

While the majority of EV charging occurs at home, public charging infrastructure is critical for EV adoption as it helps relieve real or perceived range anxiety and increases awareness of electric vehicles in the community. As of December 2019, Eau Claire has one Level 2 public EV charging station and two DC fast charging stations within the city limits. An additional Level 2 public EV charging station is located just outside Eau Claire city limits in the neighboring town of Altoona. The public chargers are located at shopping centers and at an auto dealership.

The City plans to install three duel-port Level 2 chargers in the downtown Galloway Parking Ramp, north of the confluence of the Eau Claire River and Chippewa River, by the end of 2019. **Figure 9** illustrates the locations of existing and planned public charging stations in and around Eau Claire.

Table 5 lists the existing charger levels and the business connected to each charging station listed on the map.

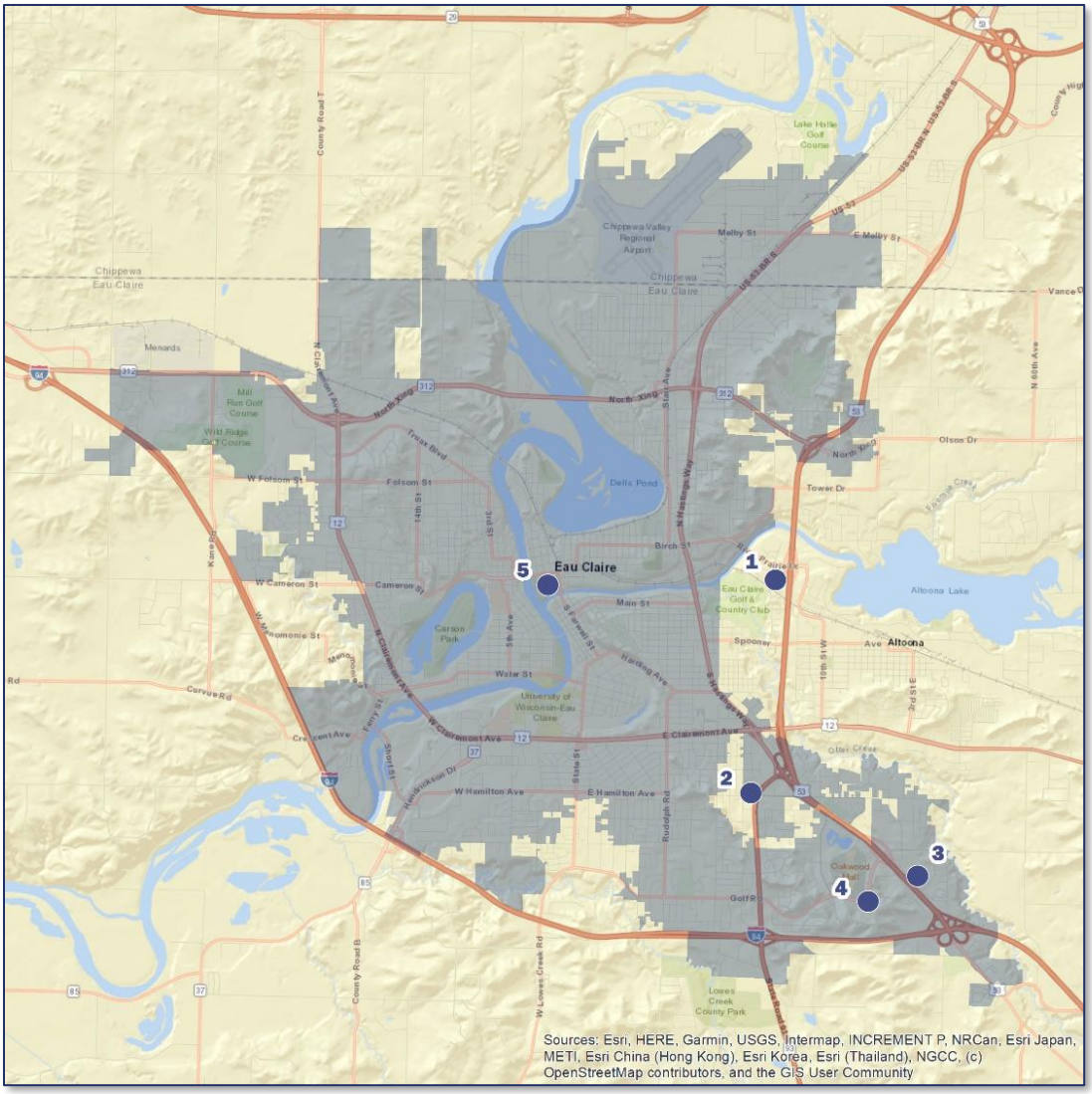


Figure 9. Existing and Planned Public EV Charging Station Locations

Table 5. Existing Public EV Charging Station Levels and Businesses

Number	Charger Level	Business
1	Level 2	Woodman's Supermarket –Altoona, WI
2	Level 2	Eau Claire Nissan – Eau Claire, WI
3	DC Fast (Tesla Station)	Shoppes at Oakwood – Eau Claire, WI
4	DC Fast	Walmart Sam's Club – Eau Claire, WI
5	Level 2	Downtown Galloway Parking Ramp (planned)

While these chargers are an initial step toward increasing visibility of EV-friendly infrastructure and supporting the integration of EVs into the community culture, many more public charging stations need to be installed throughout the city to reach carbon neutrality by 2050.

Policies and Processes

Policies are important for successful integration of EVs into the community, and should include standard guidelines and regulations for installation of charging infrastructure, public accessibility, parking, etc.

Zoning and Building Codes

Eau Claire does not currently have any zoning regulations that promote or require EV ready construction; however, Eau Claire's goal of reaching carbon neutrality by 2050 invites and supports the integration of EVs into policies created/updated in the future. In Wisconsin, building code is set at a state level - so Eau Claire cannot directly amend the building code. The community does have direct control over local zoning regulations, which can also be used to support and encourage EV infrastructure.

Permitting Process

One key barrier to EV adoption nationally is a sometimes a complex, time consuming, or expensive permitting process for installing residential or commercial charging stations. While some improvements can be made in Eau Claire's permitting process, the current process is relatively straightforward and inexpensive so doesn't likely pose a significant barrier to EV adoption. Permits for residential and commercial EV supply equipment (EVSE) installation can be submitted by mail or in-person and takes an average of 1 to 2 days to process, while the actual installation can take up to 1 week. Questions regarding the EVSE permitting process can be directed to the electrical inspector. Fees associated with the permit process range from approximately $30 to $130, depending on the type of building use and whether a service upgrade is required. Eau Claire permit inspectors do not currently have training specific to EVSE. On the state-level, Wisconsin recently adopted the 2017 National Electrical Code, which details safety measures necessary for EV infrastructure installation (Baclawski, 2016).

EV Taxes and Fees

A common concern related to the integration of EVs is revenue loss from gasoline tax, since EVs do not use gasoline. The state of Wisconsin is offsetting these losses by applying an annual surcharge to registration fees for EVs (WISDOT, 2019). By including the surcharge, WisDOT is establishing an alternative revenue stream to support infrastructure improvement projects. As of December 2019, these charges are $75 for HEVs and $100 for BEVs in addition to registration fees.

Existing Efforts to Promote EV adoption

Eau Claire currently offers programs to promote and accelerate the adoption of EVs through community education and outreach, as well as by municipal planning and feasibility research.

Ride-and-Drive Events

Ride-and-drive events give the community a way to experience EVs in a relaxed, no-pressure environment. These events can be a fun way to build excitement around EVs and to dispel misconceptions that prevent people from buying EVs. Eau Claire has assisted on ride-and-drive events in partnership with local organizations such as Xcel Energy and the Chippewa Valley Technical College Energy Education Center.

Hybrid Transit Buses

Out of the fleet of 22 transit buses owned by Eau Claire, 5 of the buses are hybrid electric and 3 more hybrid electric buses will be added in 2020. The hybrid electric buses have programmable "emissions-free zones" where the buses run entirely on the battery for a set distance. This allows Eau Claire to reduce air pollution in designated areas of bad air quality, such as under-served communities that are often impacted the most by poor air quality. Hybrid electric buses are estimated to reduce emissions up to 75% compared to traditional diesel buses, which suggests that Eau Claire has reduced emissions from transit buses by 6% in 2019 and will reduce emissions by 9% in 2020 (Ranganathan, 2007). The range of current battery electric buses (BEBs) is not sufficient to meet the needs of the scheduled routes without recharging, so hybrid buses are the best option for the Transit Division to reduce GHG emissions near term. Eau Claire is actively planning for charging infrastructure at the current and new transit facilities, to prepare for future charging needs when the range of BEBs increases to the required level and it is feasible to purchase BEBs for all routes.

Fleet Carma Study

Through a partnership with Xcel Energy and Fleet Carma, Eau Claire conducted a telematics sustainability study in 2019 to determine the best approach for transitioning to low emission vehicles for the municipal fleet. Through this study, 20 vehicles, including light-duty trucks, full-sized vans, sedans, and SUVs in the municipal fleet, were considered for replacement with EVs. Out of the 20 vehicles, Fleet Carma suggested that by exchanging 5 of the light-duty vehicles with EVs, Eau Claire could save:

- Over $103,000 (12%) on total cost of ownership for the fleet over the service life of the vehicles,
- About 58 tons (37%) on annual CO_2 emissions over the service life of the vehicles,
- Approximately 4,500 gallons (37%) on annual fuel consumption over the service life of the vehicles.

VISION AND GOALS

Eau Claire EV Vision

A vision statement creates a picture of where the community wants to go, and provides direction for developing goals, implementing strategies, creating partnerships, and involving the entire community as it moves forward. Through the community engagement process of the Renewable Energy Action Plan (REAP), the following vision statement for Eau Claire's sustainable future was developed.

> *Eau Claire's Renewable Energy Action Plan will be guided by an evidence-based, transparent, equitable, and inclusive process to meet the goals of 100% renewable energy and carbon neutrality by 2050.*
>
> *These ongoing efforts will strengthen our leadership in sustainability and renewable energy development for generations to come.*

This EV roadmap was developed to support the REAP plan vision by providing more detailed guidance to allow the city to meet their electric vehicle goals established in the REAP. To that end, the following EV Vision was developed to guide the development of this plan:

> *The City of Eau Claire will lead and stimulate the community and regional non-carbon transportation evolution through practical and cost-effective strategies that, along with other City sustainability actions, will help meet the goal of carbon neutrality by 2050 for the benefit of current and future generations.*

EV Goals

To create and measure progress toward reaching the City's vision of a sustainable future, emissions reduction goals for each source were determined based on a drawdown scenario that allows the City to reach carbon neutral status in 2050. As part of this process the following EV adoption goal was set. This EV roadmap was developed to help ensure that the City meets this goal.

In 2030, at least 10% of all vehicle miles traveled[1] in Eau Claire will be by electric vehicles.

[1] Vehicle miles traveled (VMT) is a measure used in transportation planning for a variety of purposes. It measures the amount of travel for all vehicles in a geographic region over a given period of time (typically a one-year period).

In most communities, as well as in the nationwide trend, EV adoption tends to have an exponential curve. This is because people are more likely to choose an electric vehicle if they see their neighbors or coworkers driving one. Using the nationwide exponential EV adoption trend and applying it to Eau Claire, the number of new EVs that need to be registered in Eau Claire to meet the City's EV goal was calculated. The results are shown in Figure 10.

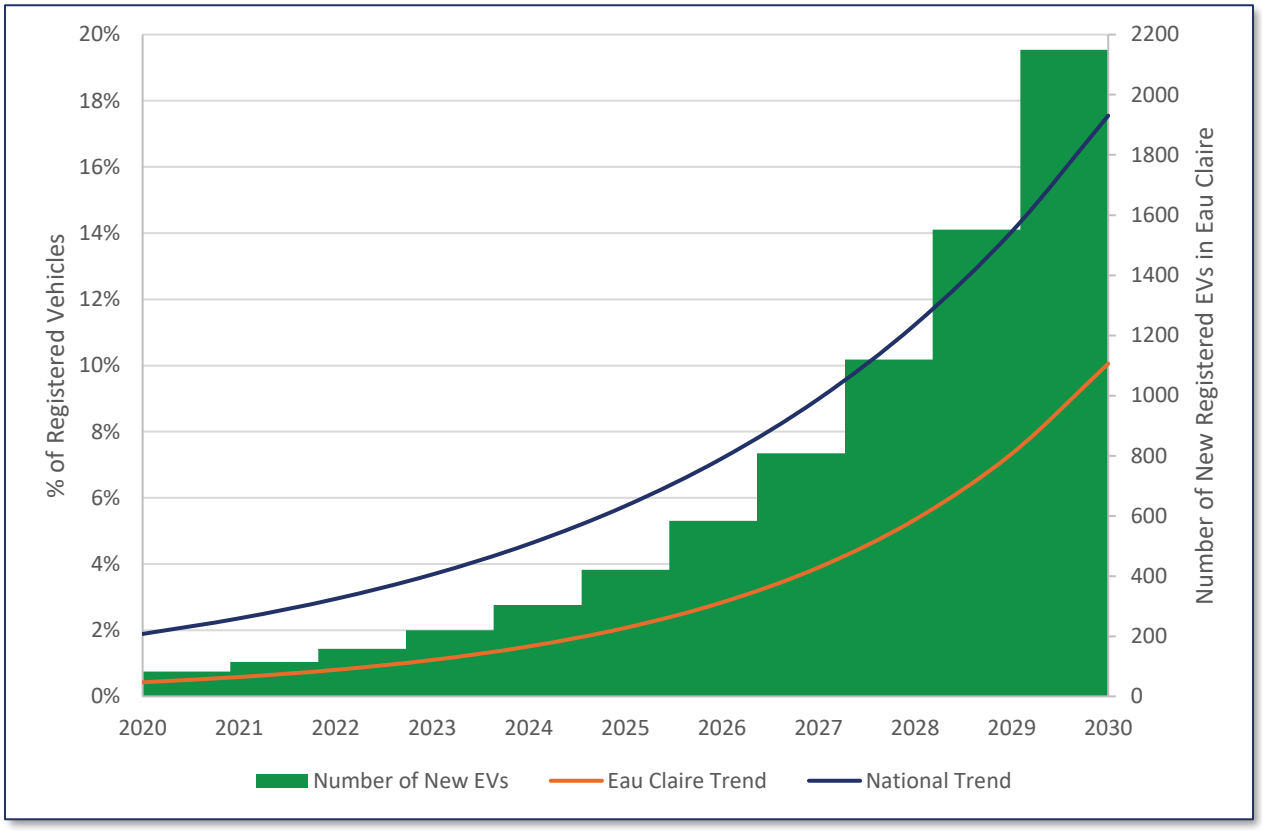


Figure 10: Vehicle Adoption Curve Required to Meet EV Goal

While the overall municipal, commercial, and private vehicle fleet in Eau Claire must ultimately transition to BEVs to meet the City's carbon neutrality goal, in some cases HEVs can be a good interim step in EV adoption. For the purposes of this plan, HEVs will be assumed to run 50% of the time on the electric engine and 50% of the time on the ICE when evaluating their contribution toward meeting Eau Claire's EV goal.

Since EVs are a rapidly evolving technology, it is difficult to predict the potential growth of the EV segment beyond 2030. After implementation of the strategies outlined in this plan over the next 10 years, City staff will evaluate the impact on the local vehicle stock and determine an appropriate milestone for the next 10 years (based on progress to date and available and/or predicted technological advances).

FOCUS AREAS AND STRATEGIES

Three focus areas were identified by the stakeholder group: Modeling the Way (municipal planning and fleets), Building a Strong Foundation (public charging infrastructure), and Sowing the Seeds for Transition (community education, outreach, and partnerships). The following sections detail the selected strategies, targets, and implementation plans for each focus area. The focus area work plans reflect the current situation for a rapidly evolving technology. It will be important that these strategies are evaluated and updated throughout implementation to reflect advancements and new offerings from the automotive and transportation industry and the electric utilities that serve Eau Claire. Throughout the planning process, we worked to build relationships between the city staff and Xcel Energy staff that will foster the collaboration and cooperation required to successfully navigate the changing EV landscape.

Modeling the Way

This focus area addresses the strategies that municipal operations can use to begin to transition fleet and transit vehicles, as well as the installation of necessary infrastructure. The strategies in this section apply to both the heavy-duty bus and the light-duty fleet, but a greater impact on emissions can be achieved by converting the buses to EVs. If the transit fleet were to be 100% electrified by 2030, the City of Eau Claire public transit emissions could be reduced roughly 90%. This would reduce the emissions from the entire transportation fleet for the City by about 32%.

Leading Department: Community Services

Priorities

- Transition fleet vehicles to EVs
- Pilot, learn, and begin to convert transit buses to EVs as technologies become available
- Provide appropriate charging infrastructure for municipal operations
- Provide appropriate employee training

Target: Replace 15% of municipal fleet with EVs by 2030.

Hybrid-electric Transit Bus Eau Claire, WI, 2019 (City of Eau Claire)

Data Used for Target Setting

The City fleet department has identified City equipment, including fleet vehicles and machinery such as lawn mowers, due for replacement over the next five years. These vehicles are shown by vehicle class in **Figure 12**.

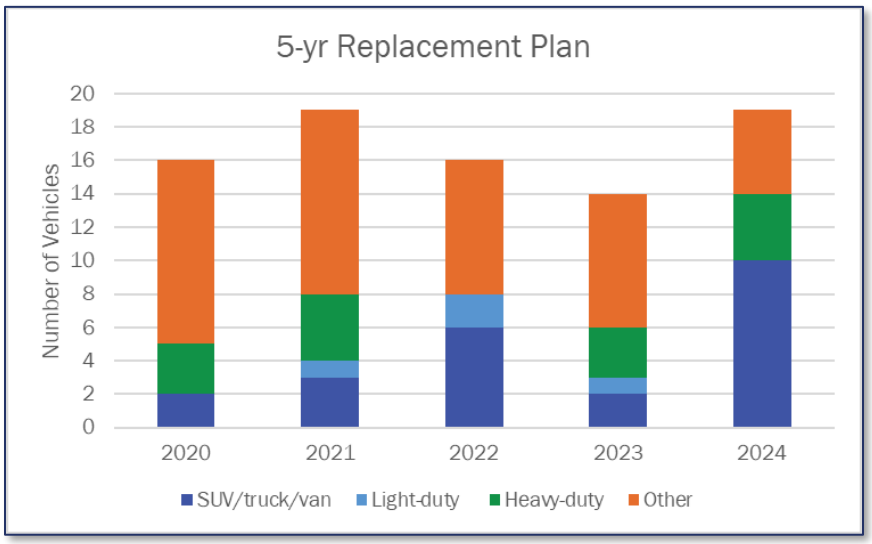


Figure 11: 5-year Fleet Vehicle Replacement Plan

Based on this vehicle replacement plan, it was assumed that all light duty vehicles and 50% of SUV and trucks could be replaced with EVs. Alternatively, all SUVs and trucks could be replaced by HEVs for similar emissions savings. This scenario is outlined in **Figure 12,** with the green bars showing the estimated vehicle replacement based on the 5-year replacement plan and the blue bars showing the number of additional vehicles needed to meet the 15% vehicle replacement target.

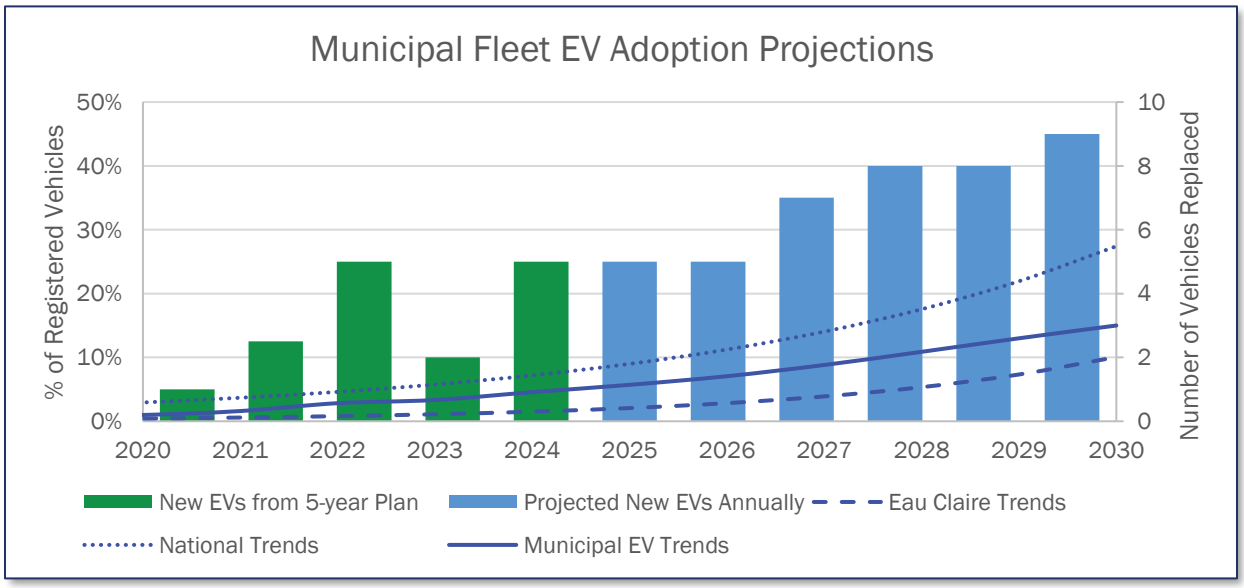


Figure 12: Projected Fleet Electrification

Workplan

To meet the EV adoption target set for this focus area, the stakeholder group developed a 10-year workplan that identifies the key strategies to be implemented as well as the leading department, important milestones, and any required budgetary asks. The timeline of strategy implementation is outlined in **Table 6** and strategy implementation details are described below. Strategies that require a budgetary ask are marked with a **$**.

Table 6: Modeling the Way 10-year Workplan

Strategy Name	2020 ◄ ► 2030
M.1 Reallocate/realign budget/funding sources.	
M.2 Explore on demand micro-transit	
M.3 Promote anti-idling policy	
M.4 Install municipal fleet EV chargers	
M.5 Update purchasing policy to support EVs	
M.6 Plan charging sites for municipal fleets	
M.7 Develop EV training for maintenance staff	
M.8 Safety training for EMS	
M.9 Develop a fleet electrification plan	
M.10 Develop a time-of-use charging plan for municipal fleets	

M 1. Reallocate/Realign Budget and Identify Funding Sources ($)

Responsible Department: Finance

Costs for infrastructure and equipment upgrades, EVs, associated energy use, and staff training hours will require additional funding and approval. By reviewing existing budget and making the necessary adjustments to better serve the EV transition, unintended delays may be avoided.

Modeling the Way team Identifying Strategies Eau Claire, WI, 2019 (Brendle Group)

Key Milestones:

- Determine budget allocations for upfront capital costs, maintenance requirements, and fuel costs.
    - Align upfront cost budgetary asks with vehicle replacement plan (M.9) and infrastructure plan (M.4), taking into consideration municipal capital budgeting process.
    - Evaluate and determine if alternative budgeting methodology may be appropriate to address up front capital increased costs over ICE replacement but decreased fuel and O&M costs.
- Determine if there are equipment or reporting requirement changes to adapt to EVs such as:
    - Submetering to assign fuel costs to proper department allocation. Determine whether functionality built into charging stations will be sufficient or additional equipment or reporting will be required.
    - Can fuel or maintenance cost savings be reallocated to cover higher upfront costs or anticipated battery replacements?
- Identify and pursue grants or other available funding sources to help cover additional upfront costs of EVs and charging infrastructure, as may be available from state or federal sources.

M 2. Explore on Demand Micro-Transit

Responsible Department: Transit

This is a transportation strategy being explored through the Transit Development Plan (TDP). The completed plan is expected to be reviewed and adopted in 2020. This strategy may support the identified opportunities for EVs in this plan using medium to light-duty vehicles to reach more riders conveniently.

M 3. Promote Anti-idling Policy

Responsible Department: Fleets

The City has passed an anti-idling policy that applies to all City-owned vehicles. Behavior change campaigns, as well as equipment upgrades, will be explored to support the successful implementation of this policy.

Key Milestones:

- Behavior change campaign to increase compliance with existing equipment
    - Use vehicle data to determine baseline compliance rate by department
    - Work with departments to determine compliance targets based on use patterns and requirements
    - Provide annual report showing how all departments are performing compared to goal
- Identify HEV opportunities, to increase compliance in vehicles where idling is currently required. Some examples could include:
    - Police vehicles that can operate cameras and other equipment from the battery
    - Fire engines that can run circulation pumps, to prevent freezing, from the battery during non-fire responses.
    - Lift trucks and/or other street equipment that might allow duty cycles from the battery

M 4. Plan and install municipal fleet EV chargers ($)

Responsible Departments: Fleets and Buildings

Xcel Energy Support: Julie Thoney (community service manager) and Larry Loverude (community service manager – EV lead)

To accommodate for growth in the number of municipal EVs, the City will need to install charging stations at the Central Maintenance Facility as well as at other satellite locations.

Key Milestones:

- Identify and prioritize municipal operation locations for charging - based on demand, overnight, duty cycles and use, security, etc. (see M.6 below)
- Identify charger requirements such as controls and connectivity or communication capabilities
- Work with Xcel Energy to evaluate and possibly upgrade power where required. Identify existing infrastructure and plan potential upgrades if needed.
- Evaluate power requirements for planned use for charging sites.
- Purchase equipment
- Install EV stations
- Provide appropriate signage and training
- Determine operational budgets for electricity fueling expense

M 5. Update purchasing policy to support EVs

Responsible Department: Purchasing

Ensure that the criteria used to make decisions around purchasing new equipment reinforces EV plan adoption (in the replacement of current vehicles with appropriate EVs).

Key Milestones:

- Allow for more flexibility for vehicle purchasing when options are limited
- Use State purchasing contract, as applicable, to simplify the process
- Evaluate other group purchase options such as Climate Mayors or others

M 6. Plan charging sites for municipal fleets

Responsible Departments: Fleets and Buildings

Xcel Energy Support: Julie Thoney (community service manager) and Larry Loverude (community service manager – EV lead)

Use data about current and planned fleet vehicle use to identify potential siting for EV charging stations. Use information about where fleet vehicles are kept when not in use, as well as information about frequently visited locations, to develop an inventory of potential charging sites.

Key Milestones:

- Based on outcomes of M4, determine charging infrastructure required at each site
- Prioritized installation based on vehicle replacement plan and building upgrade timing
- Work with Xcel Energy to identify any site limitations or power upgrade requirements
- Consider if there are co-benefit opportunities for public to use stations

M 7. Develop EV training for maintenance staff

Responsible Department: Fleets

Support employee professional development by providing training, to fleet mechanics, on EV maintenance and repair.

Key Milestones:

- Offer EV maintenance classes for light-duty vehicles as professional development (heavy-duty likely not maintained on site)
- Research applicable certifications
- Provide operator training and certification for City staff using EVs

M 8. Safety training for EMS

Responsible Departments: Fire and Police

Ensure emergency response staff understands the safety precautions that need to be taken in the case of an accident or fire involving an EV.

Key Milestones:

- Identify appropriate training
- Ensure all appropriate staff are trained and recertified as needed

M 9. Develop a fleet electrification plan ($)

Responsible Departments: Planning, Fleets, and Transit

Create a plan that outlines which vehicles will be replaced with EVs and when based on vehicle use characteristics, replacement cycle, and available technology. This plan includes light-duty and transit fleets.

Key Milestones:

- Create a vehicle inventory (done)
- Identify priority vehicles for next 3-5 years (done)
- Purchase vehicles
- Update priorities as technology evolves (review every year or every 2 years)

M 10. Develop a time-of-use charging plan for municipal fleets

Responsible Department: Fleets

Xcel Energy Support: Julie Thoney (community service manager)

Enable charging controls to manage the time of day vehicles are charging. Optimize EV operations to take advantage of time-of-use electric rates by charging during off-peak hours, which can keep energy costs low.

Key Milestones:

- Identify the most applicable rates for each charging location, working with Xcel Energy representative
- Work with City departments to identify the vehicles where time of charging can be controlled, and which vehicles must always be charged for emergency response
- Work with IT department to program charging stations to reduce demand charges and take advantage of time of day rates as applicable
- Train employees on charging schedule and how to override as needed

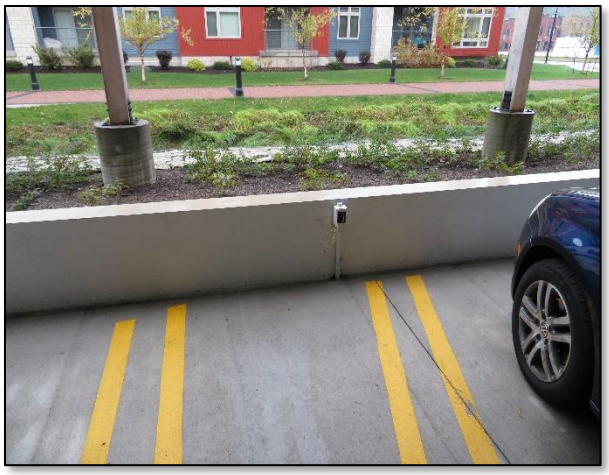
Building a Strong Foundation

This focus area will guide the City's efforts to develop a foundation for EV adoption through public charging infrastructure development.

Leading Department: Engineering

Priorities

- Siting and installing City-owned public charging stations
- Encouraging local businesses to host public charging stations
- Standardizing signage
- Updating regulations, policies, and enforcement
- Funding and operational budgets
- Identifying opportunities to Power with on-site solar



Future Level 2 EV charging station at Galloway Ramp Eau Claire, WI 2019 (City of Eau Claire)

Target: There will be 160 public charging stations in Eau Claire by 2030.

Data Used for Target Setting

To understand how many public charging stations will be required to support the City's EV goal, several scenarios were examined. The first is the recommended best practice developed by the International Energy Agency (IEA) that there be one public charging station for every ten EVs in the community. Next, the two most mature EV markets in the world, Norway and California, were examined and found to have between 25 and 30 vehicles for every public charging station. This suggests that the IEA's recommended ratio is not required for significant uptake of EVs. Eau Claire also has the benefit of a having a large portion of its residents living in owner-occupied single-family housing, which increases the proportion of residents that would mostly or only charge at home. Based on this data, a target EV to charging station ratio of 50 to 1 was developed. The resulting number of EV charging stations in each scenario is shown in **Table 7**. Note that these values include EV charging stations owned and operated by the City as well as publicly-available EV charging stations owned and operated by local businesses

Table 7: Public Charging Station Scenario Analysis

Scenario Name	EV to Public Charging Station Ratio	Number of EVs in Eau Claire in 2030	Number of publicly available charging stations in Eau Claire in 2030
IEA Recommendation	10:1	8,000	800
California Model	25:1	8,000	320
Norway Model	31:1	8,000	258
Attainable Model	50:1	8,000	160

Workplan

To meet the EV infrastructure target set for this focus area, the stakeholder group developed a 10-year workplan that identifies the key strategies to be implemented as well as the leading department, important milestones, and any required budgetary asks. This workplan is outlined in **Table 9** and strategy implementation details are described below. Strategies that require a budgetary ask are marked with a **$**.

Table 8: Building a Strong Foundation 10-year Workplan

Strategy Name	2020 ◄——► 2030
B.1 Map existing infrastructure and potential siting locations	
Phase 1 pilot area	
Phase 2 larger, more detailed effort	
B.2 Conduct an economic Analysis	
B.3 Work with large entities and employers to host EV charging stations.	
B.4 Identify Local travel corridors	
B.5 Incorporate ADA compliance into public charging station design.	
B.6 Establish and enforce parking rules for EV parking spots with charging stations.	
B.7 Establish budget for EV charging station installation and upkeep.	
B.8 Training for electrical contractors	
B.9 Install public charging stations	

B 1. Map existing infrastructure

Responsible Department: Engineering

Xcel Energy Support: GIS Department/ Larry Loverude (community service manager – EV lead)

By developing a map of existing infrastructure, including details like locations of electrical supplies, parking payment meters, and wireless/cellular connectivity, optimal charging station siting can be established to minimize required infrastructure upgrades. This strategy will be implemented in two phases. The first phase will be in a small pilot area where the City would like to target early infrastructure installations. Based on learnings from this pilot, the mapping procedures will be optimized and expanded to a larger area.

Key Milestones:

- Pilot Phase
    - Identify pilot area
    - Map existing power and communications infrastructure
    - Establish goals for chargers in pilot area (City and private)
- Second Phase
    - Identify lessons learned from pilot area
    - Modify mapping approach based on lessons learned
    - Create larger more detailed maps
    - Identify priority locations for charging installation

B 2. Conduct an Economic Study

Responsible Department: Planning

Conduct a rate and return study to analyze the strategies that best meet goals for the for-City investment in hosting or supporting public charging stations and including considerations such as time-of-use, electric demand, and total use during a billing period. These factors can be used to set rates for charging stations and to ensure that operating costs are covered - whether it be municipal-owned, leased, or other commercial models. Using these models, determine the expected annual cost and income, over time, to inform the budgeting process (B.8).

Key Milestones:

- Explore grant opportunities to fund study
- Hire a consultant to perform rate study and advise City on strategies, alternatives, fees, and cost structure

B 3. Work with large entities and employers to host EV charging stations

Responsible Departments: Planning and Economic Development

Encourage local businesses, institutions, and industries to install public chargers, to support the community EV transition.

Key Milestones:

- Create education and outreach materials
- Early on, conduct general employer outreach
- Set targets for outreach and installations in later years
- Develop a targeted commercial sector strategy to engage employers, developers, and other commercial property owners to install EV charging infrastructure.

B 4. Identity local travel corridors

Responsible Department: Engineering

Identify City transportation corridors that have high traffic volume and would be good targets for public charging station infrastructure.

Key Milestones:

- Identify public travel corridors to target installation of charging stations
- Connect to MPO and regional transportation plans

B 5. Incorporate ADA compliance into public charging station design.

Responsible Department: Engineering

Establish ADA requirements for all charging station installations to ensure public charging stations are accessible for all residents.

Key Milestones:

- Incorporate ADA compliance into design specs for bid, zoning, and other development regulations

B 6. Establish and enforce public EV parking regulations

Responsible Department: Engineering

Standardize the EV charging experience at public charging stations by establishing and enforcing rules for use of EV parking spots with charging stations. These regulations may include limiting how long an EV can use a charging location, EV parking spot use requirements (e.g., whether an EV needs to be charging to use the parking space), and penalties for violations.

Key Milestones:

- Create a parking committee with internal and external stakeholders
- Determine if an ordinance change can be done through the parking administrator rather or if City Council approval is required
- Determine budget implications related to signage and enforcement
- Make budget make requests as needed
- Change parking ordinances based on input from committee
- Set rates for use based on findings from B.2

- Ensure enforcement departments are prepared and able to ensure compliance

B 7. Establish budget for EV charging station installation and upkeep ($)

Responsible Department: Engineering

Designate an annual line item in the appropriate budgets for installation and maintenance of public charging stations or development of third-party commercial public facing charging, based on findings from B.3. Explore using income from EV charging station use to fund future charging station installations.

Key Milestones:

- Develop a multi-year budgeting strategy with EV charging station installation goals
- Include target location(s) and charger types
- Develop a multi-level strategy to pair Level 2 chargers with one Level 3 charger
- Explore multi-modal charging locations that serve multiple transit, commuting, and/or other electrical infrastructure

B 8. Training for electrical contractors

Responsible Department: Engineering

Xcel Energy Support: Julie Thoney (community service manager)

Provide training on the installation and maintenance of EV charging stations for local electrical contractors. Include in the contractor checklist developed in strategy S.4.

Key Milestones:

- City staff to develop minimal requirements for contractors working in City
- City staff to develop and reach out to list of local contractors to provide education and/or educational opportunities.
- Leverage Xcel Energy's training programs for electricians to provide training.

B 9. Install public charging stations

Responsible Department: Engineering

Based on outcomes the budget set in strategy B.8, and the priority charging station locations identified in strategies B.1 and B.5, install and maintain EV charging stations for public use.

Key Milestones:

- Identify locations, based on results in B.1 and B.5
- Work with local contractor(s) to install charging station
- Coordinate with City staff to connect charging station to City IT as needed
- Ensure locations of charging stations are displayed on EV charging station finder apps and websites

Sowing the Seeds for Transition

This focus area directs the spread of EV awareness and acceptance throughout the community and surrounding areas, with the objective of increasing public adoption and increasing EV purchases and use.

Leading Department: Community Development

Priorities

- Develop strategic local partnerships
- Advocate for EV-friendly regional policy
- Stimulate adoption of personal EVs
- Facilitate installation of residential charging
- Encourage business fleet electrification

Target: A minimum of 8,000 of the vehicles registered in Eau Claire in 2030 will be electric vehicles.

EV charging in Fort Collins, CO 2019 (Brendle Group)

Data Used for Target Setting

The previous two focus areas play important roles in familiarizing the community with EVs and helping residents feel that the necessary infrastructure is available so they can feel comfortable transitioning to an EV, but this focus area will be responsible for actively encouraging residents to replace miles driven in ICE vehicles with EV miles. To meet the City's EV goal, there must be about 8,000 EVs registered in Eau Claire by 2030. The number of new EVs per year, based on an exponential EV adoption curve, is show in **Figure 13**.

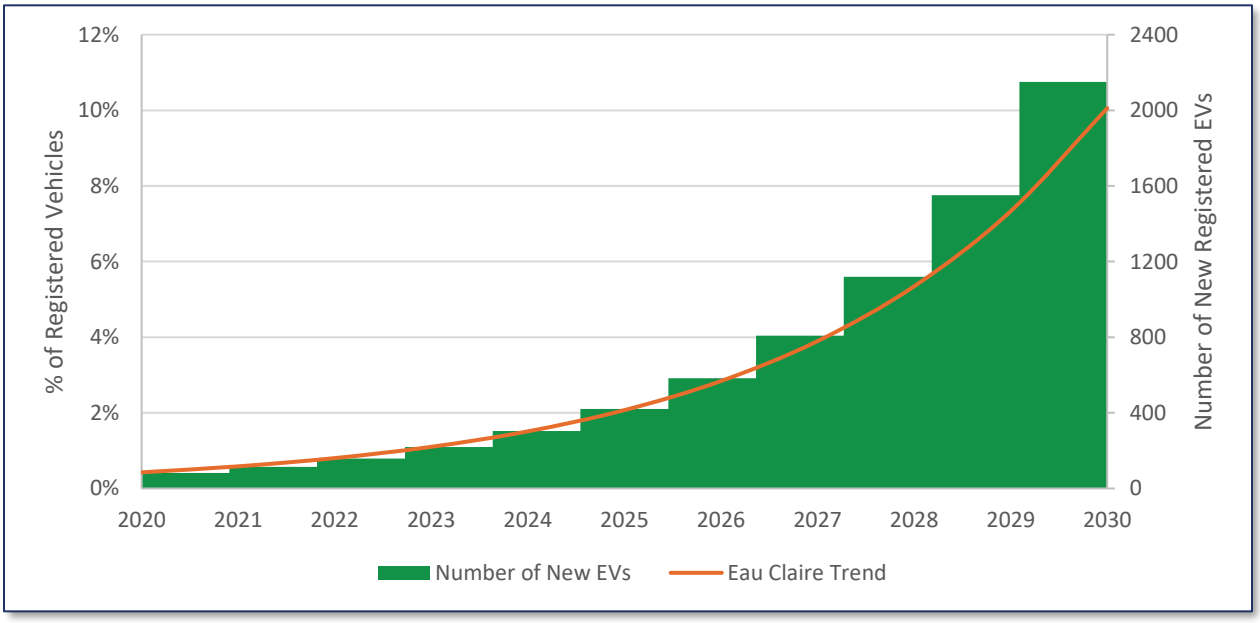


Figure 13: Required Number of New EVs Registered Annually to Meet Target

Global and national trends were used to understand the level of ambition of the EV adoption curve. If Eau Claire follows the national trend of 6-7% of vehicles being replaced each year, the percentage of new vehicle sales needs to grow to 40% of all vehicles sold by 2030 to meet this focus area's target. While this is a significant increase from the baseline condition, many vehicle manufactures are planning to transition entirely to EVs over the next 30 years. Additionally, many expert projections anticipate the upfront cost to be equivalent to ICE vehicles over the next 5 years (Lowell & Huntington, 2019). These transitions will provide more available vehicles that are cost competitive with their ICE counterparts - significantly increasing the number of people purchasing EVs. The anticipated percentage of total sales from EVs, for select manufacturers by 2025, is shown in **Figure 15**. The hatched bars represent the range provided. While this data is global data, and not projected to the goal year of 2030, it suggests that the City's stated EV sales goal is ambitious but realistic.

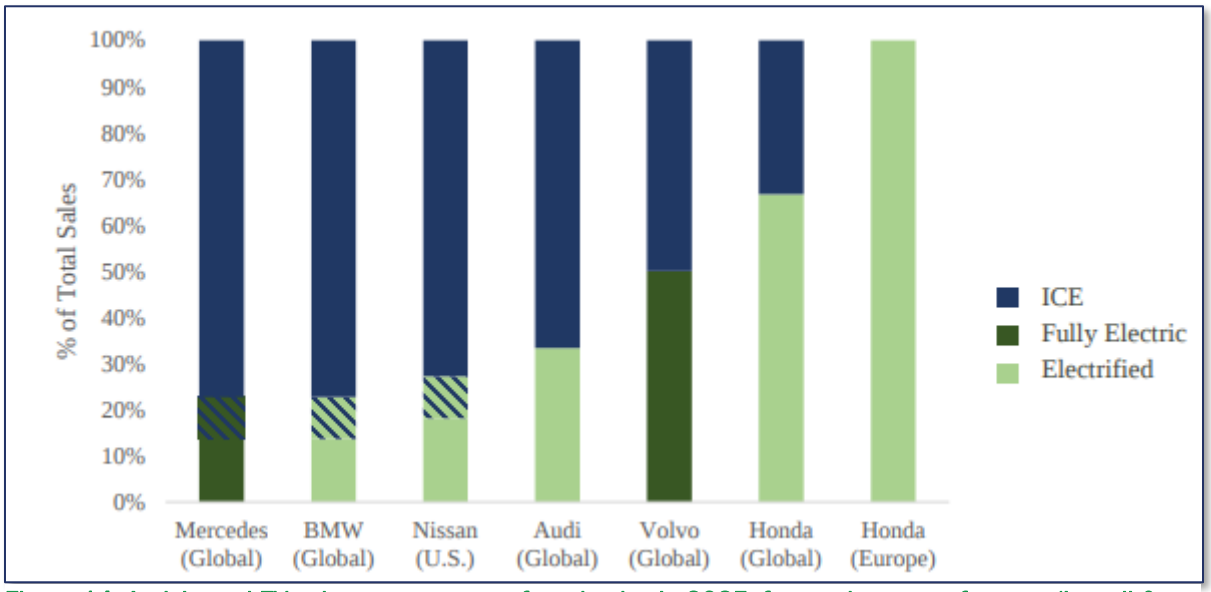


Figure 14: Anticipated EV sales as a percent of total sales in 2025, from select manufacturer (Lowell & Huntington, 2019)

Workplan

Ultimately, the success of meeting community goals of EV adoption requires public acceptance and adoption of EVs. The stakeholder group developed a 10-year workplan that identifies the key strategies to be implemented. With the City leading by example, the plan is intended to educate the community, grow community interest and support, and gain partners and community investment. Although developing residential charging infrastructure is not directly addressed through strategies in this focus area, it will be a critical component of successful implementation. This plan focuses on providing education and information on what is available in the market to help residents make informed decisions when installing chargers at home. This workplan is outlined in **Table 9**. Strategies that require a budgetary ask are marked with a **$**.

Table 9: Sowing the Seeds for Transition 10-year Workplan

Strategy Name	2020 ◄ ► 2030
S.1 Increase awareness with education events	
S.2 Dealership ride-and-drive events	
S.3 Add EV information to the City website and social media	
S.4 Educate on permitting process	
S.5 Assist and recognize local businesses with workplace charging	
S.6 Organize public group buys	
S.7 Include EVs in minimum required parking spaces	
S.8 Support adoption of state building code to require EV-ready construction	
S.9 Leverage TIF funding to require EV ready construction	

S 1. Increase awareness with education events

Responsible Department: Planning

Xcel Energy Support: Julie Thoney (community service manager)

Collaborate with Xcel Energy to develop and implement outreach and education campaigns designed to help residents understand the benefits of transitioning to an EV and to learn how to leverage applicable Xcel Energy programs to facilitate EV charger installation.

Key Milestones:

- Organize first event
- Develop a communications plan
- Set up a home charging demonstration
- Partner with Eau Claire County, Chippewa Valley Technical College (CVTC) and Eau Claire Energy Cooperative (ECEC)
- Organize a parking ramp demonstration
- Have a ribbon cutting at charging site
- Establish a free charging day or week in parking ramp
- Walk people through the process of owning and operating EVs (at events)

S 2. *Dealership ride-and-drive events*

Responsible Department: Planning

Xcel Energy Support: Julie Thoney (community service manager)

Sowing the Seeds for Transition team prioritizing strategies Eau Claire, WI, 2019 (Brendle Group)

Collaborate with local partners to host a ride-and-drive event to increase EV ownership by providing residents an opportunity to compare EVs to ICE vehicles through test drives. This also encourages local dealerships to stock more EVs, thus keeping business local. Showcase tools and information from vehicle manufacturers, clean air and transit regional entities, and the electric utilities.

Key Milestones:

- Find dealers willing to partner
- Work with regional non-profits to coordinate and facilitate ride and drives
- Organize a schedule of events with dealers, partners, City, Xcel Energy, and ECEC.
- Distribute information regarding Xcel Energy programs and services to dealerships.
- Promote tools and offerings that support EV's and at-home charging infrastructure.

S 3. *Add EV information to the City website and social media*

Responsible Departments: Planning and Community Services

Xcel Energy Support: Julie Thoney (community service manager)

The City will use its website as an outlet for EV information such as: types of vehicles, location of existing public charging stations, available rebates, and the permitting process steps for installing charging stations at homes and businesses. This may be part of a larger sustainability portal connecting to other REAP strategies.

Key Milestones:

- Update City webpages
- Create process and responsibility for social media blasts
- Co-brand materials with Xcel Energy and possibly with ECEC
- Provide utility literature that promotes home charging programs and services
- Leverage City image of Eau Claire around EV awareness and adoption

S 4. Education on permitting process

Responsible Department: Planning

Help local electrical contractors navigate the permitting processes required for EV charging station installation, to help streamline the process.

Key Milestones:

- Develop a guide or process checklist for what is required for EV infrastructure installation
    - Incorporate contact points where working with Xcel Energy is appropriate
- Include the guide or checklist in contractor training strategy identified in the Building a Strong Foundation focus area (B.9)

S 5. Assist and recognize local businesses with workplace charging

Responsible Department: Planning

Encourage local businesses to install EV charging stations by recognizing their efforts through local green business programs and by providing resources to facilitate the transition.

Key Milestones:

- Use City Green Awards to recognize businesses
- Partner with private sector for dual charging opportunities
- Educate business employees on availability and use of charging stations
- Help businesses with the fleet analysis they might need to encourage EV transition.
    - Include learnings from City fleet EV transition
- Provide a checklist of questions to guide the decision-making process for charger installation and/or EV fleet conversion
- Use local or regional grants for EV charger installations

S 6. Organize public group buys

Responsible Department: Planning

Partner with local dealerships to offer limited-time discounted pricing on EVs though a group buy for the general public.

Key Milestones:

- Develop dealer and non-profit partnerships to organize, advertise, and support group buys
- When there is available demand, organize a group-buy event

S 7. *Include EVs in minimum required parking spaces*

Responsible Department: Planning

Allow or require builders to include EV charging station parking spaces as part of the required off-street parking spaces for new commercial and multi-family building construction. This allows builders to include EV parking without having to obtain additional areas for parking to meet the minimum requirements. Timing could be such that the City requires make-ready infrastructure. Over time, could require actual minimum charging infrastructure.

Key Milestones:

- Research codes and zoning best practices
- Amend codes based on findings

S 8. *Support adoption of state building code to require EV ready construction*

Responsible Department: Planning

Retrofitting buildings and parking lots for EV charging can be expensive if not planned upfront, so there is significant cost savings associated in requiring EV-ready infrastructure during new construction. In Wisconsin, building codes are established at the State level. City of Eau Claire staff will work with State and local advocacy groups to encourage State legislature to adopt building code that requires EV-ready construction for residential and commercial new construction.

Parking lot retrofit for EV charging stations, Eau Claire, WI (City of Eau Claire)

Key Milestones:

- Lobby with League of WI Municipalities, RENEW Wisconsin, Wisconsin Clean Cities, and The Green Tier Legacy Communities (GTLC) network to support changes through State legislature

S 9. *Leverage Tax Increment Financing (TIF) to require EV ready construction*

Responsible Department: Planning

While the City cannot amend building code to require EV ready construction for all new buildings, it can amend the qualifications requirement for TIF funding (to require EV charging or EV-ready construction for these projects).

Key Milestones:

- Develop an amendment to the TIF policy to require EV charging or EV-ready infrastructure for City funding
- Pass amendment through City Council
- Incorporate EV-ready construction into Net Zero Energy Building Guide

HOW ARE WE GOING TO STAY ON COURSE?

This EV planning effort has worked hard to develop ambitious and achievable goals that align with the City's REAP and EV vision. To achieve the targets and EV goals outlined in this plan, the City of Eau Claire and its partners identified in the strategies above will work to maintain consistent and clear communication among themselves and with the community at large. Each focus area will have sub-teams that will communicate regularly to work out the details of strategy implementation, follow through with identified actions, and share progress and results. As these teams work to implement the strategies outlined in this plan, additional resources to support community EV transition are being developed by Xcel Energy's Partners in Energy and will be available at XcelEnergyCommunities.com starting in early 2020. The most up to date information about Xcel Energy's EV programs and offerings as well as basic information to help support EV adoption can be found at XcelEnergy.com/EV.

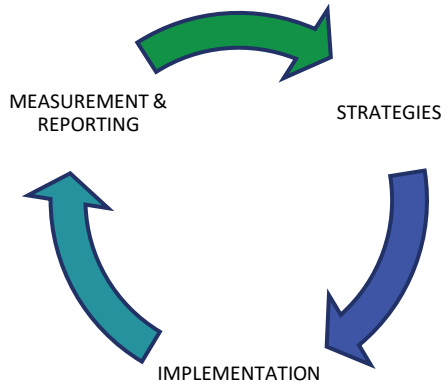


Figure 15. Actions and Tracking

Changing Course: Corrective Action

Even though this plan outlines strategies to promote EV adoption over the next 10 years, an effective plan is cyclical in nature (see **Figure 16**). In addition, the nature of implementation requires staging, flexibility, and course adjustment when necessary, to be successful and to sustain progress. To ensure this plan remains on track, the EV Team will track metrics by the focus areas outlined in **Table 10** - to review progress toward stated focus area targets and plan goals on an annual basis, to assess whether the efforts appear to be making an impact.

Table 10: Implementation Tracking Metrics

Focus Area	Leading the Way	Building a Strong Foundation	Sowing the Seeds for Transition
Target	Replace 15% of municipal fleet with EVs by 2030	There will be 160 public charging stations in Eau Claire by 2030	A minimum of 8,000 of the vehicles registered in Eau Claire in 2030 will be electric vehicles
Metric	Number of fleet electric vehicles	Number of public charging stations	Number of registered EVs
Data Source	Fleet vehicle inventory	Alternative Fuels Data Center – US DOE	DMV vehicle registration data

To accommodate the fluid nature of action and implementation and to learn from experience early in the process, the focus area groups will schedule team meetings at least annually. This meeting will allow the opportunity to review the relevant metrics, discuss roadblocks, and provide a forum for agreeing on course adjustments or new approaches necessary to hit plan targets. The Xcel Energy EV Toolkit can be a good resource for identifying new strategies to address unexpected barriers that may come up. Any adjustments will be documented and shared with the broader group and community as they occur.

Sharing Progress

It will be important to let the wider community know how things are progressing and to recognize the collaborative efforts of those involved in hitting the plan targets. At critical milestones, the City of Eau Claire will publish updates on progress, share successes, and congratulate participants and partners through various communication channels (which may include the EV website developed in strategy S.3).

Beyond the Plan Horizon

Looking beyond the plan horizon, it is recommended that the City reassess the EV goals and successes achieved over the implementation period. Based on lessons learned over the 10-year implementation period, the City will update to the EV roadmap, focused on EV adoption to meet the City's 2040 carbon reduction milestone. Additional updates to this plan may be necessary as goals are achieved and new opportunities and technologies emerge.

EV Strategy Identification and Workplan Development Eau Claire, WI, 2019 (Brendle Group)

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APPENDIX A

Based on the U.S. Environmental Protection Agency's (EPA) estimation that the typical passenger vehicle emits 404 grams of CO_2 equivalent (CO_2e) per VMT, the average Eau Claire resident contributed 4.7 metric tons of CO_2e in 2018 through vehicle travel. This is consistent with the national average resident contribution of 4.6 metric tons of CO_2e (US EPA, 2018). The average EV uses 34 kilowatt-hours (kWh) per 100 miles (US DOE, 2019). Based on Xcel Energy's 2017 CO_2e emissions intensity factor for the Upper Midwest, if an Eau Claire resident used an EV to drive the 2018 average VMT, the resulting CO_2e emissions would be 1.3 metric tons as shown in the equations below (Xcel Energy, 2018).

$$(Average\ energy\ use\ per\ EV)x(2018\ average\ VMT)x(2017\ CO_2\ emissions\ intensity\ factor)$$

$$= \frac{34\ kWh}{100\ mi} x \frac{10{,}500\ VMT}{avg\ resident} x \frac{0.373\ MT\ CO_2e}{1000\ kWh} = 1.3\ MT\ CO_2e$$