

# RECORD OF PROCEEDINGS

Dublin City Council

Minutes of

Meeting

GOVERNMENT FORMS & SUPPLIES 844-224-3338 FORM NO. 10148

Held \_\_\_\_\_ October 7, 2024 \_\_\_\_\_ 20 \_\_\_\_\_

## CALL TO ORDER

Mayor Amorose Groomes called the Monday, October 7, 2024 Regular Council Meeting of Dublin City Council to order at 7:00 p.m.

## ROLL CALL

Present were Vice Mayor Alutto, Mayor Amorose Groomes, Ms. De Rosa, Ms. Fox, Mr. Keeler, Ms. Kramb and Mr. Reiner.

Staff members present were Ms. O'Callaghan, Mr. Hartmann, Chief Paez, Ms. Weisenauer, Mr. Stiffler, Mr. Earman, Mr. Bitar, Ms. Willis, Mr. Rayburn, Mr. Gable, Mr. Hammersmith, Ms. Blake, Mr. Althouse, Ms. Wade, Ms. Goliver and Mr. Ament.

Others present: Jack O'Grady, Franklin County Auditor's Office; Sherry Kish and Paul El Asmar, HNTB.

## PLEDGE OF ALLEGIANCE

Mayor Amorose Groomes invited Ms. Kramb to lead the Pledge of Allegiance.

## CITIZEN COMMENTS

Sharon Montgomery, 572 Bonnington Way, Gahanna came forward to discuss distracted driving penalties at both the local and state level.

## CONSENT AGENDA

- Minutes of the September 16, 2024 Regular Council Meeting
- Minutes of the September 30, 2024 Special Council Meeting
- Excuse the Absence of Council Member Keeler and Council Member Fox from the September 16, 2024 Regular Council Meeting.

There was no request to remove an item from the Consent Agenda.

Vice Mayor Alutto moved to approve the Consent Agenda.

Mr. Keeler seconded the motion.

Vote on the motion: Ms. De Rosa, yes; Ms. Kramb, yes; Mr. Keeler, yes; Vice Mayor Alutto, yes; Mr. Reiner, yes; Ms. Fox, yes; Mayor Amorose Groomes, yes.

## INTRODUCTION/PUBLIC HEARING – ORDINANCES

### **Ordinance 38-24**

### **Authorizing the Annexation of 161.8 acres, more or less, of property from Washington Township, Franklin County to the City of Dublin, Ohio**

Vice Mayor Alutto introduced the Ordinance.

Mr. Hartmann stated that this ordinance begins the process of annexing the recently acquired property that falls outside the City of Dublin limits. This annexation will use the process outlined in the Ohio Revised Code for municipally owned properties. The municipally owned annexation process is the simplest process because it is already in Franklin County and Washington Township. It is expected that this annexation will be completed by the end of the year.

There were no public comments.

Mayor Amorose Groomes clarified a sentence in the accompanying memo that referred to Washington County. Mr. Hartmann stated that was an error that should read Washington Township. He will make the correction prior to second reading.

Second reading/public hearing is scheduled for October 21, 2024.

# RECORD OF PROCEEDINGS

Dublin City Council

Minutes of

Meeting

GOVERNMENT FORMS & SUPPLIES 844-224-3338 FORM NO. 10148

October 7, 2024

Page 2 of 10

Held \_\_\_\_\_ 20 \_\_\_\_\_

## **Ordinance 39-24**

### **Authorizing the Submission of a petition for the regular annexation of 79 acres, more or less, of property from Darby Township, Madison County to the City of Dublin, Ohio**

Vice Mayor Alutto introduced the Ordinance.

Mr. Hartmann stated that this Ordinance follows the annexation process outlined in the Ohio Revised Code for majority owner property in the area to be annexed. This property is currently located in Madison County, Darby Township. It is a longer process and preserves the City's ability to maintain the long-standing policy of keeping Dublin corporation limits within the same township (Washington Township). This annexation process is the only process that allows the City to conform township boundaries after annexation. The City will petition to have the boundaries of the township adjusted after the annexation is complete. This annexation process will require a hearing before the county commissioners, likely in the spring of 2025. It is anticipated that this annexation process will conclude sometime next summer.

There were no public comments.

Second reading/public hearing is scheduled for October 21, 2024.

## **INTRODUCTION/PUBLIC HEARING/VOTE – RESOLUTIONS**

### **Resolution 51-24**

#### **Accepting the Lowest and Best Bid for the Sanitary Sewer Lining & Repair 2024 Project (24-012-CIP)**

Vice Mayor Alutto introduced the Resolution.

Mr. Hendershot stated that this resolution is regarding the sanitary sewer lining and repair project for 2024. The scope of work for this Project includes cured-in-place lining and associated repairs of 8-inch, 10-inch, and 12-inch sanitary sewer mains within the City of Dublin's sanitary sewer collection system. The lining of the sanitary sewer protects the integrity of the pipe system and prevents stormwater infiltration into the system which reduces the frequency and occurrences of sanitary sewer overflows and water in basement events. Additionally, this project is a critical component of the City of Dublin's ongoing efforts to maintain its sanitary sewer infrastructure and meet the Ohio Environmental Protection Agency (OEPA) Director's Final Findings and Orders agreed upon by the City of Dublin on February 11, 2009. The sanitary sewer lining locations include the subdivisions of: Asherton, Dublinshire, Earlington Village, Indian Run Meadows, Villas at Earlington, Woods of Dublinshire, and Woods of Indian Run. The engineer's estimate for the Project is \$1.4 million and the budgeted funds for the project in the CIP are \$1.5 million.

On September 13, 2024, eight (8) bids were received and publicly opened. United Survey Inc. submitted the lowest and best bid of \$1,399,470.00. The work for this project is expected to begin November 2024 and be completed by May 2025.

Mr. Hendershot shared that the contractor will provide notification to all impacted residents approximately seven calendar days prior to work being performed. The notification will be in writing and will include the contractor name and 24-hour phone number, a description of work being performed, and instructions to impacted residents. A second notification will be made 24 hours in advance of the work being performed. This notification will include specific dates of work, start times, and any water/sanitary sewer restrictions. Residents will receive a third notification upon completion of the work.

There were no public comments.

In response to a question by Ms. Fox regarding the lifespan of sewer linings, Mr. Hendershot stated that per the specifications, the lifespan is about 50 years. She asked if it is possible to double-line the mains, to which Mr. Hendershot responded affirmatively.

Ms. De Rosa asked about the notifications and in what form those notifications will be made. Mr. Hendershot stated that the letter will be sent so that it is received by the resident seven days prior to the work starting. Ms. De Rosa suggested that a letter to the homeowners association (HOA) could also be helpful. Mr. Hendershot stated that staff will inform the HOAs as well. The 24-hour notification is a knock on the door by the contractor so they can advise of any restrictions for a given time period.

Vote on the Resolution: Mr. Keeler, yes; Ms. Kramb, yes; Vice Mayor Alutto, yes; Mr. Reiner, yes; Mayor Amorose Groomes, yes; Ms. De Rosa, yes; Ms. Fox, yes.

**Resolution 52-24**

**Accepting the Lowest and Best Bid for the Riverside Drive West Shared Use Path Project (22-019-CIP)**

Vice Mayor Alutto introduced the Resolution.

Mr. Gable stated that this project constructs 880 feet of shared use path along the west side of Riverside Drive from Emerald Parkway to the Dublin Arts Council Driveway (7135 Riverside Drive), including a 130-foot single span steel pedestrian bridge. \$720,000 is budgeted for this project in the 2024-2028 Capital Improvements Program (CIP). On September 18, 2024, three bids were received and publicly opened. V3 Construction Group, Ltd. submitted the lowest and best bid of \$790,500.00. Staff anticipates being able to cover the additional Project cost using other unencumbered budgeted funds in the CIP. Construction is expected to begin in spring of 2025 and will be complete in fall 2025.

There were no public comments.

Mr. Reiner thanked Council for their support of this improvement on behalf of Dublin Arts Council.

Ms. De Rosa asked about the width of the path. Mr. Gable stated that when connecting to existing paths, staff usually maintains the style and design of the existing paths and applies that to the added section. He agreed that whenever possible they try to make new paths 11 feet wide.

Mayor Amorose Groomes asked about the difference between what was budgeted for the CIP and the Engineer's Estimate. Mr. Gable stated that the budget was put together in the middle of 2023 and costs have gone up since then.

Vote on the Resolution: Mr. Reiner, yes; Ms. Fox, yes; Ms. De Rosa, yes; Mr. Keeler, yes; Ms. Kramb, yes; Mayor Amorose Groomes, yes; Vice Mayor Alutto, yes.

**Resolution 53-24**

**Accepting the Lowest and Best Bid for the Mobility Infrastructure Improvements Program 2023 Project (23-019-CIP)**

Vice Mayor Alutto introduced the Resolution.

Mr. Gable stated that the scope of work for this project includes work in two areas of the City. The first area performs the realignment and reconstruction of approximately 198 feet of 8-foot wide shared use path along Hyland-Croy Road. This will address an existing safety concern with the shared use path curvature along Hyland-Croy Road north of Corazon Drive. The second area performs the construction of approximately 120 feet of 5-foot wide sidewalk along the frontage of 6477 Sawmill Road. The addition of a sidewalk along this portion of Sawmill Road will provide a valuable connection to area bus routes and will address the only remaining gap in pedestrian facilities in the 6400 block of Sawmill Road. The 2024-2028 Capital Improvements Program (CIP) includes \$300,000 for construction of the Mobility Infrastructure Improvements Program 2023 Project.

On September 18, 2024, two bids were received and publicly opened. Strawser Paving Company, Inc. submitted the lowest and best bid of \$168,994.50. The work for this Project is expected to commence in spring 2025, with construction to be substantially complete, including final restoration and landscaping, by the end of May 2025.

# RECORD OF PROCEEDINGS

Dublin City Council

Minutes of

Meeting

GOVERNMENT FORMS & SUPPLIES 844-224-3338 FORM NO. 10148

October 7, 2024

Page 4 of 10

Held \_\_\_\_\_

20 \_\_\_\_\_

There were no public comments.

Ms. Fox asked about the safety concern on Hyland-Croy and Corazon. Mr. Gable stated that there have been repeated issues with safety in this area. This improvement will make the path safer for users.

Ms. De Rosa asked about striping on the paths where there can be safety issues. She stated that she does not expect an update on that this evening but would like to know the status of that work.

Mayor Amorose Groomes asked if the Sawmill Road connection is for the bus shelter that is planned along Sawmill. Mr. Gable stated that the bus shelter is north of this section. This connection is needed because the grass is worn down along the area due to foot traffic. Ms. Kramb added that there is an active bus stop just south of where this connection will be. Mayor Amorose Groomes asked about any other missing connections along the Sawmill Road corridor. Mr. Rayburn stated that the only other area that needs connectivity is the area in front of the dealership (Germain) on Sawmill. He added that everything north of Summit View is not a shared use path but could be in the future. In response to Mayor Amorose Groomes' question regarding when the portion in front of the dealership will be coming, Mr. Rayburn stated that it is expected next year.

Vote on the Resolution: Mayor Amorose Groomes, yes; Mr. Reiner, yes; Ms. Fox, yes; Ms. De Rosa, yes; Mr. Keeler, yes; Vice Mayor Alutto, yes; Ms. Kramb, yes.

## OTHER BUSINESS

- 2025 Meeting Calendars

Ms. Delgado introduced the proposed regular meeting schedule, work session calendar and committee schedule for 2025. The following dates were highlighted:

- The Revised Charter requires that Council meet at least once per month. The meeting proposed in July is proposed for Tuesday, July 1. This would allow Council to recess after the July 1 meeting until the first meeting in August;
- The Joint Work Session is proposed for Tuesday, September 2, following the Labor Day holiday on Monday;
- Following Council's direction, the Council Goal Setting Retreat is proposed to be held November 13 and 14; and
- One meeting is proposed in December (Monday, December 8), consistent with past practice.

Committee schedules follow the same meeting cadence as 2024.

Staff recommended Council review the schedules, provide feedback and adopt the 2025 schedules at the October 21, 2024 meeting.

Ms. Fox asked if the City observes Columbus Day. Ms. Delgado stated that City offices are open for Columbus Day.

Ms. De Rosa stated that she appreciates the calendar view.

- 2024 Fall - Beautify Your Neighborhood Grant Application

Ms. Mullinax stated that the Beautify Your Neighborhood Grant fund has an annual fund of \$32,000. \$26,320.60 was awarded in the spring leaving \$5,670.40 for the fall applications. One application was received from the Woods of Indian Run in the amount of \$1,756.01. The application area is for the north entry feature at Coffman Road and Forest Run Drive. The project includes removal and replacement of 10 Taxus Hicksii Yews which were damaged due to

a root fungal infection. On September 17, the Community Development Committee recommended approval to City Council of the grant application.

Mayor Amorose Groomes moved to approve the Beautify Your Neighborhood grant as recommended by the Community Development Committee. Vice Mayor Alutto seconded.

Vote on the motion: Vice Mayor Alutto, yes; Mayor Amorose Groomes, yes; Ms. De Rosa, yes; Ms. Fox, yes; Mr. Keeler, yes; Ms. Kramb, yes; Mr. Reiner, yes.

- **Dublin Electric Vehicle (EV) Infrastructure Comprehensive Plan**

Mr. Rayburn stated that this presentation is a first review of the City’s EV Comprehensive Infrastructure Plan (attached hereto and incorporated herein by reference as Exhibit A). He stated that this presentation will include: EV trends, charging infrastructure, Dublin electrification efforts, potential funding and recommendations of the plan. He stated that the development of this plan has been a citywide effort. The work on this plan will help Dublin in its grant application efforts if and when the City is ready to implement EV charging infrastructure. The documentation for this plan also supported a grant at the federal level that resulted in 18 additional charging ports – 12 on City property and 6 for OhioHealth. He introduced Sherry Kish and Paul El Asmar, HNTB. Ms. Kish explained the three types of EV charging, which are:

- Level 1 – long-dwell sites or where installing a 240V circuit is not feasible. These may be seen in mobility hubs being used for scooters and e-bikes.
- Level 2 – dwell times of a few hours (commercial locations) and EV owners with a 240V circuit installed at their residence.
- Direct Current Fast Charging (DCFC) – short dwell sites where charging speed is significantly more important than cost (gas stations, highway corridors).

She shared that the City of Dublin currently owns and operates 19 Level 2 ports and 2 DCFC ports. Elsewhere in Dublin, there are 83 publicly accessible, privately owned chargers and 6 publicly accessible DCFC ports. To begin the forecasting part of plan development, Ms. Kish stated that they looked at new AFV (alternative fuel vehicles) that have been registered in Dublin. The adoption rate of AFVs in Ohio is about 4% as of July 2024. Dublin’s adoption rate is almost 10% as of July 2024, which is more than double the State’s adoption rate. The projected EV growth in Dublin by 2030 is anticipated to be 40% of total vehicle registrations.

Ms. Kish shared the use of Dublin’s current EV chargers (Exhibit A – slide 9).

**Dublin Charger Use**

Station Name	# Unique Users / # Sessions	Average # of Sessions per Port per Day	* Active Charging Utilization (2024)	**National Utilization Average (2024)	**Ohio Utilization Average (2024)
Rec Center (Level 2)	148 / 925	5.2	35%	14.5%	Unknown
City Hall (Level 2)	78 / 471	1.3	23%	14.5%	Unknown
Dublin Library (Level 2)	617 / 1,696	3.1	26%	14.5%	Unknown
Darby Lot #1 (DCFC)	285 / 1,061	11.8	40%	17.1%	7%
Darby Lot #2 (DCFC)	312 / 1,112	12.4	41%	17.1%	7%

*\*Active Charging Utilization describes when at least one charging port at the facility is delivering power and does not include idle time  
Dublin Data from ChargePoint Dashboard, Feb 1 – April 30, 2024*

*\*\*National and Ohio utilization is defined as the % of time in a 24-hour day that each charger is plugged into a vehicle, regardless of whether that charger is actively dispensing power.*

Ms. Kish stated that utilization is up 100% from 2023. She noted the difference between Dublin’s active charging utilization and the national average.

**Recommendations**

*EV Charger Equipment Recommendation*

Ms. Kish explained that when the utilization rate reaches 30%, it is time to evaluate whether more charging stations are warranted in that location. She stated that to keep up with demand in Dublin, the plan recommends adding another 499 (476 Level 2 and 23 DCFC) stations in Dublin. 349 (333 Level 2 and 16 DCFC) of those would be privately funded and 150 (143 Level 2 and 7 DCFC) would ideally be publicly funded. This would put the total chargers in Dublin to 588 by the year 2032 (Exhibit A – slide 10).

*Charging Infrastructure Deployment Recommendation*

Ms. Kish shared that determining where the additional chargers would need to be installed is the next important part of the recommendation. Regarding deployment of charging infrastructure (Exhibit A - slide 11), the plan specifies three levels of implementation:

- Short-Term (2024 – 2025), consists of:
  - Selecting 2-3 sites for charger deployment planning and creating a process for assessing sites;
  - Meeting with the appropriate utility provider;
  - Meeting with private employers to understand their roadmap on offering chargers for employees, including incentives such as front row parking;
  - Maintaining a database of EV chargers; and
  - Considering additional chargers if 30% usage for three months is achieved at a given location.
- Medium-Term (2025 – 2030), consists of:
  - Reviewing the remaining sites for charger deployment for City and private locations; and
  - Updating projections every two years to check adoption, regulation and funding changes.
- Long-Term (2030 – 2035), consists of:
  - Reassessing the needs based on changes in EV technology, adoption rate and private charging availability.

She stated that this process allows for the consistent reevaluation of conditions as time progresses.

*Municipal Fleet Recommendations*

Ms. Kish recognized the Dublin Fleet team for advancements and achievements in sustainability. She shared that the municipal fleet has saved 44,000 gallons of gas in 2023. She stated that there are specific recommendations included in the plan for the Dublin Fleet Division (Exhibit A - slide 16). There will never be a recommendation to a whole-sale change to electric vehicles, because the City of Dublin needs to be resilient in times of natural disasters and potential electrical service interruptions.

*Policy and Regulation Recommendations*

Ms. Kish shared the Short-Term, Medium-Term and Long-Term action items (Exhibit A - slide 18). She noted the importance of talking with builders/developers about including charging capabilities in new builds.

*Fee and Code Recommendations*

Ms. Kish highlighted the following regarding fee and code recommendations. Reviewing the options for fees is the first item of note as most EV users are accustomed to paying for the use of the charger, but it is free in Dublin. She also noted that code changes may become necessary to deter gas-powered vehicles from parking in an EV charging spot.

Ms. Kish reiterated that this report was created to build upon Drive Ohio's EV Framework to position Dublin in a desirable position for grant funding. Other

# RECORD OF PROCEEDINGS

Dublin City Council

Minutes of

Meeting

GOVERNMENT FORMS & SUPPLIES 844-224-3338 FORM NO. 10148

October 7, 2024

Page 7 of 10

Held \_\_\_\_\_ 20 \_\_\_\_\_

recommendations that are in the plan, but not called out in this presentation include the funding and communication, including public outreach.

### Next Steps

Ms. Kish shared the following next steps:

- Create an internal implementation team to prioritize short-term recommendations and ensure staff involved are aware of this plan;
- Work with the Planning Department on the update of the Zoning Code; and
- Council may refer the policy development and discussion of EV charging to a Committee of Council.

Staff sought feedback from Council on the proposed Dublin EV Infrastructure Comprehensive Plan.

### Council feedback included the following:

Mr. Keeler asked for more information and clarification regarding privately funded charging stations. He used the recommendation of adding 14 charging stations to Metro Center as the example. He believes these office buildings would take care of themselves as employees express a desire for EV charging stations. He asked if the recommendation is that the City work with private partners to install EV charging stations at the Library or the Darby lot. Mr. Rayburn stated that they can be privately owned but they would need to be publicly accessible. He anticipates working with Economic Development and Planning to ensure that adding EV charging stations is part of the development conversation.

Ms. Kramb stated that an example of this type of partnership is seen at the Bridge Park parking garage. The garage is owned by Crawford Hoying, but there are public EV charging stations for anyone's use.

Mr. Keeler stated that the number of charging stations seems ambitious. Some of the automakers have backtracked their projections a bit on electric vehicles. There seems to be some skepticism that we have the infrastructure to power electric vehicles.

Ms. De Rosa asked about the cost associated with these EV charging stations. Ms. Kish stated that a DCFC charger install would cost about \$150,000. Ms. De Rosa suggested having more cost figures included in the report. She stated she has no idea what it costs to support these charging stations. She would like to see a more robust financial analysis. She stated that replacement expectation, factoring in the changes in technology, is also an important piece of information when considering if and when these are installed. Ms. Kish stated that it costs the City of Dublin about \$134,000 a year (for both Level 2 and DCFC) to offer free electricity for EV chargers. Ms. O'Callaghan stated that staff does have cost related information, but was waiting to go into that level of detail with a committee if Council chose to refer this topic. Ms. De Rosa expressed appreciation for continuing the conversation with Planning. She also expressed that she would like to see the City's internal plan for the City's fleet.

Vice Mayor Alutto stated that she would like to see additional benchmarking from comparable cities to see how Dublin compares. She would like to see this be part of the cost recovery model policy that the City uses for other services. She was interested in the EV charging etiquette and wondered if technology existed to alert owners when their car is finished charging via an app or notification. She also would like to know more about the public/private partnership opportunities and whether there could be branding opportunities and assistance with implementation costs. She agreed with Ms. De Rosa that flexibility in infrastructure is important with technology and future advancements.

# RECORD OF PROCEEDINGS

Dublin City Council

Minutes of

Meeting

GOVERNMENT FORMS & SUPPLIES 844-224-3338 FORM NO. 10148

October 7, 2024

Page 8 of 10

Held \_\_\_\_\_

20 \_\_\_\_\_

Mr. Reiner stated that he too would like to see the costs associated with the installation of these chargers. He also agrees with cost sharing and seeking out partnership opportunities. Future advancements are coming, so he stated he would like to keep an eye on that as well.

Ms. Fox found this information very interesting. She would like to see additional cost and data surrounding implementation. She stated she does not think the City should be the main supplier for public charging. She would like to see the strategies associated with public/private partnerships and the options explored further. She shared some research she found regarding the Detroit Smart Parking Lab and the work they do there. She stated that the work they are doing with different types of charging stations is fascinating. She agrees that changing technology is important to stay tuned into. She also agreed that the entire fleet should not be electric, but recent hurricanes are showing the importance of having gas powered resources. She suggested looking at hybrid options for our resources. She is appreciative of the conversations happening with Planning.

Ms. Krumb shared her support for sending this topic to a committee to continue work. She also expressed support for continuing to look for grant opportunities. She agrees that financial information should be included.

Mayor Amorose Groomes clarified that most of the charging stations have been built to date with grant funding. She stated that the \$150,000 per unit sounds alarming, but the City has not paid that. Ms. Kish stated that the \$150,000 is for the DCFC, but the Level 2 cost is in the \$7,000-\$12,000 range. Mayor Amorose Groomes would like to see the use study be tied to business operating hours (non-overnight hours), because the demand changes significantly at 12:00 p.m. versus 4:00 a.m. She spoke more in favor of the DCFC stations rather than the Level 2. Due to the level of interest of all Council members, she suggested keeping the topic at the Council level and not referring it to a committee at this time. Ms. Krumb agreed.

Mayor Amorose Groomes stated that spaces should be well marked, and the industry standard charging should be offered. If an adaptor were to be needed, it should be the owner's responsibility to have that adaptor with them. Mayor Amorose Groomes would like to know exactly what the investment would be to the City going forward if these recommendations come to fruition. She would like to be able to tell the story.

Ms. O'Callaghan stated that one of the reasons that the Drive Ohio framework was followed and this plan was developed was to put the City in a great position to secure grant funding opportunities. Ms. O'Callaghan clarified Council's desire to have a work session on the plan in its entirety or would the fee aspect be referred to committee. Some of the recommendations in the plan do require more vetting and discussion. Council consensus was to have a work session on the entire plan prior to its adoption.

Mayor Amorose Groomes stated her support for including the building code requirement of running 220V to the house for the purposes of charging. She stated that requiring that of any structure that has a garage would be a good service to residents.

Mr. Keeler suggested that municipal fleet and equipment needs to be considered when advancing sustainable technology.

## STAFF COMMENTS

Ms. O'Callaghan shared the following:

- Dublin has recently been recognized as a Runner Friendly Community for the period 2024 – 2029 by the Road Runners Club of America, one of five cities to be newly awarded and only the third city in Ohio to earn this designation. The others include Dayton and Toledo. To be awarded the designation, communities must



# RECORD OF PROCEEDINGS

Dublin City Council

Minutes of

Meeting

GOVERNMENT FORMS & SUPPLIES 844-224-3338 FORM NO. 10148

October 7, 2024

Page 9 of 10

Held \_\_\_\_\_ 20 \_\_\_\_\_

meet a set of stringent criteria, including community infrastructure, community support, government support, and additional support such as youth programs, running clubs, marked pathways, and more. Nominations take place twice a year with the home running club taking the lead in completing the submission. Staff worked in partnership with Columbus Running Club to finalize and submit our application. As a Runner Friendly Community, Dublin will be listed on the organization's website and will receive a commemorative plaque. Dublin will also be featured in a national press release and in the Road Runners Club of America's Annual Report.

- Staff from Community Events attended the International Festival Events Association conference in Pittsburgh last week and picked up some awards for the Dublin Irish Festival. The Festival received 2 gold awards for social media efforts, 3 silver awards including one for best merchandising program and for the Festival's emergency preparedness plan and 2 bronze for the website and TV promotion. Congratulations to our Community Events team this is great international recognition!
- The City of Dublin was honored with two American Public Works Association awards at the recent Public Works Expo. The City received the Technical Innovation Award for the implementation and usage of a new road weather information system using Vue Robotics weather camera stations. Operations Administrator, Gary Browning, received the Excellence in Education Award, recognizing his work in delivering educational opportunities for all levels of public works.
- Dublin's Halloween Spooktacular will take place next week on Thursday, October 17 and Friday, October 18 in Coffman Park.

## COUNCIL COMMITTEE REPORTS

- Community Development Committee Report  
Mr. Reiner stated that, in addition to the Beautify Your Neighborhood grant approved earlier this evening, the Committee discussed the City's code enforcement program and its role in the development review process. He stated that discussion was held regarding the quality that the City demands on its aesthetics. It was a great discussion of the importance of how the visual aspects that set Dublin apart from other cities are enforced. It is important to the community that the City keeps those standards up.  
Ms. Fox stated that the aesthetics of the City are a primary foundational aspect of the Committee.
- Administrative Committee Report  
Ms. De Rosa stated that there were three topics heard by the Administrative Committee. They were:
  - A report regarding the elected official/appointee required training. The Committee was supportive of incorporating some of the DEI and Ethics topics into the annual training that is done with members and aligning the training with the appointment terms. The next training plan will be shared with Council when ready.
  - Secondly, the Committee reviewed the draft retreat agenda and incorporated feedback from Council regarding topics. A draft copy of the agenda was provided to Council.
  - Lastly, the Committee reviewed the draft agenda for the Joint Work Session with Council, PZC, ARB and BZA. A copy of that agenda has been shared with Council also.

# RECORD OF PROCEEDINGS

Dublin City Council

Minutes of

Meeting

GOVERNMENT FORMS & SUPPLIES 844-224-3338 FORM NO. 10148

October 7, 2024

Page 10 of 10

Held \_\_\_\_\_ 20 \_\_\_\_\_

## COUNCIL ROUNDTABLE

Ms. De Rosa reported that:

- the street trees in her cul-de-sac have been replaced for the third time due to disease. She suggested looking at the planted inventory over the next 10 years, 20 years, etc. Mr. Reiner stated that the staff is well apprised of environmental issues and disease issues that are present. Mayor Amorose Groomes stated that our planted environment resiliency is a good topic for the Committee to investigate. Council consensus was to add this topic to a Committee agenda.
- Ms. De Rosa offered her congratulations and thanks to Pat Losinski who recently retired from his post as CEO of the Columbus Metropolitan Library. During his tenure, every branch of the library was either updated or re-built. She congratulated Lauren Hagan as the new CEO. The Dublin branch has a new Branch Manager and her name is Trish Piliado.
- Tolles celebrated their 50<sup>th</sup> anniversary – congratulations to them;
- The Economic Development meeting was an excellent well-attended event on October 3<sup>rd</sup>; and
- She congratulated staff for all the awards and recognition.

Ms. Fox congratulated staff on the Economic Development Strategic Plan open house. She also expressed gratitude to staff for their presentations at the event.

Mr. Reiner expressed congratulations to the staff for the awards. He encouraged everyone to join the Dublin Arts Council in celebrating their 40<sup>th</sup> anniversary on October 9.


Vice Mayor Alutto congratulated staff on the awards won. She mentioned that even though the school district is a separate entity from the City, Dublin schools is having a redistricting public meeting on October 21 and public input will be taken regarding the upcoming redistricting in 2025.

Mayor Amorose Groomes reported that:

- She was in Washington D.C. for an FCC meeting where their findings were shared at the FCC Board meeting. Her working group is waiting on feedback and she will keep Council apprised of this work.
- She thanked Town Square for the stakeholder interviews. She thought their questions were good.
- She congratulated the Chamber of Commerce on a sold out "Taste of Dublin" event.
- She attended the Impact Lab groundbreaking in East Liberty.
- She and the City Manager attended the COMMA meeting last Friday (October 4) and there were many great speakers brought in by Kenny McDonald of One Columbus. The topic was affordable housing and workforce housing and overall housing expansion in the region. She stated that she provided the feedback at the conclusion of the meeting that the housing problems are well documented, but not the solutions.
- She congratulated staff on all the awards and thanked them for representing the City with excellence.

## ADJOURNMENT

The meeting was adjourned at 8:43 p.m.



Mayor – Presiding Officer



Clerk of Council



# CITY OF DUBLIN, OHIO DUBLIN EV INFRASTRUCTURE COMPREHENSIVE PLAN

OCTOBER 2024



## LIST OF TABLES

Table 1: Working Group Participants.....	6
Table 2: Eligible Funding Opportunities.....	11
Table 3: Number of Ports by Ownership.....	14
Table 4: Replacement and New Vehicles CIP 2023.....	17
Table 5: Fleet Management Vehicle Request 2024-2028.....	17
Table 6: Dublin Charger Utilization and National Averages.....	19
Table 7: Idle Time by Charger Type.....	21
Table 8: Dublin Electrification Scenarios - Low, Medium, and High.....	23
Table 9: Dublin 2030 Electrification Recommendations.....	24
Table 10: Public Level 2 and DCFC Recommended Implementation Targets by Year.....	24
Table 11: Estimated EVSE Costs Through 2030.....	25
Table 12: EV Charging Best Practices for Private Developers.....	27
Table 13: Key Considerations for the City of Dublin.....	28

## LIST OF FIGURES

Figure 1: City of Dublin Vision.....	6
Figure 2: SWOT Analysis.....	8
Figure 3: Level 1, Level 2, and DC Fast Charging.....	9
Figure 4: US EV Sales 2023.....	10
Figure 5: Ohio New Alternative Fuel Vehicle (AFV) Registrations.....	12
Figure 6: Total PEV Registrations and PEV Fleet Percentage in Dublin.....	13
Figure 7: Top EV Registrations in Dublin.....	14
Figure 8: Existing EV Chargers in and Around Dublin.....	15
Figure 9: City of Dublin Owned Existing Chargers.....	16
Figure 10: Starting and Ending State of Charge for DCFC Sessions.....	20
Figure 11: Future EV Charging Location Recommendations.....	26

## CONTENTS

1 Executive Summary.....	4
2 Introduction and Goal.....	6
2.1 SWOT Analysis.....	7
3 Trends in Electrification.....	9
3.1 National EV Trends.....	10
3.2 State EV Trends.....	11
4 Electrification Efforts to Date.....	12
4.1 Dublin Trends.....	13
4.2 Dublin Fleet.....	16
4.3 Dublin-Owned Charger Usage Analysis.....	18
4.4 Fees for EV Charger Use.....	21
5 Charging Infrastructure Needs.....	23
5.1 Charging Projection Scenarios.....	23
5.2 Electrification Best Practices.....	26
6 Electrification Recommendations.....	30
6.1 Charging Infrastructure Deployment.....	30
6.2 Planning and Zoning Codes, Building Standards.....	31
6.3 Partnerships.....	32
6.4 Education and Outreach.....	33
6.5 Dublin Fleet.....	34
6.6 Funding.....	35
6.7 Fee and Law Considerations.....	36
Appendix A – Existing Conditions.....	37
Appendix B – EV Charging Forecasting.....	64

## 1 Executive Summary

Dublin, Ohio, aspires to be the most sustainable, most connected and most resilient global City of choice through state-of-the-art infrastructure, convenient transportation and expansive broadband access. With a 100-gigabit fiber network, strategic private and public partnerships, and significant investments in innovation, Dublin is emerging as a global leader providing an ecosystem for companies to beta test new technologies. The City is working to “improve lives, drives and experiences” by embracing the significant shift in the automotive industry towards sustainability. Recognizing the potential of electric vehicles (EVs) to reduce carbon emissions and dependence on fossil fuels, Dublin has actively engaged in fostering the adoption of EVs and the development of necessary charging infrastructure for the City fleet, residents and visitors.

This Implementation Plan builds upon the comprehensive analysis of Dublin’s current electrification conditions presented in the preceding Existing Conditions Report (Appendix A). It serves as a roadmap for the development and execution of a forward-looking strategy to drive transportation electrification within the City, covering several key areas:

- **Current EV Infrastructure:** Assessing existing EV charging stations and their usage patterns.
- **Future Projections:** Forecasting the deployment of Electric Vehicle Supply Equipment (EVSE) to meet anticipated demand.
- **Municipal Fleet Transition:** Strategies for converting a portion of the City’s passenger and small truck vehicle fleet to electric drivetrains.
- **Policy and Regulation:** Examining of relevant policies, regulations, and best practices to support electrification efforts.

The analysis forecasts that Dublin will require an additional 499 public EVSE ports to support the anticipated 20,000 EVs registered in Dublin by 2030. These projections are based on a conservative scenario, considering the high density of single-family homes where most EV drivers can charge at home. To address these needs effectively, the Implementation Plan recommendations have been categorized into seven key areas:



### Key Recommendations Overview

1. **Charging Infrastructure Deployment:** Identifying and prioritizing locations for new EV charging stations, ensuring accessibility and convenience for all users.
2. **Planning and Zoning Codes, Building Standards:** Updating building standards and zoning codes to facilitate the installation of EV charging infrastructure in new developments and public spaces.
3. **Partnerships:** Fostering collaborations with local businesses, utility companies, and other stakeholders to expand the EV charging network.

- 4. Education and Outreach:** Developing programs to raise awareness about the benefits of EVs and provide information on available incentives and best practices.
- 5. Dublin Municipal Fleet:** Gradually replacing a portion of the City's passenger and small truck fleet with electric vehicles, starting with those that have lower duty cycles.
- 6. Funding:** Exploring and securing external grants and incentives to support the expansion and maintenance of EV infrastructure.
- 7. Fee and Law Considerations:** Implementing charging fees, idle fees, and legal measures to ensure efficient use of EV charging stations, and regularly update policies based on user needs and best practices.

Short, medium and long term recommendations are provided for each recommendation category. While recommendations are given for time periods up to 10 years in the future, it's important to note that EV charging technology, vehicle offerings, and consumer buying are changing rapidly so the plan will be reviewed on regular basis to ensure City resources are being used appropriately.

Impact and Benefits

Implementing this plan will have a profound impact on Dublin's sustainability and quality of life. By expanding the EV charging infrastructure and promoting EV adoption, Dublin will significantly reduce greenhouse gas emissions and improve air quality. The transition to electric vehicles will also decrease the City's dependence on fossil fuels, contributing to energy security and resilience.

Moreover, the plan will position Dublin as a forward-thinking city, attracting businesses and residents who value innovation and sustainability. The partnerships and collaborations fostered through this initiative will strengthen community ties and create economic opportunities. Education and outreach efforts will ensure that residents are well-informed about the benefits of EVs, leading to increased adoption and support for the City's sustainability goals.

In summary, this Implementation Plan not only addresses the immediate needs for EV infrastructure but also sets the stage for a sustainable, resilient, and connected future for Dublin.

During the initial working group meeting on July 19, 2023, participants worked together to develop goals and examine projection scenarios for EV charging in Dublin. This initial meeting set the foundation for strategic planning and the establishment of key objectives to enhance EV infrastructure across the City. It also laid the groundwork for subsequent meetings, where members discussed the integration of best practices from other cities, engaged in analysis of different policy approaches, and mapped out potential pathways to implement these strategies, including identifying optimal EVSE locations, the associated costs, potential funding resources, as well as policy changes and collaboration opportunities.

**2.1 SWOT Analysis**

The first meeting started with an understanding of where electrification trends are heading and how that will affect Dublin. A brainstorming session was held in the workshop to outline the Strengths, Weaknesses, Opportunities and Threats or SWOT of Dublin as it relates to electrification within the City. **Figure 2** highlights key points of the SWOT analysis used in developing this electrification implementation plan.

**2 Introduction and Goal**

This document outlines the comprehensive plan for the future of vehicle electrification in the City of Dublin, Ohio, incorporating an analysis of existing electrification conditions alongside national and international trends. Its purpose is to serve as a guiding resource for all city departments as they work towards aligning Dublin with the City's vision, sustainability goals and efforts to foster a cutting-edge, connected, and resilient city. This plan helps ensure that the City of Dublin remains at the forefront of sustainable urban mobility. By synthesizing the electrification work done to date, future forecasts, and policy considerations, this plan will lay the foundation for a more efficient and environmentally conscious transportation landscape in Dublin.

The Ohio Department of Transportation, through DriveOhio, conducted the Electric Vehicle Charging Study, preparing Ohio for the future of transportation infrastructure. The study is a roadmap to create a more robust statewide network of charging stations that reduce EV range anxiety, connect more destinations and support Ohio's goal to increase its smart mobility. Dublin is building on Ohio's statewide study to focus on local needs to successfully position Dublin for upcoming granting and other collaborative opportunities.

Figure 1: City of Dublin Vision

The City of Dublin aspires to be the most **sustainable, connected** and **resilient** global city of choice.

Source: City of Dublin

To realize the City of Dublin's vision (Figure 1), Dublin established an internal working group with members shown in Table 1. The working group met four times over a period of six months, where they discussed topics including EV best practices, strategies, and actionable policies aimed at accelerating Dublin's electrification efforts.

Table 1: Working Group Participants

PARTICIPANT NAME	DIVISION
Bradley Fagrell	Building Standards
Brian Ashford	Facilities & Fleet Management
Christopher Will	Community Planning & Development
Emily Golliver	Office of the City Manager
J.M. Rayburn	Transportation & Mobility
Jean-Ellen Willis	Transportation & Mobility
Jennifer Rauch	Community Planning & Development
Paul Hammersmith	Engineering

Figure 2: SWOT Analysis



Source: City of Dublin

### 3 Trends in Electrification

This section presents an overview of national and state EV trends. Differentiating the types of EV charging is central to this topic. Plug-in electric vehicle charging options are commonly divided into three general types as shown in Figure 3.

Figure 3: Level 1, Level 2, and DC Fast Charging

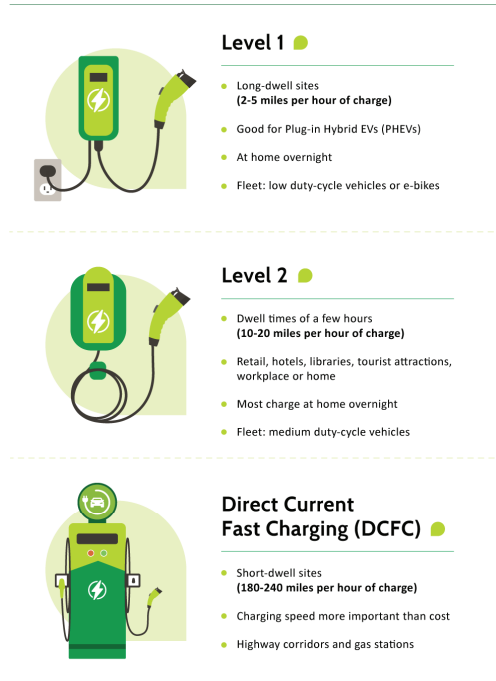


Table 2: Eligible Funding Opportunities

NAME	DESCRIPTION
National Electric Vehicle Infrastructure Program (NEVI)	\$5 billion federal program to deploy a national network of electric vehicle (EV) charging stations.
Charging and Fueling Infrastructure (CFI) Grant	\$2.5 billion federal program to support the deployment of alternative fueling infrastructure, including EV charging stations.
Vehicle Technologies Office Grant	Federal program that supports research, development, and demonstration of advanced vehicle technologies, including electric vehicles and hybrid vehicles.
Rebuilding American Infrastructure with Sustainability and Equity (RAISE)	Federal grant program that provides funding for major transportation projects that have a significant impact on economic competitiveness, safety, and equity.

Source: HNTB

### 3.2 State EV Trends

Compared to states like California and Oregon, Ohio was not an early adopter of electric transportation technologies. However, some of its most populous cities are leading the way in EV adoption. DriveOhio developed the [Ohio Alternative Fuel Vehicle Registration Dashboard](#) using data from the Ohio Bureau of Motor Vehicles (BMV) to track the market penetration of all alternative fuel vehicles (AFVs), with a focus on PEVs.

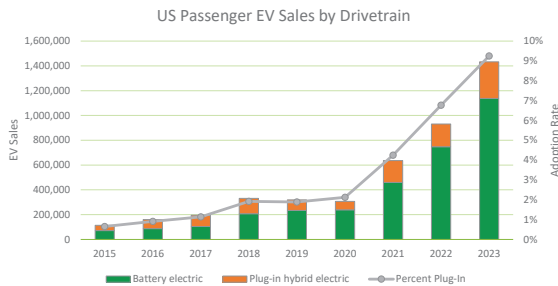
Currently, EVs make up less than 1% of all light-duty vehicles on the road. However, in January 2024, nearly 4% of all new vehicle registrations were PEVs, either Battery Electric Vehicles (BEVs) or Plug-in Hybrid Electric Vehicles (PHEVs). This suggests that Ohio is approaching a significant milestone: once 5% of new vehicle sales are PEVs, other countries have observed a rapid acceleration in EV market growth.<sup>2</sup> In fact, Ohio's new PEV registrations in 2023 exceeded the total number of PEV registrations for 2022 by September.

<sup>2</sup> <https://www.bloomberg.com/news/articles/2022-07-09/us-electric-car-sales-reach-key-milestone>

### 3.1 National EV Trends

EV sales in the United States reached a record high, with US plug-in electric vehicle (PEV) sales surpassing 1.4 million vehicles through 2023, as shown in Figure 4. EV demand continues to grow month-over-month, increasing steadily from 8.5% of new light-duty vehicle sales in January 2023 to 10% in January 2024.<sup>3</sup> This growth is largely driven by a combination of factors including technological advancements, increased consumer awareness, and supportive government policies.

Figure 4: US EV Sales 2023



Source: Argonne National Laboratory

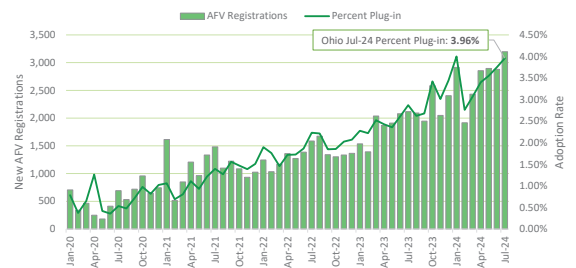
The surge in funding for EVs has been a significant benefit for sustainability efforts. However, it's important to acknowledge that the rules governing this funding landscape are continually shifting to address evolving priorities. Initially, the focus was primarily on EV adoption and charging infrastructure, but funding programs have since expanded to include charger repair, workforce training, and community initiatives.

While this evolving funding landscape is a positive sign of progress, it may require Dublin to be agile and adapt to changing priorities. Not all funding opportunities will align perfectly with the City's needs, and as new areas of focus emerge, flexibility will be key to leveraging these opportunities effectively.

Table 2 shows the most relevant eligible funding opportunities.

<sup>3</sup> [Light Duty Electric Drive Vehicles Monthly Sales Updates - Historical Data | Argonne National Laboratory \(anl.gov\)](https://www.argonne.gov/newsroom/2024/01/01/light-duty-electric-drive-vehicles-monthly-sales-updates-historical-data/)

Figure 5: Ohio New Alternative Fuel Vehicle (AFV) Registrations



Source: [Ohio Alternative Fuel Vehicle Registration Dashboard](#), as of July 2024

There was a large increase in charger installations starting in the first quarter of 2021 in Ohio. That momentum has continued and is expected to accelerate with the increased availability of federal funding, such as the approximately \$140 million in funding allocated to Ohio<sup>3</sup> through the National Electric Vehicle Infrastructure (NEVI) for charging infrastructure. As of August 2024, Ohio has 1,751 publicly accessible charging station locations, including 3,148 level 2 ports and 971 DCFC ports<sup>4</sup>.

### 4 Electrification Efforts to Date

Dublin's history with electrification started with their first public charging station in 2012 at the Dublin Community Recreation Center. The station has two level 2 ports and charging is free for the public. At the time, the Public Utilities Commission of Ohio would not allow non-utilities to sell for electricity to the public. This has since changed and entities who are not Electric Distribution Utilities are allowed to re-sell electricity for EV charging. Dublin has continued to let users of Dublin-operated charging stations charge for free. Dublin's first EV fleet purchase was for four Nissan Leaf BEVs in 2018. Since then, the majority of Dublin's new alternative fuel fleet vehicles have been hybrids and a variety of heavy-duty CNG vehicles.

The City of Dublin fleet was awarded the Leading Public Fleet Award for Green Sustainability at the Advanced Clean Transportation Awards in 2018, having gone beyond what is required to achieve



<sup>3</sup> <https://drive.ohio.gov/programs/electric/infrastructure/nevi/nevi>

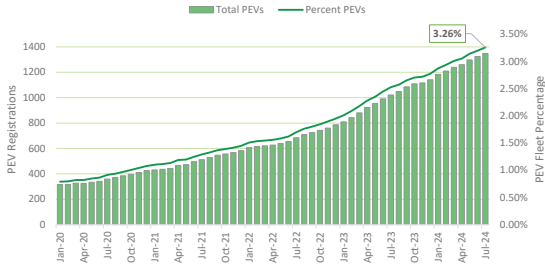
<sup>4</sup> [https://afdc.energy.gov/stations#/analyze?tab=station&fuel=ELEC&country=US&region=US-OH&status=E&status=T&show\\_map=true](https://afdc.energy.gov/stations#/analyze?tab=station&fuel=ELEC&country=US&region=US-OH&status=E&status=T&show_map=true)

sustainability in their fleet operations. In 2021, the City of Dublin received the Ohio EPA Silver Level Encouraging Environmental Excellence in Communities (E3C) award, which recognizes communities with exceptional achievements in environmental stewardship. Later in 2023, Dublin was one of the first communities to earn the Gold Level award.

**4.1 Dublin Trends**

Dublin is ahead of the state, with about 3.26% of its registered vehicles being PEV as of July 2024, compared to the State's 0.82%. In the second quarter of 2024, 8.1% of vehicle sales in Dublin were electric. Figure 6 shows the steady growth in the percentage of PEVs out of all vehicles registered in Dublin. As of July 2024, 1,348 vehicles out of the 41,393 registered vehicles in Dublin were PEVs.

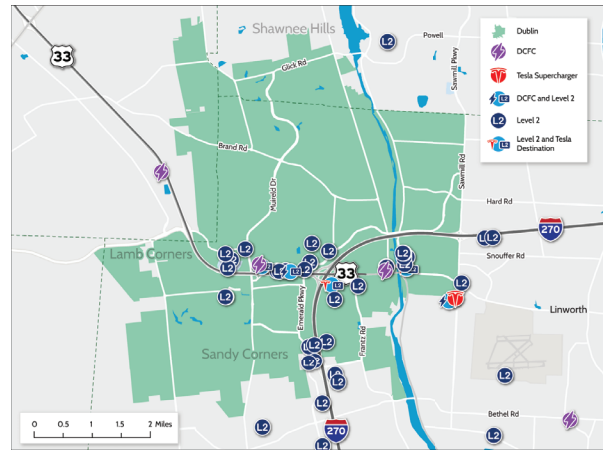
Figure 6: Total PEV Registrations and PEV Fleet Percentage in Dublin



Source: Ohio Alternative Fuel Vehicle Registration Dashboard, as of July 2024

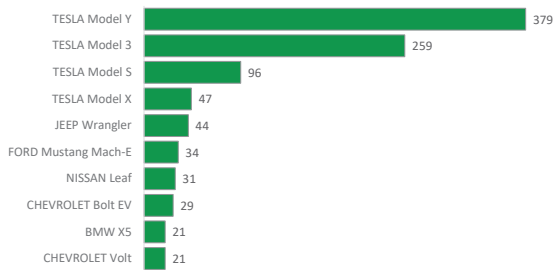
Figure 7 shows the most popular EV makes and models that are registered in Dublin. Tesla is the most popular choice by far, taking four of the top five spots. The Jeep Wrangler 4xe PHEV is a surprising addition to the top five, given that it was only released in 2021. It is also one of two PHEVs in the top ten plug-in vehicles, alongside the Chevy Volt (discontinued in 2019).

Figure 8: Existing EV Chargers in and Around Dublin



Source: AFDC and City of Dublin

Figure 7: Top EV Registrations in Dublin



Source: Ohio BMV, via DriveOhio AFV Dashboard (as of July 2024)

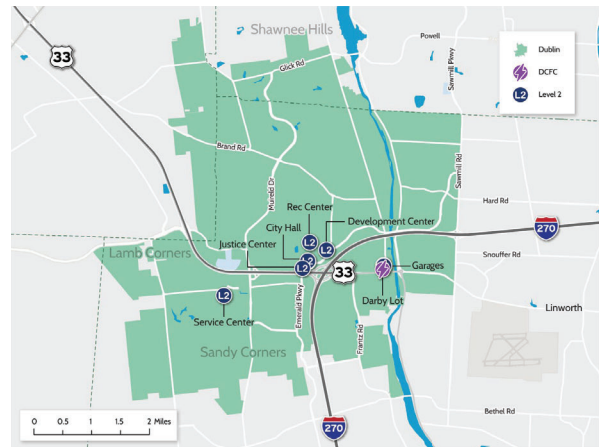
In terms of charging infrastructure, there are 83 publicly accessible level 2 ports and 6 DCFC ports in Dublin as shown in Table 3. These chargers are located mainly in proximity to I-270 and US-33, as shown in Figure 8. The City of Dublin owns and operates 19 of the level 2 ports and 2 of the DCFC ports as shown in Figure 9.

Table 3: Number of Ports by Ownership

OWNERSHIP	CHARGER TYPE	NUMBER OF PORTS
City of Dublin	Level 2	19
	DCFC	2
Private Development	Level 2	64
	DCFC	4

Source: AFDC, PlugShare, August 2024

Figure 9: City of Dublin Owned Existing Chargers



Source: City of Dublin

**4.2 Dublin Fleet**

The Dublin vehicle fleet represents a diverse array of vehicles essential to the City's operations and services with a total of 218 vehicles that serve the municipality. The average model year for all vehicles is 2015 and the low average annual mileage of 5,289 miles reflects a modern and well-maintained fleet.

Table 4 lists the new vehicle purchases in 2023 that replaced existing vehicles, along with their associated costs, which total around a \$1.4 million investment in alternatively fueled vehicles.

Table 4: Replacement and New Vehicles CIP 2023

VEHICLE	NUMBER	TOTAL
CNG F150 Ford extended cab trucks (\$40,000 each) / CNG upfit (\$14,000 each)	2	\$108,000
CNG F450 Ford dump trucks (\$60,000 each) / CNG upfit (\$23,000 each)	2	\$170,000
CNG F250 Ford four door trucks (\$45,000 each) / CNG upfit (\$16,000)	5	\$305,000
Police hybrid interceptors (\$70,000 each)	3	\$210,000
Small police electric SUV	1	\$60,000
CNG Freightliner plow trucks (\$230,000 each)	2	\$460,000
CNG Ford 4 door F350 with utility bed (\$80,000 each) / CNG upfit (\$16,000 each)	1	\$96,000
<b>Rounding</b>		\$1,000
	<b>Total 2023 Investment</b>	<b>\$1,410,000</b>

Source: City of Dublin

Table 5 lists the proposed vehicle replacements between 2024-2028 along with their associated costs, which total around a \$1.3 million investment.

Table 5: Fleet Management Vehicle Request 2024-2028

VEHICLE	YEAR	VEHICLE AND FUEL TYPE TO BE ORDERED	COST
F450 Plow Truck, Used year round	2012	CNG 4x4 F450 Extended Cab Plow	\$90,000
F450 Plow Truck, Used year round	2003	CNG 4x4 F450 Extended Cab Plow	\$90,000
F450 Parks chipper truck, Used year round	2003	CNG 2x4 F450 Reg. Cab Dump Bed	\$75,000
7400 International Snow Plow	2010	CNG Freightliner M2 Snow Plow	\$260,000
7400 International Snow Plow	2011	CNG Freightliner M2 Snow Plow	\$260,000
7400 International Snow Plow	2011	CNG Freightliner M2 Snow Plow	\$260,000

Table 6: Dublin Charger Utilization and National Averages

Station Name	# Unique Users / # Sessions	Average # of Sessions per Port per Day	Active Charging Utilization (2024)*	National Utilization Average (2024)**
Rec Center (Level 2)	148 / 925	5.2	35%	14.5%
City Hall (Level 2)	78 / 471	1.3	23%	14.5%
Dublin Library (Level 2)	617 / 1,696	3.1	26%	14.5%
Darby Lot #1 (DCFC)	285 / 1,061	11.8	40%	17.1%
Darby Lot #2 (DCFC)	312 / 1,112	12.4	41%	17.1%

\*Active Charging Utilization describes when at least one charging port at the facility is delivering power and does not include idle time.

\*\*National and Ohio utilization is defined as the % of time in a 24-hour day that each charger is plugged into a vehicle, regardless of whether that charger is actively dispensing power.

Sources: Dublin Data from ChargePoint Dashboard, Feb 1 – April 30, 2024 and National and Ohio data from Stable: <https://stable.auto/insights/electric-vehicle-charger-utilization-by-month>.

Based on Dublin’s ChargePoint data, utilization from February to April of 2024 is up approximately 100% from 2023 utilization. Industry opinion on what charger utilization rate threshold should trigger a discussion on adding additional chargers varies. For Dublin, a charger utilization rate reaching 30% or higher for three months is suggested as the time to discuss whether an expansion is necessary. Other factors helping to make that decision would be whether the three months were a spike due to a specific event or whether other stations are already planned to be built in the area to displace the need.

The starting and ending State of Charge (SoC) were examined for DCFCs (Figure 10). SoC is less critical for level 2s – it is commonly considered poor charging etiquette to leave a vehicle plugged into a DCFC beyond 80% SoC, but the expectation for level 2 chargers is that the vehicle will remain plugged in until it is full, which can take anywhere from a few hours to over a day, depending on the SoC, battery size, and power level. Charge speed on a DCFC falls off dramatically once 80% SoC has been reached. Charging over 80% can also harm the battery long-term. The data reveal that while many users plug in around 30% SoC, 60% of users remain plugged in beyond 80% SoC.

Interceptor Dublin Police Detective Vehicle	2016	TBD	\$60,000
Interceptor Police Front line	2014	Ford Hybrid Interceptor	\$75,000
Interceptor Police Front line	2016	Ford Hybrid Interceptor	\$75,000
Interceptor Police Front line	2016	Ford Hybrid Interceptor	\$75,000
		<b>Total 2024-2028</b>	<b>\$1,320,000</b>

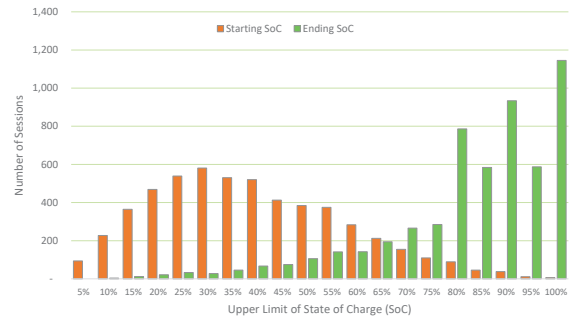
Vehicle procurement is aligning with Dublin’s proposed sustainability plan which emphasizes reducing or eliminating diesel and standard fuel vehicles from the City’s fleet. This entails establishing and enforcing an EV procurement policy for new vehicles and phasing out non-EV or hybrid vehicles, except for heavier vehicles without currently viable EV alternatives. As Dublin continues to procure vehicles annually, careful consideration should be given to selecting models that meet these criteria. For instance, an electric or hydrogen-powered snowplow might become available on the market that allows the City to meet its sustainability goals. Ford is also likely to continue making more electrified police vehicles as the rest of their lineup electrifies. The low mileage requirements of the City’s entire fleet make electrifying a portion of it easier in theory, but the market is focused on larger and therefore more expensive batteries. Changing battery technologies and consumer preferences may change, bringing more models to the market that are not overbuilt for Dublin’s needs.

4.3 Dublin-Owned Charger Usage Analysis

Dublin operates 19 level 2 ports across the City (12 of which are available for public use), and two public use DCFCs at the Darby lot in Historic Dublin. A year of charging data from the City’s ChargePoint dashboard was examined, covering December 2022 to 2023, to understand usage patterns and help predict future needs. There were 18,907 transactions from 2,233 unique users. Transactions were reviewed to ensure the analysis included quality data. Drivers will sometimes initiate a charging session incorrectly and need to unplug then plug back in. A transaction was deemed unproductive if it lasted less than five minutes and delivered less than 0.15 kWh of energy.<sup>5</sup> This threshold represents a mere 1.8 kW of power, or about 25% of what would be expected of a typical level 2 charger. Of 18,907 transactions, 3,012 were deemed unproductive and not included in the analysis.

First, overall utilization of the public facing chargers was reviewed. Table 6 lays out the active charging utilization rates versus the national utilization average rates. As shown, Dublin’s utilization rates are significantly higher than the national average.

Figure 10: Starting and Ending State of Charge for DCFC Sessions



Source: City of Dublin ChargePoint Dashboard

Next, idle times by charger type were examined (Table 6). A vehicle is considered idling when it has stopped charging but remains connected to the charging station. One key limitation of idle time data is that the session ends when the vehicle is unplugged. This means users may have unplugged their vehicles but remained blocking the space. Interestingly, in contrast to the SoC analysis, most idle times are very short, especially for the DCFCs. 88% of DCFC sessions and 52% of level 2 sessions end within five minutes of charging completion. However, some vehicles, especially on the level 2 chargers, remain plugged in for a very long time after charging has finished.

<sup>5</sup> Winn, “Electric Vehicle Charging at Work: Understanding Workplace PEV Charging Behavior to Inform Pricing Policy and Investment Decisions.” [https://innovation.luskin.ucia.edu/wp-content/uploads/2019/03/EV\\_Charging\\_at\\_Work.pdf](https://innovation.luskin.ucia.edu/wp-content/uploads/2019/03/EV_Charging_at_Work.pdf)

Table 7: Idle Time by Charger Type

	NUMBER OF SESSIONS	IDLE TIME
DCFC	4,802	<5 mins
	543	5-60 mins
	135	>60 mins
Level 2	5,370	<5 mins
	3,838	5-60 mins
	1,207	>60 mins

Source: City of Dublin ChargePoint Dashboard

Given the idle times, ending SoC, and lack of any fees for charging, Dublin should consider implementing fees for EV chargers. Fees will allow for an opportunity to offset the cost of electricity and instill better EV charging etiquette among users. Fees for charging are discussed further in **Section 4.4**.

The Dublin City Council has adopted the 2024-2028 Five-Year Capital Improvements Program (CIP), which allocates \$256 million dollars for new and existing infrastructure in the City. The 2024-2028 CIP includes \$475k funding<sup>6</sup> for EV Charging Station Infrastructure for the City's growing fleet of EVs. The design for the EV charging stations was completed in 2023 and includes carport structures equipped with solar panels which protect the stations from snow and ice while also providing a renewable energy source for the chargers.

Additional CIP funding is proposed each year to support electric vehicle fleet purchases and the future buildout of EV charging stations both for Dublin's fleet and the public. Dublin has also dedicated significant personnel resources to furthering electrification efforts.

**4.4 Fees for EV Charger Use**

When EVs were first introduced, charging stations were often free to use and readily available as needed. However, as EVs become more common, this is changing. Chargers, especially DCFC in popular areas and during high travel periods, can be busy and require a driver to wait their turn. This is also common for gas pumps during high travel times but the turnover is much faster. Chargers can also be unavailable when a charging vehicle seeks to charge their vehicle to 100% which is not suggested as it can damage the battery through overcharging and the last 10-15% charge can take a much longer time to complete.

Charging fees can be based on the amount of energy used [measured in kilowatt-hours (kWh)], the time spent charging (measured in minutes), the time spent idling after charging, or a combination of all three. An informal survey of the Electrify America app for chargers in Ohio revealed a pricing structure based on energy usage. This typically includes additional fees if the vehicle remains connected after charging.

<sup>6</sup> <https://city.dublin-oh-budget-book.cleargov.com/12774/capital-request/71042/view>

**5 Charging Infrastructure Needs**

This section focuses on three key areas: charging projection scenarios, associated costs, and identification of potential priority charging locations in Dublin. This analysis aims to offer a strategic roadmap for efficient and effective EV charging infrastructure deployment, ensuring the City of Dublin's readiness for the increasing adoption of EVs.

**5.1 Charging Projection Scenarios**

As of July 2024, there were 41,393 vehicles registered in Dublin. Historically, the city has seen an average population growth rate between 2-3% per year. Taking into account future growth and potential annexation, it's reasonable to use the higher end of this range, a 3% annual growth rate, to forecast the number of EVs that will be registered in Dublin by 2030.

With this 3% annual growth rate, compounded yearly, it is expected that approximately 49,425 vehicles will be registered in Dublin by 2030. This estimate also takes into account the expected increase in visitors to Dublin.

To simplify these projections, the estimated number of vehicle registrations by 2030 has been rounded up to 50,000. Assuming a 40% EV adoption rate among the estimated 50,000 vehicles, the projected number of EVs registered in Dublin in 2030 is estimated to be 20,000. This figure is used in the scenario and in the calculations summarized in **Table 7**. These scenarios are created by projecting how many EVSEs will be needed to support the total number of EVs. EVSE numbers include all level 2 and DCFC chargers, whether publicly or privately funded. However, it does not include chargers installed in private homes.

Table 8: Dublin Electrification Scenarios - Low, Medium, and High

CHARGING SCENARIO	EV TO EVSE RATIO	EV TO EVSE RATIO SOURCE	EVSE NEEDED IN DUBLIN BY 2032
Low Electrification	34:1	Norway Existing <sup>7</sup>	588
Medium Electrification	18:1	US DOE Recommendation <sup>8</sup>	1,111
High Electrification	7:1	California Goal <sup>9</sup>	2,857

Source: See Footnotes

The recommended electrification scenario for Dublin will need to be reassessed based on actual market trends due to how rapidly the EV market is evolving, but at this moment a low electrification scenario for 2032 is recommended, with a 34 to 1 EV to EVSE ratio. This is recommended because of the high density of single-family homes in Dublin where most EV drivers will have the ability to charge at home, rather than relying on public charging.

<sup>7</sup> <https://www.visitnorway.com/plan-your-trip/getting-around/by-car/electric-cars/>, Accessed 2023-11

<sup>8</sup> [https://www.energy.gov/sites/default/files/2017/09/f36/NationalPlugInElectricVehicleInfrastructureAnalysis\\_Sept2017.pdf](https://www.energy.gov/sites/default/files/2017/09/f36/NationalPlugInElectricVehicleInfrastructureAnalysis_Sept2017.pdf), Accessed 2023-11

<sup>9</sup> <https://www.energy.ca.gov/data-reports/reports/electric-vehicle-charging-infrastructure-assessment-ab-2127>, Accessed 2023-11

known as idle fees. The cost per kWh ranged from \$0.48 to \$0.64, while idle fees were either waived or charged at \$0.40 per minute after a 10-minute grace period.

The City of Bexley, Ohio charges an idle fee of \$0.10 per minute after two hours of charging for the chargers near their city hall. However, most private companies charge at the higher end of the scale. If the fees are set too low, it may not deter drivers from occupying the charging stations longer than necessary.

Tesla also has a congestion fee of \$1 per minute that is charged when a vehicle reaches 90% SoC. This is another tactic to turn over parking spots to the next vehicle. It's worth noting that EV drivers, particularly those who are accustomed to using public charging stations from well-known brands, are likely accustomed to these energy-based, idle and congestion fees.

Dublin's first chargers went live before state law changed to allow non-utilities to charge for electricity so they could only be provided free of charge. Not charging fees can also be a draw for employees and tourists. As the City expands its charger offerings and to respond to the congestion that could occur with more EVs on the road needing charging, it is recommended that fees be considered for both energy usage and idling.

Next, the number of each type of charger needed was reviewed – level 2 versus DCFC. In terms of the number of level 2 charging ports needed compared to DCFC ports, it is recommended to have a more conservative ratio in the Dublin area at around 20:1 level 2 to DCFC as shown in **Table 8**. This is recommended because Dublin already has a relatively low number of public level 2 ports compared to DCFC ports at 14:1. Since Dublin is comprised of mostly residential and mixed-use areas, where most users will be parked for extended periods and not necessarily need rapid charging, a higher number of level 2 ports versus DCFC ports could serve most users.

Table 9: Dublin 2032 Electrification Recommendations

Assumed Total Number of Vehicles Registered in Dublin (based on 2023 registrations)	50,000
Projected Number of EVs in Dublin by 2030 (40%)	20,000
Recommended EV to EVSE Ratio	34:1
Recommended Number of Public EVSE	588
<b>Recommended Level 2 to DCFC Ratio</b>	<b>20:1</b>
<b>Recommended Public Level 2 Ports</b>	<b>559</b>
<b>Recommended Public DCFC Ports</b>	<b>29</b>

Source: HNTB

Note that Dublin is already well on its way to reaching these targets with 83 existing public level 2 charging ports and 6 existing DCFC ports. **Table 9** shows targets for EVSE implementation to meet the 2032 recommendations. These will include EVSE funded by the City of Dublin and the private sector.

Table 10: Public Level 2 and DCFC Recommended Implementation Targets by Year

YEAR	LEVEL 2 PORTS	DCFC PORTS
2023 (existing)	83	6
2025 (planned)	105	6
2028	150	15
2030	300	22
2032	559	29

Source: HNTB

**5.1.1 Projected Costs**

The installation of EV chargers incurs various costs. **Table 10** provides an estimated range of these costs, broken down by charger type and charging scenario (Low, Medium, High).

A low charging scenario, similar to the charging ratio observed in Norway in 2023, is recommended for Dublin. When this scenario is combined with a 20:1 ratio of level 2 to DCFC chargers, the projected total cost comes to approximately \$7.8M.

It's important to note that these costs will not be borne by the City of Dublin alone. Rather, they represent the collective investment required from all parties involved in charger installation to achieve the stated charging infrastructure goal.



Table 11: Estimated EVSE Costs Through 2032

EV PER EVSE	LEVEL 2 PER DCFC	ADDITIONAL LEVEL 2 NEEDED BY 2032	ADDITIONAL DCFC NEEDED BY 2032	LEVEL 2 COST ESTIMATE	DCFC COST ESTIMATE	TOTAL COST ESTIMATE
<b>Low:</b>	<b>20:1</b>	<b>476</b>	<b>23</b>	<b>\$3.2M</b>	<b>\$4.6M</b>	<b>\$7.8M</b>
<b>Norway 2023 (34:1)</b>	12:1	461	38	\$3.1M	\$7.6M	\$10.7M
	3:1	374	125	\$2.5M	\$25.0M	\$27.5M
<b>Med: USDOE 2017 Estimate (20:1)</b>	20:1	973	49	\$6.6M	\$9.8M	\$16.4M
	12:1	944	78	\$6.3M	\$15.6M	\$22.0M
<b>High: CA Goal (7:1)</b>	3:1	767	255	\$5.2M	\$51.0M	\$56.2M
	20:1	2,636	132	\$17.8M	\$26.4M	\$44.2M
	12:1	2,555	213	\$17.2M	\$42.6M	\$59.8M
	3:1	2,076	692	\$14.0M	\$138.4M	\$152.4M

Source: EV per EVSE from footnotes 6-8; all others HNTB

5.1.2 EV Charging Locations

Figure 11 provides a detailed overview of the existing and the recommended locations for EV charging stations, including level 1, level 2, and DC Fast charging options across both public and private developments. These stations are strategically positioned based on existing and anticipated demand in traffic, tourism, and areas of growth as described in the Envision Dublin Community Plan.<sup>10</sup> These locations will help ensure accessible and convenient coverage to support the growing EV market in the area.

<sup>10</sup> <https://storymaps.arcgis.com/stories/775646484c58444e87f0a9bf507e6c6>

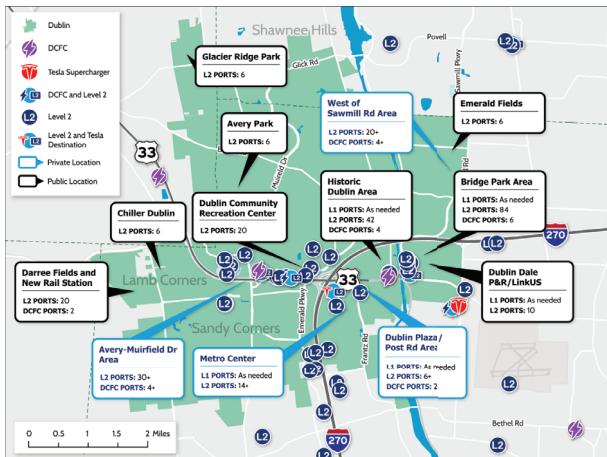
creating public-private funding mechanisms to promote the installation of new EV charging stations, particularly in multi-family residences and commercial developments.

Table 11 presents best practices for private developers to implement when installing EV chargers. It is recommended that these best practices be shared on an electrification webpage, serving as a resource to guide effective and efficient charger installations and promote broader adoption of EVs.

Table 12: EV Charging Best Practices for Private Developers

CATEGORY	BEST PRACTICES	DESCRIPTION
Physical Space	Easy Access	Place EV chargers in well-lit and easily accessible areas, such as near parking lot entrances and exits. This will make it easier for drivers to find and use the chargers.
	Location Convenience	Place EV chargers in locations that are convenient for users, such as near shopping centers, workplaces, and residential areas to encourage more people to use the chargers.
	Site Aesthetics	Ensure that the placement of EV chargers is carefully considered to preserve the site's visual appeal while still providing convenient access to charging stations.
Electric Utilities	Early Coordination	Coordinate with the local electric utility company early in the planning process to ensure that there is sufficient electrical capacity to support the EV chargers.
	Site Improvements	Determine if any utility upgrades such as system upgrades, distribution work, or new service work are needed and the associated costs.
	Separate Metering	Request separate metering for EV chargers to appropriately pass along electricity charges and to receive better data on electricity usage. Separately metering charging load, either with a separate meter or submetering equipment, is necessary for functions such as billing EV drivers based on usage, administering different rates, collecting charging data, and excluding charging load from demand charge calculations from the rest of the building.
Site Feasibility	Permits and Licenses	Obtain all necessary permits and licenses from the City of Dublin to ensure that the EV chargers are in compliance with all applicable laws and regulations.
	Pull-Through Spots	Prioritize pull-through spots for more efficient use of charging and to address the needs of medium and heavy-duty vehicles.
	Amenities	Install chargers near amenities such as restaurants, restrooms, seating, and vending machines.
Safety and Security	Fire Safety	Comply with all applicable fire safety codes and regulations.
	Remote Shutoff	Equip the EV chargers with remote shutoff capability, so that they can be turned off in the event of an emergency.
	Cybersecurity Measures	Implement cybersecurity measures to protect against unauthorized access and data breaches.
	Locked Cabinets	Store the EV charging equipment in locked cabinets to prevent theft and vandalism.
	Vandalism Resistance	Choose EV chargers that are vandalism resistant. This includes features such as heavy-duty construction, security cameras, and motion sensors.
	Cameras	Consider installing cameras at the EV charging station to improve safety.

Figure 11: Future EV Charging Location Recommendations



Source: HNTB

5.2 Electrification Best Practices

The working group reviewed the various ownership models and researched best practices for electrification from the City's perspective as a charging owner/operator and from the perspective of developers bringing EV chargers to the City. This section provides guidance for private developers on installing EV charging and best practices for contractual agreements for the City to own and operate chargers on their property. The recommendation is to continue contracting full services to third parties, as this approach minimizes costs, leverages skilled maintenance, and allows for flexibility in provider changes.

5.2.1 Private Development

From offering EV charging as an incentive for employees to adding an EV charger to their place of business as a new revenue source, private businesses and developers of various types are seeing the electrification of vehicles impact their day-to-day decisions.

The City of Dublin takes an active role in partnering with businesses who choose Dublin as their home and wants to continue to offer that partnership as Dublin's EV charging network is built. This includes

CATEGORY	BEST PRACTICES	DESCRIPTION
Accessibility	Lighting	Install adequate lighting at the EV charging station to improve visibility and safety.
	ADA Compliance	Make sure that the EV charging station is accessible to people with disabilities, taking into consideration guidelines provided by the U.S. Access Board <sup>11</sup> for inclusive design.
	Maintenance	Establish a regular maintenance schedule for the EV charging station to ensure that it is in good working order. This includes inspecting the equipment for damage and making any necessary repairs.

Source: HNTB

5.2.2 City of Dublin

Table 12 presents best practices that the City of Dublin should consider when operating EV charging infrastructure on Dublin-owned property.

Table 13: Key Considerations for the City of Dublin

CATEGORY	BEST PRACTICES	DESCRIPTION
Accessibility	Scalability	Prioritize EV charging management system capabilities that meet the growing demands of handling more drivers, chargers, and transactions.
	Compatibility	Deploy chargers that are compatible with the highest number of EVs on the market and ensure interoperability with various EV models by accommodating the appropriate connector standards (such as CCS, or NACS standards).
	Code Changes	Enact code changes that allow the City to enforce EV charging only parking spaces.
Standards and Integration	Fleet Management Capabilities	Ensure the EV charging infrastructure is optimized to fulfill the charging needs of employee drivers and fleet managers, including automatic notifications via smart connections to promptly address maintenance issues.
	Data Security and Privacy	Implement robust data security measures to protect user data and privacy, in compliance with applicable regulations.
	Customer Support	Specify the provision of reliable customer support services, including 24/7 assistance and responsive maintenance teams.
Sustainability and Future-Proofing	Pricing Transparency	Ensure a transparent procurement and charging pricing process. All vendors will be required to make an API available for free to third party software developers to share this information.
	Smart Grid Integration	Promote integration with the local smart grid to optimize charging schedules and reduce strain on the electrical grid during peak times. Include provisions for community engagement and feedback mechanisms to address concerns and ensure charger locations are well-received by residents.
	Community Engagement	Set up regular reporting and compliance checks to ensure that contractors meet the terms of the agreement and adhere to City standards.
Futureproofing	Compliance and Reporting	Set up regular reporting and compliance checks to ensure that contractors meet the terms of the agreement and adhere to City standards.
	Futureproofing	Consider future technologies and standards, ensuring that the contract allows for upgrades and adaptations as the EV charging industry evolves.

<sup>11</sup> <https://www.access-board.gov/ta/had/ev/>

Pricing	Incentives for Renewable Energy	Explore incentives for contractors to invest in renewable energy sources and energy storage solutions to reduce environmental impact.
	Stay Up to Date with State Law	An entity providing EV charging services is not considered a utility. Pricing by kWh and time are both permitted, with per kWh gaining more popularity and being perceived as fairer. Costs around \$0.50/kWh are common for privately owned DCFc.
	Charging For Usage	Ohio currently collects EV, PHEV, and Hybrid registration fees to supplant or replace gas tax revenue, but these fees are not being shared with municipalities.
	Demand Charges	Set up fees to recoup energy costs and encourage good etiquette. Specific recommendations are discussed in <b>Section 4.4</b> .
	Fees for Behavior Change	Low utilization of high-power chargers can impose high demand charges. <sup>12</sup> Be careful not to over-build DCFcs to keep utilization high. Inconsistent or "peak" usage will incur higher fees from the utility. Talk to the utility about EV-specific rates that may exist.
Equity	Imposing idle fees once charging has substantially completed encourages turnover. Drivers have come to expect fees, and pricing this scarce resource accordingly will become more critical. Flat idle fees in the range of \$0.40 - \$1.00 per minute are common for DCFcs. Tesla offers a tiered system where the fee is dynamically adjusted based on congestion at the Supercharger and the vehicle's SoC. <sup>13</sup>	
		Outreach to people who don't have charging at home is recommended to ensure that pricing strategies do not exclude these groups. Lower-income populations are less likely to have access to home charging, a double-edged sword – higher prices will affect them disproportionately, but higher turnover of spaces could be a benefit to a group that doesn't otherwise have access.

Source: HNTB

<sup>12</sup> [Electricity Cost for Electric Vehicle Fast Charging \(eia.gov\)](https://www.eia.gov/energyexplained/electricity/electricity_cost_for_ev_charging.php)  
<sup>13</sup> <https://www.tesla.com/support/charging/supercharger/fees>

## 6.2 Planning and Zoning Codes, Building Standards

Short-term Recommendations (2024-2025)	
<p><b>A</b> <b>Update and refine existing zoning codes</b> to facilitate the installation of EV charging infrastructure. This includes conducting an assessment of current zoning codes, implementing EV-ready parking, and creating solutions for renters in various housing types. Special focus should be on allocating a specific percentage of spaces in new parking lots/garages for EV charging readiness.</p>	<p><b>WHO'S INVOLVED:</b> Transportation and Mobility, Planning, Engineering</p>
<p><b>B</b> <b>Adopt the U.S. Access Board Design Recommendations</b> for ADA accessible vehicle charging stations. This entails requiring a percentage of spaces to be ADA accessible ensuring inclusivity and accessibility.</p>	<p><b>WHO'S INVOLVED:</b> Transportation and Mobility, Planning, Engineering, Facilities</p>
<p><b>C</b> <b>Initiate discussions with homeowners, renters, small business owners, and other stakeholders</b> to understand their needs and preferences regarding EV charging infrastructure. Ensure that new zoning codes and ordinances address the practical concerns and expectations of the community. This includes conducting stakeholder consultations and surveys for comprehensive community input.</p>	<p><b>WHO'S INVOLVED:</b> Transportation and Mobility, Planning, Economic Development, Community Representatives</p>
Medium-term Recommendations (2025-2030)	
<p><b>D</b> <b>Host an annual open house</b> to engage with the community and stakeholders about EV charging infrastructure developments and updates.</p>	<p><b>WHO'S INVOLVED:</b> Transportation and Mobility, Economic Development, Planning, City Manager, EV stakeholders</p>
<p><b>E</b> <b>Work collaboratively with housing developers</b> to integrate EV charging solutions in new homes and multi-unit developments, focusing on developing and implementing new zoning codes and ordinances that promote and streamline the installation of EV charging infrastructure, particularly level 2 charging, in various types of developments. This includes proposing updated zoning codes after understanding the current practices of housing developers.</p>	<p><b>WHO'S INVOLVED:</b> Planning, Transportation and Mobility, Engineering</p>
<p><b>F</b> <b>Encourage planners to establish clear guidelines for EV readiness</b> in construction projects, offering options for varying levels of development, from basic readiness to comprehensive charging infrastructure. This will be tailored to meet community needs and preferences.</p>	<p><b>WHO'S INVOLVED:</b> Planning, Transportation and Mobility, Economic Development</p>

## 6 Electrification Recommendations

This section provides actionable insights for stakeholders at various levels, detailing how to navigate the evolving landscape of EVs and EV charging infrastructure. These core recommendations provide a roadmap for making informed decisions and investments in the electrification journey.

### 6.1 Charging Infrastructure Deployment

Short-term Recommendations (2024-2025)	
<p><b>A</b> <b>Select 2-3 sites for charger deployment planning</b> and create process for assessing sites. Maintain updates to the database of EV chargers in the City.</p>	<p><b>WHO'S INVOLVED:</b> Transportation and Mobility, Planning, Data and Analytics</p>
<p><b>B</b> <b>Meet with the appropriate utility provider</b> to understand level of effort for deployment.</p>	<p><b>WHO'S INVOLVED:</b> Transportation and Mobility, Facilities, Utilities</p>
<p><b>C</b> <b>Meet with large, private employers</b> to understand their roadmap on offering chargers for employees, including incentives such as front row parking.</p>	<p><b>WHO'S INVOLVED:</b> Economic Development, Transportation and Mobility, Planning, Private Employers</p>
<p><b>D</b> <b>Consider a standard of 30% usage</b> for three months as the time to evaluate adding chargers to existing locations. Look at usage data, potential events going on in the area that may skew the data and any public comments about the location.</p>	<p><b>WHO'S INVOLVED:</b> Facilities, Transportation and Mobility, City Manager</p>
Medium-term Recommendations (2025-2030)	
<p><b>E</b> <b>Review remaining sites</b> for charger deployment for City and private locations.</p>	<p><b>WHO'S INVOLVED:</b> Transportation and Mobility, Planning, Data and Analytics</p>
<p><b>F</b> <b>Update projections every 2 years</b> to check adoption, regulation, funding changes, etc.</p>	
Long-term Recommendations (2030-2035)	
<p><b>G</b> <b>Reassess needs</b> based on changes in EV technology, adoption rate, and private charging availability.</p>	<p><b>WHO'S INVOLVED:</b> Transportation and Mobility, Planning, Data and Analytics</p>

Long-term Recommendations (2030-2035)	
<p><b>G</b> <b>Integrate EV charging requirements in the City's building code</b> for new constructions, renovations, and public facilities. This involves updating the building codes to establish clear and standardized requirements for EV charging infrastructure.</p>	<p><b>WHO'S INVOLVED:</b> Building Standards, Planning, Transportation and Mobility, Facilities</p>
<p><b>H</b> <b>Continuously assess and adapt land use and design practices</b> collaboratively with housing developers to accommodate the evolving needs of EV charging infrastructure, ensuring it aligns with the City's growth and development. This includes periodic reviews and updates of land use and design guidelines, incorporating stakeholder feedback to adapt to evolving requirements.</p>	<p><b>WHO'S INVOLVED:</b> Planning, Economic Development, Transportation and Mobility</p>

### 6.3 Partnerships

Short-term Recommendations (2024-2025)	
<p><b>A</b> <b>Foster partnerships with potential partners</b> such as local businesses, auto dealerships, Dublin school district, property owners, Drive Electric chapters, COTA (Park and Ride) and EV charging providers to expand the network of public and private charging stations. Seek unique options to partner at community and educational events. Continue relationship with Beta District.</p>	<p><b>WHO'S INVOLVED:</b> Transportation and Mobility, Economic Development, City Manager's Office, Local Businesses, Charging Providers</p>
<p><b>B</b> <b>Collaborate with utility companies</b> to understand grid capacity, the road map for grid upgrades and to align sustainability through developing educational programs that discuss energy efficiency and EV options, such as time-of-use electricity pricing. Additionally, expand and promote energy efficiency-related programming and incentives for commercial properties in the Bridge Street and ID zoning districts.</p>	<p><b>WHO'S INVOLVED:</b> City Departments working on Sustainability, Economic Development, Utility Companies</p>
<p><b>C</b> <b>Meet with Dublin's largest businesses</b> to discuss their plans to add employee EV charging to parking areas.</p>	

Medium-term Recommendations (2025-2030)	
<b>D</b> Update existing partners on Dublin's electrification plan efforts and understand any updates to their plans.	<b>WHO'S INVOLVED:</b> Transportation and Mobility, Ohio Department of Transportation, COTA, Utilities, DriveElectric Coalitions, General Public
<b>E</b> Continue collaborating with utilities, EV charging companies, and other partners.	<b>WHO'S INVOLVED:</b> Transportation and Mobility, Utilities, MORPC, Neighboring Jurisdictions
<b>F</b> Review electrification plans from neighboring jurisdictions and MORPC to identify collaboration opportunities.	

Long-term Recommendations (2030-2035)	
<b>G</b> Further coordinate with regional partnerships to consider a cohesive network of EV charging stations connecting Dublin to neighboring communities (information sharing, pursuing grants, economies of scale).	<b>WHO'S INVOLVED:</b> City Leadership, Transportation and Mobility, Regional Municipalities

6.4 Education and Outreach

Short-term Recommendations (2024-2025)	
<b>A</b> Develop and execute a public outreach action plan to engage the residents and visitors of Dublin to gauge their understanding of electrification, identify any needs of the community and share what Dublin has done to date, including this plan.	<b>WHO'S INVOLVED:</b> Transportation and Mobility, Communications & Marketing with input from local community partners
<b>B</b> Uses outreach results to develop an educational campaign to cater to the specific needs and interests of Dublin's communities. While continuing to raise awareness about the benefits of EVs, refocus the campaign to target different aspects, such as incentives for EV owners, latest technologies, best practices, and EV etiquette.	<b>WHO'S INVOLVED:</b> Transportation and Mobility, City Public Information Office with input from local community partners
<b>C</b> Discuss plans with the three electric utility companies in Dublin.	<b>WHO'S INVOLVED:</b> Transportation and Mobility, Economic Development, Utilities

Long-term Recommendations (2030-2035)	
<b>F</b> Replace the fleet vehicles based on the knowledge gained with testing light duty and MD/HD EV/PHEV models, and the latest in vehicle technologies.	<b>WHO'S INVOLVED:</b> Transportation and Mobility, Facilities and Fleet Management
<b>G</b> Reassess fleet needs. Fleet needs and vehicles available to fill those needs will continue to change over time so a regularly scheduled reassessment of needs around the capital budget process is recommended. Actively reassess and ensure attainment of the 45% fleet electrification goal by 2035.	<b>WHO'S INVOLVED:</b> Transportation and Mobility, Facilities and Fleet Management

6.6 Funding

Short-term Recommendations (2024-2025)	
<b>A</b> Explore available external state and federal grants and incentives for EV charging infrastructure and develop a strategy to secure funding. Engage with other governmental agencies on partner opportunities to develop regional grant applications. Priority federal grants to consider are: Charging and Fueling Infrastructure (CFI) Grant, Vehicle Technologies Office (VTO) Grant, National Electric Vehicle Infrastructure (NEVI) Grant.	<b>WHO'S INVOLVED:</b> Transportation and Mobility, City Manager's Office, Transportation & Mobility

Medium-term Recommendations (2025-2030)	
<b>B</b> Establish a long-term capital plan to support the ongoing expansion and maintenance of EV charging infrastructure, and continue to monitor federal, state, and utility grant programs, by developing funding and grant monitoring mechanisms.	<b>WHO'S INVOLVED:</b> Transportation and Mobility, City Finance Department, City Council
<b>C</b> Consider economic development opportunities to prepare developable sites with the appropriate level of electricity up to the property line.	<b>WHO'S INVOLVED:</b> Transportation and Mobility, City Economic Development Department

Medium-term Recommendations (2025-2030)	
<b>D</b> Implement a community outreach program that provides information and support to New Americans and diverse populations, ensuring equitable awareness and knowledge sharing to EVs and charging infrastructure.	<b>WHO'S INVOLVED:</b> Transportation and Mobility, Communications and Marketing, Local Community Organizations
<b>E</b> Work with Visit Dublin Ohio to update their tourism information to include information on EV charging.	

Long-term Recommendations (2030-2035)	
<b>F</b> Reassess public education and outreach needs as EV technology advances.	<b>WHO'S INVOLVED:</b> Transportation and Mobility

6.5 Dublin Fleet

Short-term Recommendations (2024-2025)	
<b>A</b> Continue to replace a portion of light duty fleet vehicles that have lower duty cycles with EVs or PHEVs. Evaluate BEV and PHEV options as vehicles reach their end of life.	<b>WHO'S INVOLVED:</b> Transportation and Mobility, Facilities and Fleet Management
<b>B</b> Perform a right-sizing analysis of the fleet using telematics data and driver interviews to determine if any vehicles are under- or over-utilized. For instance, if employees are using large, fuel-inefficient trucks that aren't required for their tasks, these should be replaced with more efficient EVs.	<b>WHO'S INVOLVED:</b> Transportation and Mobility, Facilities and Fleet Management
<b>C</b> Determine which City facilities will host EVs in the future and install fleet charging at the appropriate locations.	<b>WHO'S INVOLVED:</b> Transportation and Mobility, Facilities and Fleet Management

Medium-term Recommendations (2025-2030)	
<b>D</b> Test replacing just a sample of light duty fleet vehicles that have demanding duty cycles with EVs or PHEVs to assess if operational needs are met. Poll departments to start EV pilot with demanding duty cycle.	<b>WHO'S INVOLVED:</b> Transportation and Mobility, Facilities and Fleet Management
<b>E</b> Meet with local government fleet management teams to discuss ideas and best practices around procurement and management of EVs and chargers.	<b>WHO'S INVOLVED:</b> Transportation and Mobility, Facilities and Fleet Management

Long-term Recommendations (2030-2035)	
<b>D</b> Explore public-private partnership opportunities for EV infrastructure investments to reduce the burden on the City's budget.	<b>WHO'S INVOLVED:</b> Transportation and Mobility, City Economic Development Department, Private Sector Partners

6.7 Fee and Code Considerations

Short-term Recommendations (2024-2025)	
<b>A</b> Evaluate an appropriate fee for DCFC. This would allow Dublin to recoup electricity costs for operating these chargers, shifting the burden from taxpayers to the people benefiting from the chargers. Additionally, consider fees to encourage drivers to move on once they have reached 80% state of charge (SoC) instead of staying plugged in to 100% or idling after fully charged.	<b>WHO'S INVOLVED:</b> City Council, City Manager's Office, Transportation & Mobility, City Finance Department, City Engineer
<b>B</b> Consider recouping energy costs for Level 2 chargers which are about half those of the DCFCs. Idle fees are less critical due to nominal etiquette concerns.	

Medium-term Recommendations (2025-2030)	
<b>C</b> Consider code updates for deterring ICE vehicles from parking in an EV charging spot.	<b>WHO'S INVOLVED:</b> City Planning Department, Transportation and Mobility
<b>D</b> Consider code updates for incentivizing private companies to install appropriate EV charging.	

Long-term Recommendations (2025-2030)	
<b>E</b> Keep up with maintenance, make sure costs are accomplishing the intended goals.	<b>WHO'S INVOLVED:</b> City Manager's Office, Transportation & Mobility, City Finance Department

Appendix A – Existing Conditions

CONTENTS

1 Introduction ..... 5
2 EV Market Trends ..... 5
2.1 Ohio EV Trends ..... 5
2.2 EV Charger Trends ..... 6
3 Existing Plans ..... 8
3.1 State of Ohio ..... 8
3.2 Mid-Ohio Regional Planning Commission ..... 8
3.3 Franklin County ..... 9
3.4 City of Columbus ..... 10
3.5 City of Dublin ..... 10
3.6 City of Marysville ..... 11
3.7 Columbus Partnership ..... 11
4 Dublin EVSE Locations and Utilization Patterns ..... 12
4.1 EV Charging Types ..... 12
4.2 Inventory of Chargers ..... 14
4.3 User Behavior Analysis ..... 19
4.3.1 Level 2 Charger User Behavior ..... 19
4.3.2 DC Fast User Behavior ..... 20
4.4 Public EV Charging Policy ..... 23
4.5 Impact of Deploying EV Charging for Parking Business Owners and Users ..... 23
5 Current Electric Grid and Capacity ..... 24
6 EV Adoption Rates ..... 25
6.1 Comparison with National Trends ..... 27
7 Next Steps ..... 28

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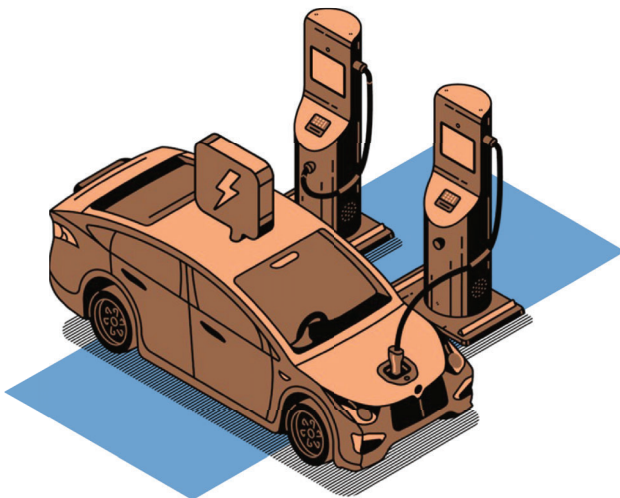
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CITY OF DUBLIN, OHIO
EXISTING ELECTRIC VEHICLE
CHARGING CONDITIONS

December 1, 2023



LIST OF TABLES

Table 1: Acronyms ..... 4
Table 2: Fleet Vehicles Targeted for Electric Replacement ..... 11
Table 3: EV Charging Types ..... 13
Table 4: EV Chargers in the City of Dublin ..... 14
Table 5: Type of Public Charging Facilities ..... 17
Table 6: Charging Infrastructure by Network ..... 18
Table 7: Sample Summary Statistics for Residential and Public Level 2 Charging Stations ..... 19
Table 8: Sample Summary Statistics for DCFC Stations ..... 21
Table 9: Local EV Registration Trends ..... 26

LIST OF FIGURES

Figure 1: Ohio Alternative Fuel Vehicle Registrations ..... 6
Figure 2: Timeline of Chargers Coming Online in Ohio ..... 7
Figure 3: Chargers in Ohio by Location and Age ..... 7
Figure 4: MORPC Regional Sustainability Agenda Goals ..... 9
Figure 5: Dublin CFI Application Summary ..... 9
Figure 6: Columbus Partnership Recommended Charging Locations in Central Ohio ..... 12
Figure 7: Level 1, Level 2, and DC Fast Charging ..... 13
Figure 8: Existing EV Chargers in and around Dublin ..... 16
Figure 9: Public Charging Infrastructure from 2018-2023 ..... 17
Figure 10: Representation of a ChargePoint Dashboard ..... 18
Figure 11: Sample Distribution of Residential and Public Level 2 Charging Session Start and End Times ..... 20
Figure 12: Sample DCFC Sessions SOC Before and After Charging ..... 21
Figure 13: Annual Average Daily Traffic (AADT) Trends in Dublin ..... 22
Figure 14: Chargers by City in Central Ohio ..... 23
Figure 15: Utility Providers in Dublin ..... 24
Figure 16: Top EV Registrations in Dublin ..... 25
Figure 17: EV Local Adoption Rates ..... 27
Figure 18: Cumulative EV Sales by State (Jan 2011 to Dec 2022 - excluding California) ..... 27
Figure 19: Marion County, IN - EV Registrations ..... 28

HNTB

Table 1: Acronyms

ACRONYM	DEFINITION
AA DT	Annual Average Daily Traffic
AC	Alternating Current
AFDC	Alternative Fuel Data Center
AFV	Alternative Fuel Vehicle
BEV	Battery Electric Vehicle
BMV	Bureau of Motor Vehicles
CCS	Combined Charging System
CFI	Charging and Fueling Infrastructure
DC	Direct Current
DCFC	Direct Current Fast Charging
EV	Electric Vehicle
EVSE	Electric Vehicle Supply Equipment
FCEO	Franklin County Engineer's Office
GHG	Greenhouse Gas
ICE	Internal Combustion Engine
L1	Level 1
L2	Level 2
MORPC	Mid-Ohio Regional Planning Commission
NACS	North American Charging Standard
NEVI	National Electric Vehicle Infrastructure
NREL	National Renewable Energy Laboratory
ODOT	Ohio Department of Transportation
PEV	Plug-in Electric Vehicle
PHEV	Plug-in Hybrid Electric Vehicle
SOC	State of Charge
SWOT	Strengths, Weaknesses, Opportunities and Threats
TRC	Transportation Research Center
USDOT	United States Department of Transportation

## 1 INTRODUCTION

Dublin, Ohio, aspires to be the most sustainable, connected and resilient global City of choice through state-of-the-art infrastructure, convenient transportation and expansive broadband access. With a 100-gigabit fiber network, strategic private and public partnerships, and significant investments in innovation, Dublin is emerging as a global leader providing an ecosystem for companies to beta test new technologies. Dublin is working to “improve lives, drives and experiences” by embracing the significant shift in the automotive industry towards sustainability. Recognizing the potential of electric vehicles (EVs) to reduce carbon emissions and dependence on fossil fuels, Dublin has actively engaged in fostering the adoption of EVs and the development of necessary charging infrastructure.

This report compares the existing electrification conditions in Dublin with national and international trends to set the foundation for the development of a comprehensive implementation plan for transportation electrification in Dublin. The implementation plan will serve as a guide for future EV activities and a resource for future land use and transportation planning for the Dublin Development and Public Works Departments.

## 2 EV MARKET TRENDS

The EV market is witnessing a dynamic transformation in both its buyer demographics and market factors. Initially, the typical EV buyer was characterized as men over the age of 55, but the market has seen a shift towards millennials, followed by Gen X men, with over 70% of EV buyers being male compared to 60%<sup>1</sup> for all vehicle purchases. Higher gas prices and exposure to EVs have led to increased consideration among prospective buyers, and the profile is skewing towards the more affluent, though there is a noticeable movement towards mass-market buyers, as evidenced by the average EV buyer credit score dropping from 800 in 2019 to 788 in 2022.<sup>2</sup>

Driving the EV market are a variety of factors including stringent emissions standards, attractive incentives, increasing vehicle availability, improvements in battery technology, a preference for the unique EV driving experience, fluctuating fuel prices, association with other EV owners, and the increasing availability of charging infrastructure. These interconnected elements reflect a market that is maturing and diversifying, catering to a broader segment of the population and adapting to the changing transportation landscape.

### 2.1 Ohio EV Trends

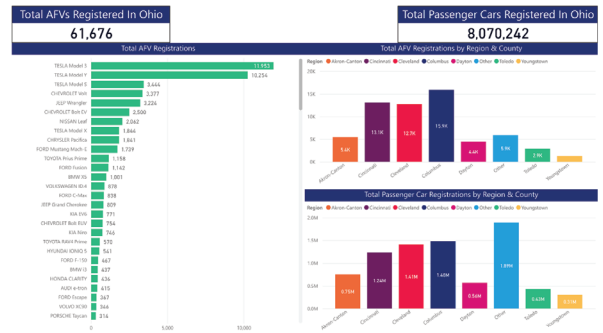
Ohio as a state has not been an early adopter of electric transportation technologies when compared with states like California or Oregon, but some areas, namely cities with the highest populations, are farther ahead in EV adoption than others. DriveOhio developed the [Ohio Alternative Fuel Vehicle](#)

<sup>1</sup> <https://www.spglobal.com/mobility/en/research-analysis/women-not-buying-electric-vehicles.html>

<sup>2</sup> <https://www.businessinsider.com/typical-ev-buyer-wealthy-millennial-man-trading-luxury-for-electric-2023-2>

Registration Dashboard using data from the Ohio Bureau of Motor Vehicles (BMV) to track the market penetration of all alternative fuel vehicles (AFVs), with a focus on plug-in electric vehicles (PEVs). While the overall market penetration of AFVs is low at less than 1%, nearly 4% of all new registrations in October 2023 were PEV, either battery EV (BEV) or plug-in hybrid EV (PHEV). Ohio appears to be near an inflection point of 5% of new sales which is where, once achieved, other markets have noticed rapid growth in the EV market.<sup>3</sup> Based on new sales in 2023, Ohio already surpassed 2022's total AFV registrations as of September 2023. Dublin is ahead of the state with over 2.84% of registered vehicles being PEV, and nearly 9.24% of vehicle sales from Aug-Oct 2023 were electric.

Figure 12: Ohio Alternative Fuel Vehicle Registrations



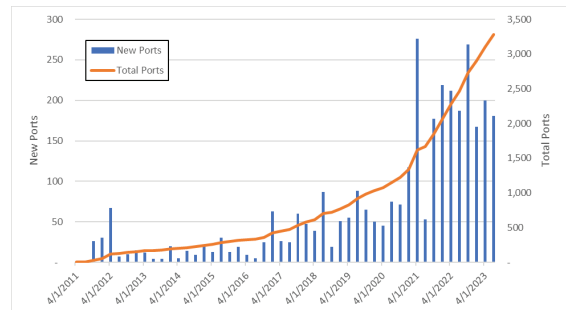
Source: Ohio Alternative Fuel Vehicle Registration Dashboard, as of October, 2023

### 2.2 EV Charger Trends

Among the approximately 1,400 public EV charging stations in Ohio as of October 2023, the median age of the chargers is 28 months. There was a large increase in installations starting in the first quarter of 2021. That momentum has continued and is expected to accelerate with the increased availability of federal funding for charging infrastructure. Figure 2 on the next page shows the timeline of installation for chargers in Ohio, while Figure 3 shows this same information spatially. Non-overlapping points were chosen over precise locations in order to not bias the apparent age of the chargers. These data are compared to Dublin in Chapter 6.

<sup>3</sup> <https://www.bloomberg.com/news/articles/2022-07-09/us-electric-car-sales-reach-key-milestone>

Figure 13: Timeline of Chargers Coming Online in Ohio



Source: Alternative Fuels Data Center and Plugshare

Figure 14: Chargers in Ohio by Location and Age



Source: AFDC and Plugshare

### 3 EXISTING PLANS

Electrification planning, in earnest, started in the Central Ohio region around the time the City of Columbus won the United States Department of Transportation (USDOT) Smart City Challenge in mid-2016. Since then, the City of Columbus, the State of Ohio through DriveOhio, and Franklin County have invested in creating and implementing electrification plans and many governmental agencies in the Central Ohio region have started purchasing hybrid vehicles or EVs.

The Bipartisan Infrastructure Law, signed November 15, 2021, created numerous opportunities for federal funding of EV related infrastructure. Two funding programs for states and local governments to create and implement electrification plans: the National Electric Vehicle Infrastructure (NEVI) program and the Charging and Fueling Infrastructure (CFI) program will change the face of publicly available alternative fueling options in the US. The NEVI program is funded with \$5 billion distributed to states based on formula funding and focused on building a connected, U.S. EV charging network. The CFI program is funded with \$2.5 billion focused on discretionary community and other corridor grants. While the CFI program doesn't require an electrification plan be developed to apply, having a well thought out plan will better prepare the applicant to respond quickly and thoroughly.

Ohio and the Central Ohio region, including Dublin<sup>4</sup>, have electrification and sustainability plans that can be useful as Dublin works towards an electrification implementation plan. Dublin's focus on best practices and enhanced coordination to ensure seamless integration and the realization of shared electrification goals will keep Dublin at the forefront of planning.

#### 3.1 State of Ohio

The State of Ohio is expected to receive \$140 million over five years in NEVI formula funds. DriveOhio has developed an [electrification plan](#) to build out Alternative Fuel Corridor charging efforts over the first few years of funding. Once that buildout is complete, Ohio will focus on other major roadways for charging connectivity and community projects. Ohio is using a public, private procurement (P3) model to deliver the charging stations and support the building, maintaining, and operating of EV chargers on private property. Ohio was the first state to break ground on a NEVI station and lessons learned from these near-by deployments will help inform future charging station implementation in the region, state, and U.S.

#### 3.2 Mid-Ohio Regional Planning Commission

MORPC has had many efforts around sustainability in the region including the recent Regional Sustainability Agenda<sup>5</sup> that lays out the region's plan for reducing carbon emissions and increasing quality of life for people in Central Ohio. The agenda encompasses four major goals as shown in [Figure 4](#) which are tracked in a [dashboard](#).

<sup>4</sup> <https://telldublin.dublinohiousa.gov/sustainability-framework-plan>  
<sup>5</sup> <https://www.morpc.org/regional-sustainability-agenda/>

telematics data. In addition, the FCEO investigated the feasibility of providing workplace charging for employees and what policies may need to be put in place prior to implementation.

#### 3.4 City of Columbus

The City of Columbus won the USDOT Smart City Challenge in 2016. This award was both a \$40 million grant from USDOT to test smart city technology and a \$10 million grant from the Paul G. Allen Foundation to boost EV adoption and EV charging in the region. This funding, specifically the \$10 million for electrification efforts, helped to measurably decrease light-duty transportation greenhouse gas (GHG) emissions in the region as a result of five priorities: Grid Decarbonization; EV Fleet Adoption; Transit, Autonomous and Multi-Modal Systems (implemented via USDOT grant agreement); Consumer EV Adoption; and Charging Infrastructure during the grant period compared to a baseline year (2016). Nearly 3,500 EVs were purchased and over 900 EV charging ports were installed in the region during the program. Lessons learned were published in the final project report<sup>6</sup> and some relevant lessons include:

- Considering challenges outside of your project and jurisdiction – Understand State and utility policies may affect an EV charging project as it moves forward so working together early on will help identify barriers and opportunities.
- Plan for the future – Always consider what's next in planning and funding opportunities.
- Partnering – Identify partners and understand their goals and requirements to work together.

#### 3.5 City of Dublin

While most of this chapter is dedicated to existing plans outside of Dublin, it's important to take note of Dublin's forward-thinking commitment to EV charging infrastructure planning that has already been established. Dublin's sustainability efforts have been underway since at least 2000 with the first level 2 (L2) chargers installed in 2012. In addition to committing to alignment with the MORPC Sustainable2050 plan, Dublin has continued to refine its own Sustainability Framework Plan<sup>7</sup> to suit local needs, including goals to consider tax credits for residents and businesses for the installation of EV charging stations, reduce vehicle emissions by purchasing/leasing alternative fuel vehicles, and provide City-owned charging stations. A plan update is underway and is expected to be adopted in January, 2024. This action-based plan and its goals will be cross-departmental when it comes to electrification leading to many opportunities for varying user needs and partnerships.

Dublin also started electrifying City-owned vehicles after reviewing which vehicles would be appropriate to convert. The assessment took into consideration how each City vehicle is used (hours per day, days per week, heavy or light duty) and the availability and performance capability of the EVs on the market. After this review, Dublin decided to focus on transitioning light-duty EVs as they came up for replacement. Police vehicles are an example of a light-duty vehicle that qualified for replacement as a hybrid because the vehicles idle for much of their shift, are not required to run for 24 hours, and do not perform heavy-duty work. PHEV models of police vehicles are not available yet.

Alternatively, vehicles used for snow removal are heavy duty, can be used for 24 hours during a snow event, and no EV on the market can meet the needs of a larger, heavy-duty vehicle; therefore, they

<sup>6</sup> [https://d2zfd3nwhmf29.cloudfront.net/2021-03/SCC-PGAF-FinalReport\\_07.31.20.pdf](https://d2zfd3nwhmf29.cloudfront.net/2021-03/SCC-PGAF-FinalReport_07.31.20.pdf)  
<sup>7</sup> [https://dublinohiousa.gov/dev/wp-content/uploads/2021/10/CS\\_2018-Sustainability-Framework-Plan.pdf](https://dublinohiousa.gov/dev/wp-content/uploads/2021/10/CS_2018-Sustainability-Framework-Plan.pdf)

Figure 15: MORPC Regional Sustainability Agenda Goals

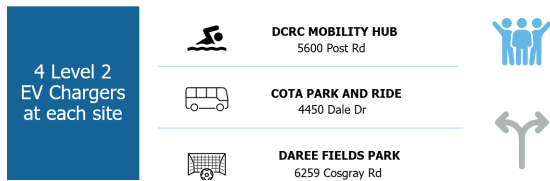


Source: MORPC

MORPC also was the lead applicant in the CFI program's first discretionary grant process which occurred in mid-2023. The Central Ohio region, including Dublin, came together to submit a project, MORE EVS (Mid-Ohio Regional Equity for Electric Vehicle Stations), for funding. The application was successfully submitted on June 13, 2023. As a region, with the total project cost of approximately \$21.9 million, \$15 million was requested with matching funds of \$6.9 million (a 68/32 split), exceeding the program's minimum match requirements (80/20). The application consisted of installing 62 charging sites across the region including three in Dublin. [Figure 5](#) shows the location of the three charging sites in Dublin.

Figure 16: Dublin CFI Application Summary

### Dublin Selected Sites for CFI Application



Source: City of Dublin

Award announcements are expected in early Fall. At least three additional rounds of funding are expected with the CFI program. Therefore, spending time cultivating partnerships in the region and having projects ready to go will make applying easier.

#### 3.3 Franklin County

The Franklin County Engineer's Office (FCEO) recently analyzed fleet transition options and developed an AFV fleet transition plan. As part of the analysis, the FCEO compared the operating costs of internal combustion engine (ICE) vehicles with EVs, PHEVs, and hybrid electric vehicles (HEVs) using existing fleet

were not a good candidate for conversion to an EV at this time. After discussion with the City, the vehicles in [Table 2](#) were identified as good candidates for electric or hybrid replacement:

Table 2: Fleet Vehicles Targeted for Electric Replacement

VEHICLE	COUNT	ANNUAL MILES	VEHICLE	COUNT	ANNUAL MILES
Ford Escape	15	3,498	Police Dodge Caravan	1	804
Ford E-Transit	1	2,205	Police Ford Escape	2	9,849
Ford Explorer	5	3,717	Police Ford F150	2	4,490
Ford F150	24	4,497	Police Ford Interceptor	33	8,543
Ford Focus	1	1,792	Police Ford Taurus	4	5,246
Ford Fusion SEL	2	2,749	Police Jeep Patriot	1	561
Ford Transit	3	2,205	Police Nissan Altima	1	561
Ford Van Cargo	1	2,205	Police Nissan Leaf S	2	4,024
Honda CRV	1	3,936	Police Pursuit Ford Interceptor	11	14,329
Nissan Leaf S	8	5,598	Police Pursuit Ford Responder	1	13,286
Police Chevrolet Tahoe	2	2,095			

Source: Dublin

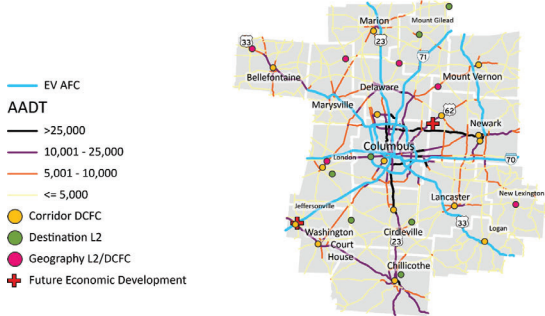
#### 3.6 City of Marysville

Dublin and the City of Marysville are more than neighbors, they have been partners on efforts like the US 33 Smart Corridor and the Beta District, both regional test beds for transportation technology and other beta products and services. In terms of electrification, the City of Marysville is currently developing an EV Readiness Plan. This plan will help Dublin identify opportunities for collaboration across their jurisdictional boundary.

#### 3.7 Columbus Partnership

In 2023, the Columbus Partnership developed a regional plan to identify charging needs and key stakeholders within Central Ohio. This plan is focused on workplace and intracity L2 charging in the near term and served as a springboard for MORPC's CFI grant application in 2023. Critical factors included evaluation of key corridors, important destinations, and a holistic look at what gaps remained after other charging criteria were met. The results of this study can be seen in [Figure 6](#). Having locations identified before the grant launched streamlined the application process.

Figure 17: Columbus Partnership Recommended Charging Locations in Central Ohio



Source: Columbus Partnership

## 4 DUBLIN EVSE LOCATIONS AND UTILIZATION PATTERNS

This section delves into the EV charging types, an inventory of existing chargers, and the current state of EVSE infrastructure and utilization patterns in Dublin, setting the stage for future projections and planning.

### 4.1 EV Charging Types

To understand EVSE locations and how they can be used, it's important to understand the different EV charging types. Plug-in electric vehicle charging options are commonly divided into three general types as shown in Figure 7 and Table 3.

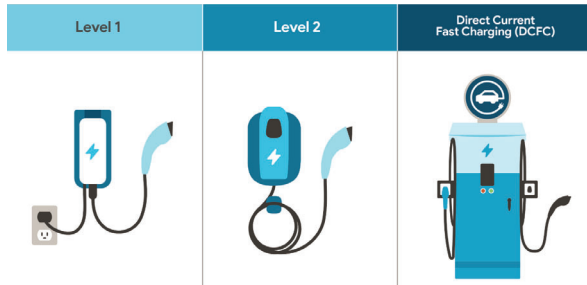
### 4.2 Inventory of Chargers

Table 4 lists the existing chargers in Dublin, their address, access type (public or private), number and type of ports, EV network and connector types (Combined Charging System (CCS) and CHAdeMO are used for DC fast charging, J1772 is used for L2 charging). Single-family residential chargers are not shown.

Table 4: EV Chargers in the City of Dublin

STATION NAME	ADDRESS	ACCESS	L2 PORTS	DCFC PORTS	NETWORK	CONNECTORS	SOURCE
AAA Car Care Plus* temporarily out of service	6600 Perimeter Loop Rd	Public	0	1	EVgo Network	CCS	AFDC
Acura of Columbus	4340 W Dublin Granville Road	Public	2	1	Unknown	J1772, CCS	City of Dublin
AEP	5721 Shier Rings Road	Public	3	0	Unknown	J1772	City of Dublin
D Block Garage	6750 Longshore St	Public	4	0	ChargePoint	J1772	AFDC
DoubleTree by Hilton	576 Metro Pl N	Public	3	0	Non-Networked	J1772, TESLA	AFDC
Dublin City Hall	5555 Perimeter Dr	Public	4	0	ChargePoint	J1772	AFDC
Dublin Darby Lot	35 Darby St	Public	0	2	ChargePoint	CHAdeMO, CCS	AFDC
Dublin Development CT4020	5200 Emerald Pkwy	Private	2	0	ChargePoint	J1772	AFDC
Dublin Garage	74 North St	Public	6	0	ChargePoint	J1772	AFDC
Dublin Justice Center	6565 Commerce Pkwy	Private	2	0	ChargePoint	J1772	AFDC
Dublin Rec Center	5600 Post Rd	Public	2	0	ChargePoint	J1772	AFDC
Dublin Service Center	6555 Shier Rings Rd	Private	3	0	ChargePoint	J1772	AFDC
Dublin Methodist Hospital	7450 Hospital Dr	Public	4	0	ChargePoint	J1772	AFDC
Dublin Methodist Hospital Outpatient Department	6805 Perimeter Dr	Public	4	0	ChargePoint	J1772	AFDC

Figure 18: Level 1, Level 2, and DC Fast Charging



Source: <https://electricvehicles.bchydro.com/how-use-our-fast-chargers/what-are-different-options-charging-my-electric-vehicle-ev>

Table 3: EV Charging Types

TYPE	PRIMARY USE	POWER TO VEHICLE	CHARGE (VOLTS)	POWER (KW)
Level 1 (L1)	Residential, Workplace	Alternating Current (AC)	120	≤ 1.8
Level 2 (L2)	Residential, Public	AC	240	3.6 – 19.2
Direct Current Fast Charging (DCFC)	Public	DC	480	Typically, ≥ 50 - 350

Source: [https://www.sae.org/standards/content/j1772\\_201710/](https://www.sae.org/standards/content/j1772_201710/)

In general, the different types of charging are best suited for:

- Level 1:** Extremely long-dwell sites or areas where it is not feasible to install a 240V circuit. Generally, these are located at a home where overnight charging can occur, and can also be effectively utilized in workplaces where vehicles can be charged throughout the workday or for fleet charging if the daily vehicle duty cycles are small
- Level 2:** Moderate-to-long dwell sites, including retail centers, hotels, libraries, or tourist attractions. L2 chargers can also be installed in a residence which is how most EV charging takes place – with an L2 charger at home.
- DCFC:** Short-dwell sites where charging speed is significantly more important than installation cost (e.g., highway corridor sites, gas stations).

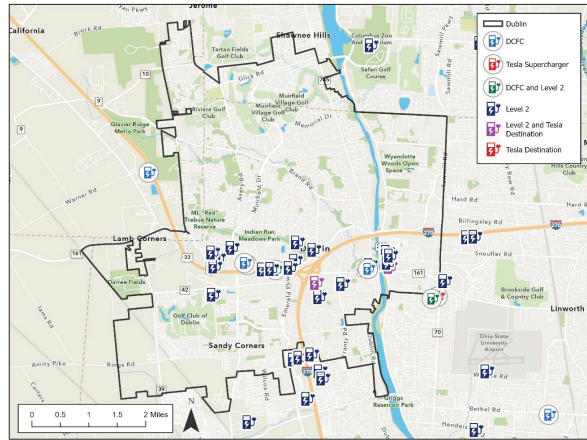
STATION NAME	ADDRESS	ACCESS	L2 PORTS	DCFC PORTS	NETWORK	CONNECTORS	SOURCE
Farbman Group	545 Metro South	Public	1	0	Unknown	J1772	City of Dublin
Germain Lexus	650 Shamrock Blvd	Public	3	0	Unknown	J1772	City of Dublin
Gordon Food Service	3901 W Dublin Granville Road	Public	1	0	Unknown	J1772	City of Dublin
Hotel Parking Garage at Bridge Park	6725 Longshore Street	Public	9	0	Tesla	TESLA	AFDC
Huntington Avery Muirfield	6655 Avery-Muirfield Dr	Public	1	0	ChargePoint	J1772	AFDC
Huntington Frantz Road	6340 Frantz Road	Public	1	0	ChargePoint	J1772	AFDC
JLR Dublin DC Fast 01	5775 Venture Dr	Public	1	1	ChargePoint	CCS	AFDC
Longshore Garage	6650 Longshore Street	Public	10	0	Non-Networked	J1772	AFDC
MAG Audi	5875 Venture Dr	Public	2	0	ChargePoint	J1772	AFDC
MAG Volvo	6335 Perimeter Loop Rd	Public	1	0	Non-Networked	J1772	AFDC
Mercedes Drive	6500 Perimeter Loop Rd	Public	2	1	ChargePoint	J1772, CHAdeMO, CCS	AFDC
Midwestern Auto Group BMW	5016 Post Rd	Public	2	0	ChargePoint	J1772	AFDC
Mooney Garage	6568 Longshore Street	Public	12	0	Non-Networked	J1772	AFDC
Nature Conservancy	6375 Riverside Dr	Public	2	0	Unknown	J1772	City of Dublin
One Metro Place	545 Metro Pl S	Public	2	0	SWITCH	J1772	AFDC
Subaru of America Training Center	350 Cramer Creek Ct	Public	1	0	Unknown	J1772	City of Dublin
Theodore Garage	6640 Mooney Street	Private	12	0	Non-Networked	J1772	AFDC

102 6

Source: As shown in Source column

These chargers are located mainly in proximity to I-270 and US-33, as shown in Figure 8 below.

Figure 19: Existing EV Chargers in and around Dublin



Source: AFDC and City of Dublin

Figure 9 shows the rapid growth in the number of public DCFC and L2 ports in Dublin from 2018 to September 2023, with the number of L2 ports increasing by over 20-fold. Recent trends show a significant rise in L2 ports from 40 in 2021 to 83 in 2023, while the availability of DCFC ports also doubled from 3 in 2021 to 6 in 2023.

Table 6 lists the number and type of ports by Network. ChargePoint is the main network in Dublin with 33 L2 ports and 4 DCFC ports. The non-networked chargers are new Enel X - JuiceBox chargers that replaced old chargers in the Bridge Park parking garages.

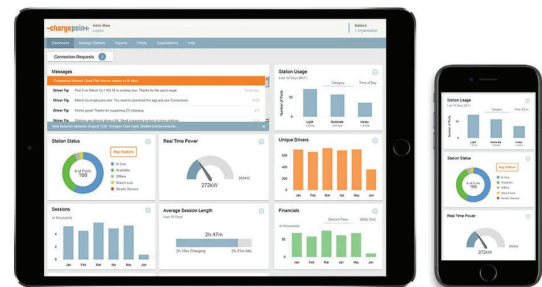
Table 6: Charging Infrastructure by Network

EV NETWORK	NUMBER OF PLUGS	
	Level 2	DCFC
ChargePoint	33	4
Non-Networked	26	0
Unknown	13	1
Tesla	9	0
SWTCH	2	0
EVgo	0	1
<b>Total</b>	<b>83</b>	<b>6</b>

Source: City of Dublin and Plugshare, accessed October 31<sup>st</sup> 2023

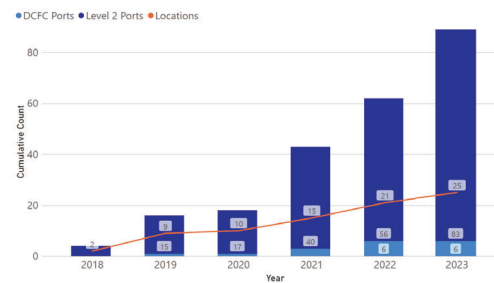
ChargePoint is the provider of the City of Dublin's public chargers. There are rolling operations and maintenance agreements for each charger that begin at installation acceptance and normally run 4-5 years. This arrangement allows for the City of Dublin to offer these chargers to the public without having the extra cost of specifically skilled employees to operate and maintain the chargers. This relationship also allows for an in-depth dashboard of charging data that is reviewed to check for maintenance issues and charging patterns.

Figure 21: Representation of a ChargePoint Dashboard



Source: ChargePoint

Figure 20: Public Charging Infrastructure from 2018-2023



Source: AFDC, Plugshare, accessed October 31, 2023

Table 5 lists the available public chargers in Dublin by facility type. Thirty-one percent of the public ports are L2 ports located in parking garages in the Bridge Park area.

Table 5: Type of Public Charging Facilities

TYPE OF FACILITY	NUMBER OF PLUGS	
	Level 2	DCFC
Parking Garage	26	0
Car Dealership	14	3
Hotel	12	0
Government Building	12	2
Hospital	8	0
Workplace	8	0
Bank	2	0
Grocery	1	0
Auto Repair	0	1
<b>Total</b>	<b>83</b>	<b>6</b>

Source: City of Dublin and Plugshare, accessed October 31<sup>st</sup> 2023

### 4.3 User Behavior Analysis

User behavior goes hand in hand with siting and planning for electric vehicle charging, as well as estimating the electrical load to help avoid costly demand charges, especially for DCFC. A data-driven approach informs the type, quantity, and location of EV charging infrastructure and uses lessons learned from other installations to make informed decisions in the future.

#### 4.3.1 Level 2 Charger User Behavior

With the exception of workplace and fleet charging, L2 charging can largely be split between two usage types: residential charging and public charging. A 2023 study performed by the University of Rhode Island<sup>8</sup> compiled residential L2 charging data for 2,657 ports with over 675,000 charging sessions, and public L2 charging data for nearly 4,000 ports and 1,285,610 sessions. Table 7 highlights the differences in average energy consumption and time plugged in when comparing residential L2 charging to public L2 charging.

Table 7: Sample Summary Statistics for Residential and Public Level 2 Charging Stations

CHARGING TYPE	AVG ENERGY CONSUMPTION (KWH)	AVG SESSION DURATION (HOURS)	AVG TIME PLUGGED IN AFTER CHARGING IS COMPLETE (HOURS)	TOTAL TIME PARKED (HRS)	CHARGING FREQUENCY (AVG NUMBER OF CHARGES PER DAY)
L2 - Residential	12.06	2.61	8.09	10.70	0.73
L2 - Public	8.83	2.41	5.16	7.57	0.63

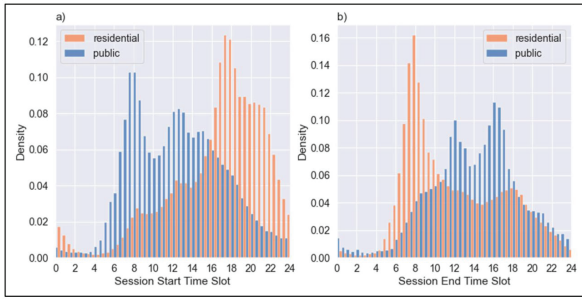
Source: <https://www.mdpi.com/1996-1073/16/4/1592>

In addition to the differences in energy consumption and session duration, the time of use also varied widely when comparing residential L2 charging to public L2 charging. Figure 11 from the same study shows the highest density of start times for public charging sessions between 7:30-8:30am with a second peak between 12:00-1:30pm, before diminishing throughout the end of the day. Charging start sessions at residential chargers are mostly initiated later in the day, with a peak between 5:00-6:00pm when drivers are returning home from work. The end session times are also predictable based on usage type with most residential sessions ending in the morning when drivers are off to work and public end times staggered 2-3 hours after the session start times.

<sup>8</sup> Jonas T. Daniels N, Macht G. Electric Vehicle User Behavior: An Analysis of Charging Station Utilization in Canada. Energies. 2023; 16(4):1592. <https://doi.org/10.3390/en16041592>



Figure 22: Sample Distribution of Residential and Public Level 2 Charging Session Start and End Times



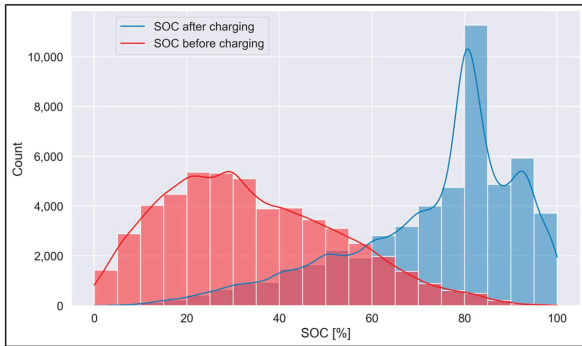
Source: <https://www.mdpi.com/1996-1073/16/4/1592>

Workplace charging is typically comprised of L1 and L2 chargers and the user behavior is highly dependent on day of week and location work hours. Levels 1 and 2 fleet charging is also highly dependent on the operational hours, as well as the specific duty cycles for the fleet vehicles.

4.3.2 DC Fast User Behavior

In the same 2023 University of Rhode Island study, the researchers compiled data from 59 DCFCs with approximately 51,000 DCFC sessions in Quebec and British Columbia, Canada between 2018 and 2019. Figure 12 on the next page shows the distribution of state of charge (SOC) when vehicles were plugged in to a DCFC and when they were unplugged from a DCFC. Most charging sessions started when the vehicle was around 20–35% SOC and ended when the SOC reached approximately 80%.

Figure 23: Sample DCFC Sessions SOC Before and After Charging



Source: <https://www.mdpi.com/1996-1073/16/4/1592>

Table 8 shows the average energy consumption for DCFC sessions was 12.9 kWh and much shorter session durations when compared to residential and public L2 charging. The DCFC stations were also used more frequently compared to L2 chargers at a median of once per day and an average of 1.6 times per day.

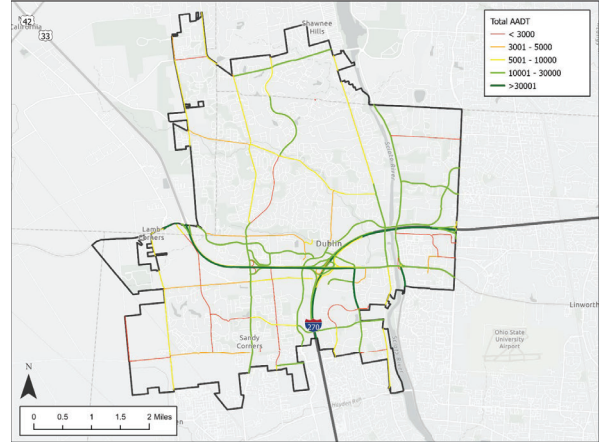
Table 8: Sample Summary Statistics for DCFC Stations

CHARGING TYPE	AVERAGE ENERGY CONSUMPTION (KWH)	AVERAGE SESSION DURATION (HOURS)	CHARGING FREQUENCY (AVERAGE NUMBER OF CHARGES PER DAY)
DCFC – Public	12.90	0.43	1.64

Source: <https://www.mdpi.com/1996-1073/16/4/1592>

DC fast charging is meant to serve EV drivers quickly and is often located along arterials and interstates, but is also increasingly expanding into urban areas. As shown in Figure 13, most traffic in Dublin is on I-270, US-33, and SR-161, which is where most public chargers are concentrated.

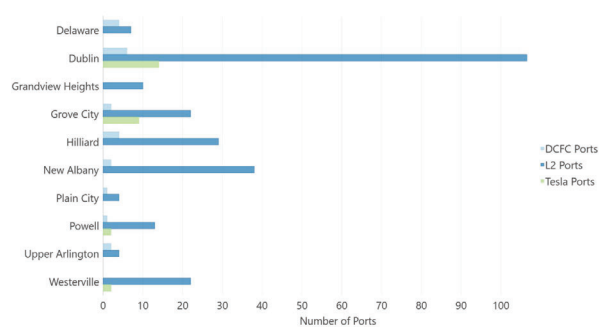
Figure 24: Annual Average Daily Traffic (AADT) Trends in Dublin



Source: ODOT Transportation Information Mapping System

Most EV charging takes place at home, with either L1 or L2 chargers. However, not everybody has access to a convenient location or the means to install a charger where they park. Workplace L2 and public DCFC can fill this gap for this segment. Among similar cities in Central Ohio, Dublin has the most public chargers of any type, as seen in Figure 14. Dublin is positioned well for continued growth and goes hand-in-hand with their high rate of EV adoption, climate goals, and attractions.

Figure 25: Chargers by City in Central Ohio



Source: Ohio BMV, via DriveOhio AFV Dashboard

4.4 Public EV Charging Policy

The City of Dublin does not currently charge a fee for any of their public chargers but will want to consider adding a fee as usage continues to grow. Charger policies can consider a fee for general charging, idling after receiving a full charge, charging on different days (workday versus weekend), or during different times of day (work hours versus evening) to better allow everyone the opportunity to charge.

Currently, Dublin does not charge users for the cost of electricity and does not have policies to charge or enforce removal for idling. Charging and idle fees can help alleviate vehicles using a public charger after a charging session has completed by using the fee to incentivize people to re-park once they no longer need the charger. Having fees that vary based on time of day or day of week can be confusing for customers, but it can also be a useful tool to shape user behavior towards charging at times that are better for the grid or encouraging turnover at EV chargers so more vehicles can take advantage of the charger. If the data shows many vehicles using a charger once the charging activity is over, a hybrid incentive of making the first few hours of charging free and then charging a fee for any time beyond the established incentive time period could be an option.

4.5 Impact of Deploying EV Charging for Parking Business Owners and Users

Many small business owners view EV charging as a cost, composed of both startup costs (equipment, installation, permitting) and ongoing costs (maintenance, higher electric bills). However, there are various ways to mitigate those costs, such as installation grants and new rate structures for EVSE. Once installed, they may attract new customers and encourage them to stay longer while the vehicle is charging. For customers, the ubiquity of charging stations will ease range anxiety, increasing adoption

and furthering Dublin's green energy goals. Though the technology is not widely available, some EVs have the ability to serve as backup power sources during power outages, increasing resiliency for equipped locations.

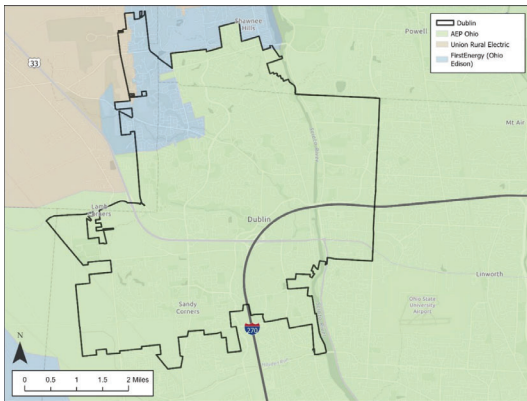
## 5 CURRENT ELECTRIC GRID AND CAPACITY

Navigating the complexities of electrification requires comprehensive collaboration and insights from electric utility providers. There are three utility providers in Dublin:

- American Electric Power (AEP):** AEP is the 6<sup>th</sup> largest utility company in the U.S. based on market capitalization and covers more than 85% of the Dublin area.
- Ohio Edison:** A subsidiary of FirstEnergy Corp. the 12<sup>th</sup> largest utility company in the U.S., Ohio Edison has a small coverage area in the northwest part of Dublin.
- Union Rural Electric:** Union Rural Electric is a cooperative covering a small area in the northwest part of Dublin.

Figure 15 shows the different utility coverage areas in Dublin.

Figure 26: Utility Providers in Dublin



Source: ODOT Transportation Information Mapping System

It can be difficult for electric utility providers to determine capacity constraints without knowing specific planned site locations and planned electrical loads, but the electric utilities have an obligation to serve customers and will provide power as needed. Future charging sites in developed areas, where there is a higher likelihood of existing electric capacity, will likely require less upgrades compared to more rural areas without an existing, robust electric infrastructure. AEP Ohio is continuously working to upgrade their power system to support Dublin's growing energy needs, investing more than \$38 million in upgrades in the past 5 years<sup>9</sup>.

## 6 EV ADOPTION RATES

EV adoption rates in Ohio are being tracked and made available to the public by DriveOhio. Figure 16 shows the most popular EV makes and models that are registered in Dublin.

Figure 27: Top EV Registrations in Dublin



Source: Ohio BMV as of October 2023, via DriveOhio AFV Dashboard

Tesla is the most popular choice by far, taking four of the top five spots. The Jeep Wrangler PHEV is a surprising addition to the top five, given that it was only released in 2021. It is also one of two PHEVs in the top ten plug-in vehicles, alongside the Chevy Volt (discontinued in 2019).

<sup>9</sup> <https://www.aepohio.com/community/projects/Dublin-Project#:~:text=Dublin%20West%20Transmission%20Project%20%20in,the%20Dublin%20West%20Innovation%20District.>

Table 9 gives a broader view of EV registration trends in Ohio, counties within Dublin's borders and other Central Ohio cities of interest. Dublin is close to the national average, approaching 10%.

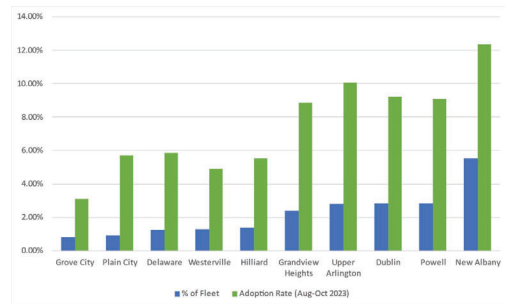
Table 9: Local EV Registration Trends

	PASSENGER CAR REGISTRATIONS			Adoption Rate (Aug-Oct 2023)
	Total Vehicles	AFVs	% of Fleet	
Ohio	8,070,242	61,676	0.76%	3.40%
Franklin County	887,051	9,753	1.10%	4.32%
Delaware County	169,139	3,421	2.02%	7.82%
Union County	51,135	718	1.40%	5.60%
Dublin	39,025	1,107	2.84%	9.24%
Delaware	31,258	389	1.24%	5.87%
Grove City	30,678	252	0.82%	3.11%
Westerville	29,163	375	1.29%	4.90%
Upper Arlington	28,230	792	2.81%	10.06%
Hilliard	27,123	383	1.41%	5.52%
Powell	11,501	327	2.84%	9.09%
New Albany	9,248	512	5.54%	12.35%
Grandview Heights	6,104	148	2.42%	8.88%
Plain City	3,003	28	0.93%	5.71%

Source: Ohio BMV, via DriveOhio AFV Dashboard

Dublin has the most AFVs of comparable cities in the region and the third highest adoption rate for new vehicle purchases, as seen in Figure 17. Adoption rate is the percentage of new vehicles sold.

Figure 28: EV Local Adoption Rates

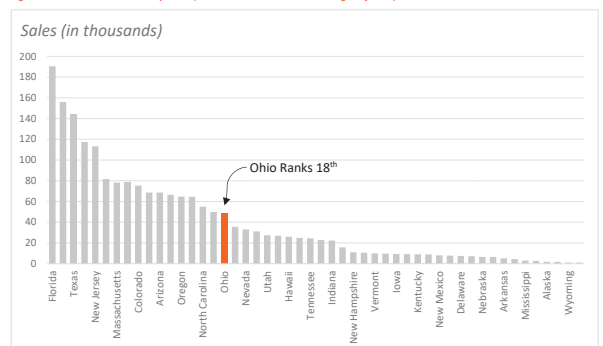


Source: Ohio BMV as of October 2023, via DriveOhio AFV Dashboard

### 6.1 Comparison with National Trends

Figure 18 shows EV sales by state (excluding California) with Ohio ranked 18<sup>th</sup>.

Figure 29: Cumulative EV Sales by State (Jan 2011 to Dec 2022 - excluding California)



Source: <https://www.autosinnovate.org/resources/electric-vehicle-sales-dashboard>

It's difficult to do a city-to-city comparison when looking at EV adoption rates since other states do not publish their alternative fuel vehicle registration information. Indiana does post their EV registration data, but only by county and year. **Figure 19** shows Marion County, Indiana, which includes Indianapolis, with an EV adoption rate of 2.65% as of November 2023. In comparison, Franklin County, Ohio, had a 3.99% EV adoption rate during the same period in 2023.

Figure 30: Marion County, IN - EV Registrations

Registered Vehicles (2023)		
Fuel Type	Count	Percent of Total
Electric & Gas Hybrid	17,612	2.17%
Electric	3,881	0.48%
Hydrogen Fuel Cell	5	0.00%
Electric & Diesel Hybrid	2	0.00%
<b>Total</b>	<b>21,500</b>	<b>2.65%</b>

Notes: Fuel types that do not have a count value of at least 1 are omitted from this table. The Counts are based on the total registered vehicles given the filters being applied.  
Percent of Total = Fuel Type Count / 811,198

Source: <https://www.in.gov/oed/resources-and-information-center/vehicle-fuel-dashboard/>

## 7 NEXT STEPS

The information in this document is the first building block in the future movement to build on the past efforts to electrify Dublin. Dublin has a strong foundation from which to build including the city's existing charging station infrastructure and the notable public commitment to sustainability. These elements demonstrate Dublin's readiness for further electrification and ensure that future developments will be supported by both the infrastructure and the people of Dublin.

## Appendix B – EV Charging Forecasting

Date  
December 1, 2023

To  
J.M. Rayburn, City of Dublin, Ohio



PROJECT  
CORRESPONDENCE

From  
HNTB Corporation  
Subject  
Potential EV Charging Scenario  
Forecasting

### Introduction

The EV market is changing rapidly, with indicators pointing to greater EV adoption throughout the decade. The White House set an ambitious goal to make 50% of all new vehicles sold in 2030 zero-emissions vehicles, including battery electric, plug-in hybrid electric, and fuel cell electric vehicles (EVs)<sup>1</sup>. A survey<sup>2</sup> of 1,500 U.S. consumers in March 2023 showed nearly half of United States (US) car buyers plan to buy an electric vehicle in the next two years, a 20% jump from the prior year. In July 2023, Carvana reported a 786%<sup>3</sup> increase in EV sales over the past 5 years.

Various projections exist and are updated regularly trying to predict the adoption rate of EVs in the future. To support and help foster future EV adoption, public charging infrastructure needs to keep up with EV growth.

The purpose of this document is to present low, medium, and high future projection scenarios for EV charging infrastructure needs in Dublin, Ohio, including level 1, level 2 and Direct Current Fast Charging (DCFC) on both public and private property.

### Dublin Transit and Parking

Existing transit operations, public and private parking and charging infrastructure are foundational elements upon which the future EV charging scenarios are developed. Each are summarized below.

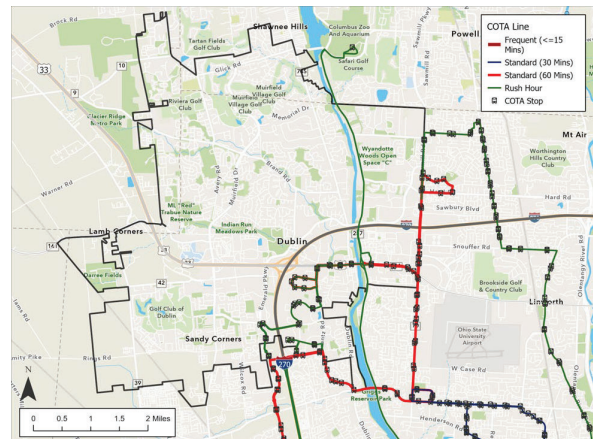
#### Transit

Dublin is currently served by six COTA routes, the 21, 33, 72, 73, 74 and Zoo bus. The 21 route runs every 60 minutes. The 33 route runs every 30 minutes south of Dublin Granville Road, where it splits and alternates trips to Olde Sawmill Square and Microcenter every hour. The 72, 73, 74, and Zoo bus all operate on a Rush Hour schedule with 1-4 trips in the morning and evening peak periods. The Zoo bus

<sup>1</sup> <https://www.whitehouse.gov/briefing-room/statements-releases/2021/08/05/fact-sheet-president-biden-announces-steps-to-drive-american-leadership-forward-on-clean-cars-and-trucks/>  
<sup>2</sup> <https://www.prnewswire.com/news-releases/ev-research-nearly-half-of-us-car-buyers-intend-to-purchase-an-electric-vehicle-charging-and-safety-concerns-weigh-on-consumers-301863850.html>  
<sup>3</sup> <https://investors.carvana.com/news-releases/2023/07-10-2023-140014673>

only operates from May to October. Given that some riders using these routes leave a personal vehicle at the COTA Park & Rides while they are commuting to and from downtown, these lots may be ideal for level 1 and level 2 chargers. All six routes operate in the southeast portion of the City of Dublin.

Figure 31: COTA Lines and Stops in Dublin



Source: Dubscopy and COTA GIS and Mapping Hub

The **Dublin Connector** service is a unique, free mobility service for residents over 55 years old, residents with disabilities or anyone who works in Dublin. Dublin contracts with SHARE Mobility to offer the service and rides to work, the library, grocery shopping, medical appointments and other needed locations scheduled through an app, [website](https://www.sharemobility.com) or by phone. Currently, vehicles used for this service are located at Dublin's fleet building which already has EV charging.

**Future Opportunity:** Convert Dublin Connector vehicles to EVs and provide additional charging at Dublin's fleet building. **LinkUS** is an initiative to bring world class transit and mobility to central Ohio. The backbone of the system is a high-capacity transit network, with other features such as mobility hubs envisioned at key points as well. The Northwest Corridor of the system is planned to pass through Dublin along State Route (SR) 161 and possibly terminate at the Ohio University Dublin Integrated Education Center. **Figure 2** shows the locally preferred alternative route for the Northwest Corridor.

**Future Opportunity:** Electrification along this route so people can park, ride, and charge.

Figure 32: LinkUS Northwest Corridor



Source: LinkUS Northwest Corridor Locally Preferred Alternative

Related to LinkUS, Dublin also has an ongoing study of SR-161 to better understand how bus rapid transit, pedestrian friendly amenities and other roadway uses can benefit this corridor.

**Future Opportunity:** Incorporate electrification opportunities along Dublin’s SR-161 corridor so people can park, ride, and charge.

**Public Parking**

Of the 6,220 public parking spaces in Dublin, slightly over 10%, or 645, are for on-street parking. This street parking is located in the Bridge Park and Historic Dublin districts. When considering electrifying these spaces, both areas present different challenges. For Bridge Park, there are a number of parking structures with chargers already present and new chargers should be focused within the same garages where possible to avoid digging up streets to construct additional infrastructure. Similarly, on-street charging is going to be a challenge in Historic Dublin due to space constraints and existing infrastructure and is not recommended.

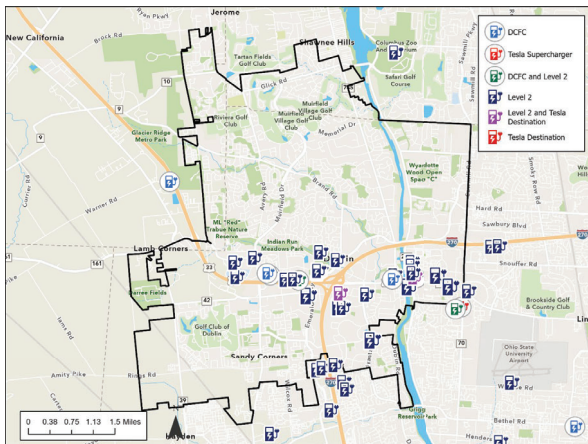
**Future Opportunity:** Consider streamlining the permitting process to aid in the installation of public charging stations or offering parking incentives similar to the [City of Cincinnati’s Electric Car Incentive Program](#) to help encourage EV drivers in Dublin.

**Existing Charging Infrastructure**

The existing charging infrastructure in Dublin, as shown in [Figure 3](#), coincides with the areas of high-density commercial activity. The recommended locations of future EV charging will also largely be concentrated in these areas.

**Future Opportunity:** As EV adoption increases, Dublin can install charging infrastructure at city-owned facilities outside of the Bridge Park and Historic Dublin areas and encourage private businesses to do the same to help distribute charging resources throughout Dublin.

Figure 33: Existing Public EV Charging in Dublin



Source: AFDC, Plugshare, City of Dublin

**Scenario Forecasting Methodology**

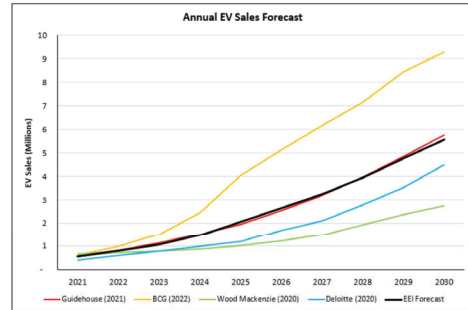
As a way to estimate the number and type of charging infrastructure that might be needed in Dublin by 2030, various EV sales forecasts and charger ratios were analyzed to develop a low, medium, and high future projection scenario. The [Edison Electric Institute \(EEI\)](#) developed an EV forecast in 2018 and again in 2022<sup>4</sup> based on four independent forecasts:

<sup>4</sup> <https://www.eei.org/-/media/Project/EEI/Documents/Issues-and-Policy/Electric-Transportation/EV-Forecast-Infrastructure-Report.pdf>

- Guidehouse – Guidehouse Insights: Plug-in EV (PEV) Sales by Region, World Markets (Q4 2021).<sup>5</sup>
- Boston Consulting Group (BCG) – Electric Cars Are Finding Their Next Gear (June 2022).<sup>6</sup>
- Deloitte – Electric Vehicles: Setting a Course for 2030 (July 2020).<sup>7</sup>
- Wood Mackenzie – Electric Vehicle Outlook to 2040 (2020).<sup>8</sup>

As shown in [Figure 4](#), the models used to generate these forecasts show a wide range in projected EV adoption by 2030 since they use inputs such as customer preference to determine general interest in EVs, technological advances related to declining battery costs that influence EV cost competitiveness with internal combustion engine (ICE) vehicles, and fuel efficiency standards/environmental regulations which will drive investment in EVs by the automakers.

Figure 34: Annual EV Sales Forecast Compared to Selected Forecasts



Source: Edison Electric Institute

<sup>5</sup> Guidehouse. Market Data: EV Geographic Forecast – North America. <https://guidehouseinsights.com/reports/market-data-ev-geographic-forecast-north-america>  
<sup>6</sup> Boston Consulting Group. Electric Cars Are Finding Their Next Gear. <https://www.bcg.com/publications/2022/electric-cars-finding-next-gear>  
<sup>7</sup> Deloitte. Electric Vehicles: Setting a Course for 2030. <https://www2.deloitte.com/us/en/insights/focus/future-of-mobility/electric-vehicle-trends-2030.html>  
<sup>8</sup> Wood Mackenzie. Electric Vehicle Outlook to 2040. <https://www.woodmac.com/our-expertise/capabilities/electric-vehicles/>

**EV Adoption Percentage by 2030**

S&P Global Mobility<sup>9</sup> forecasts EV sales in the US could reach 40% of total passenger car sales by 2030, and more optimistic projections foresee electric vehicle sales surpassing 50% by 2030. It’s important to note that these figures represent new sales of EVs, and not the vehicle stock on the road.

The City of Dublin has already shown to be a leader in Ohio in terms of EV adoption with:

- An EV adoption rate of 9.24% between Aug-Oct 2023 and 2.84% of all vehicles registered in Dublin being EVs.
- The average passenger vehicle age in Dublin is 3 years newer than the state as a whole (10 years vs. 13 years).

Higher vehicle turnover means that Dublin will likely electrify faster. Therefore, for the purposes of this document, it is assumed that 40% of registered vehicles in Dublin will be EVs in 2030<sup>10</sup>.

To determine the number of EV chargers required to support the EV adoption forecast, EV to EVSE charging ratios and level 2 to DCFC port ratios were explored. The following sources were used to develop a low, medium, and high scenario for the number of chargers needed in Dublin by 2030.

- Norway: Internationally, Norway is often considered to be the leader in EV adoption with PEV sales in June 2023 reaching over 90%.<sup>11</sup>
- California: This state leads EV adoption in the US with PEVs making up a market share of 25% in Q2 2023.<sup>12</sup>
- US Department of Energy: The US Department of Energy (DOE) released a report in 2017 exploring how much charging infrastructure will be needed to support EV adoption in the US.<sup>13</sup>
- S&P Global Mobility: S&P Global compiled existing registration data and projected 28.3 million EVs by 2030<sup>14</sup>.
- Alternative Fuel Infrastructure Directive (AFID): Regulates the deployment of public EV charging infrastructure in the European Union.<sup>15</sup>
- Edison Electric Institute: EEI compiled various trend data and adoption projections to forecast the number of chargers needed in the US by 2030.<sup>16</sup>

**EV to EVSE Port Ratio**

The EV to EVSE ratio represents the number of EVs on the road compared to the number of publicly available level 2 and DC fast chargers. This metric serves as a starting point to understand how many chargers might be needed based on the number of EVs registered. [Table 1](#) summarizes the existing and

<sup>9</sup> <https://www.bis.gov/opub/btn/volume-12/charging-into-the-future-the-transition-to-electric-vehicles.htm>

<sup>10</sup> Note that this figure will need to be monitored and updated based on future trends.

<sup>11</sup> <https://insideevs.com/news/675163/norway-plugin-car-sales-june2023/>

<sup>12</sup> <https://www.veloz.org/california-ev-sales-reach-25-percent-market-share/>

<sup>13</sup> [https://www.energy.gov/sites/default/files/2017/09/f36/NationalPlugInElectricVehicleInfrastructureAnalysis\\_Sept2017.pdf](https://www.energy.gov/sites/default/files/2017/09/f36/NationalPlugInElectricVehicleInfrastructureAnalysis_Sept2017.pdf)

<sup>14</sup> <https://www.spglobal.com/mobility/en/research-analysis/ev-chargers-how-many-do-we-need.html>

<sup>15</sup> <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A02014L0094-20211112>

<sup>16</sup> <https://www.eei.org/-/media/Project/EEI/Documents/Issues-and-Policy/Electric-Transportation/EV-Forecast-Infrastructure-Report.pdf>

recommended EV to EVSE ratios from low to high using the sources listed above, as well as the existing Dublin ratio.

Table 1: Existing and Target EV to EVSE Ratios

SOURCE	EV TO EVSE RATIO
Norway Existing	34:1
California Existing	26:1
US DOE Recommendation	18:1
S&P Global Recommendation	12:1
Dublin Existing	12:1
AFID/European Union Goal	10:1
EEl Goal	8:1
California Goal	7:1

Source: Listed on page 6

### Electrification Scenarios

As of October 2023, 38,465 vehicles are registered in Dublin. Historically, population growth rates have averaged between 2 and 3%. Accounting for future growth, annexation, and visitors outside of Dublin that are not part of the population, using the high end annual growth rate of 3% seems reasonable to forecast the number of EVs registered in Dublin by 2030. If a 3% annual growth rate for vehicle registrations is compounded annually, about 47.4k vehicles will be registered in Dublin by 2030. To simplify the projections, the estimated vehicle registrations by 2030 was rounded to 50,000 vehicles. Using the assumed 40% EV adoption rate with the estimated 50,000 vehicles, the projected number of EVs registered in Dublin in 2030 is estimated to be 20,000. This figure is used below in each scenario and in calculations summarized in Table 2.

Table 2: Dublin Electrification Scenarios - Low, Medium, and High

	EV TO EVSE RATIO	EV TO EVSE RATIO SOURCE	EVSE NEEDED IN DUBLIN BY 2030
Low Electrification	34:1	Norway Existing	588
Medium Electrification	18:1	US DOE Recommendation	1,111
High Electrification	7:1	California Goal	2,857

Source: HNTB

#### Low Electrification

Using the lowest EV to EVSE ratio from Norway at 34 EVs for every EVSE, Dublin would need about 588 EVSE ports by 2030.

#### Medium Electrification

Using the medium EV to EVSE ratio recommended from the USDOE report at 18 EVs for every EVSE, Dublin would need about 1,111 EVSE ports by 2030.

#### High Electrification

Using the highest EV to EVSE ratio set as a goal by California of seven EVs for every EVSE, Dublin would need about 2,857 EVSE ports by 2030.

7

SOURCE	LEVEL 2 TO DCFC RATIO
California Existing	5:1
Norway Existing	3:1

Source: Listed on page 6

Type of EV is important when considering what charging level is appropriate. PHEVs, which represent 21% of alternative fuel vehicles in Dublin, cannot use DCFCs and many can rely on level 1 chargers since battery sizes are smaller compared to BEVs.

### Recommended Electrification Scenario

Based on discussions with working group members and the Dublin Economic Development team, Dublin wants to ensure that adequate charging will be offered for incoming workers, tourists and residents who may not be able to access charging at-home, i.e. multi-unit dwellings, while not overbuilding as the technology is changing rapidly. Alignment with Norway's existing 34:1 ratio is justifiable based on similar home charging availability in Dublin. For example, 82% of EVs in Norway charge at home<sup>17</sup>. Although at home charging data was not available for Dublin, 68% of Dublin's total housing units are single family detached homes, with an additional 15% comprised of single family attached housing products<sup>18</sup>. Assuming that both types of homes have the ability to setup a home charger, over 80% of Dublin homes could provide charging for EVs. As a result, it is recommended that Dublin start with a 34:1 EV to EVSE ratio goal for 2030, although this goal should be reassessed biennially based on existing data, market trends, and funding availability.

When determining the number of level 2 charging ports needed compared to DCFC ports, it's important to consider the usage type and location of the chargers. Most retail centers, multi-unit dwellings, and higher vehicle AADTs are clustered along the US-33/SR-161 corridor, especially near Bridge Street. Given this higher concentration within the Dublin area, with the availability of home charging being very high, it is recommended to have a more conservative ratio in the Dublin area at a 20:1 level 2 to DCFC as shown in Table 5.

Table 5: Dublin 2030 Electrification Recommendations

Assumed Total Number of Vehicles Registered in Dublin (based on 2023 registrations)	50,000
Projected Number of EVs in Dublin (40%)	20,000
Recommended EV to EVSE Ratio (to be reassessed at least biennially)	34:1
Recommended Number of Public EVSE	588
Recommended Level 2 to DCFC Ratio	20:1
Recommended Public Level 2 Ports	559
Recommended Public DCFC Ports	29

Source: HNTB

Note that Dublin is already well on its way to reaching these targets with 83 existing public level 2 charging ports and 6 existing DCFC ports. Table 6 shows targets for implementation to meet the current 2030 recommendations. It's important to note that these targets do not follow a linear trendline, but

<sup>17</sup> <https://www.theglobeandmail.com/business/article-ev-charging-stations-norway/>.

<sup>18</sup> <https://communityplan.dublinohiousa.gov/character/demographics>

9

### Fleet Electrification

Dublin's fleet was also examined to determine which municipal vehicles were good candidates for electrification based on use cases and duty cycle in order to assess future fleet transition opportunities and charging needs. Dublin had 232 fleet vehicles as of August 29, 2023, and 218 of those were driven in the preceding year. Of the 218 to be evaluated for electrification, 18 vehicles were identified for snow and leaf removal and excluded from consideration. An additional 88 vehicles were removed from consideration because they were either medium-duty or their use cases were not compatible with electrification in the near term. One Nissan Altima with no miles was re-included for replacement analysis. As a result, a portion of the remaining 113 vehicles are possible candidates for electrification. Nine of these were police pursuit vehicles, which were targeted for replacement by hybrids due to operational constraints. Plug-in Hybrid (PHEV) and Battery Electric (BEV) vehicles were examined for each of the remaining models.

Table 3: Dublin Fleet Vehicles Analyzed

Total Fleet Vehicles as of 8/29/2023	232
Vehicles with Miles in Preceding Year	218
No Miles but Re-Included	1
Snow and Leaf Removal	18
Medium Duty or Incompatible with Electrification	88
Total Vehicles Analyzed	113

Source: City of Dublin, HNTB Analysis

Based on this analysis, we recommend a level 2 charger be installed for each fleet vehicle converted to electric. This 1:1 ratio would guarantee that the fleet vehicles can be recharged overnight without requiring city employees to move vehicles. In addition, any BEV police vehicles should have access to DCFCs at a 1:25 ratio. These ratios would result in a requirement for 109 level 2 chargers, plus 2 DCFC ports. Level 1 chargers could be implemented on an as needed basis for fleet vehicles with very low duty cycles or for any fleet PHEVs and would likely be easy to utilize since 110V outlets would be available at Dublin facilities.

### Level 2 to DCFC Ratio

Another important ratio to aid in planning for the appropriate number of EV charging infrastructure is the level 2 to DCFC ratio, which informs the type of chargers needed by location. To determine what ratio of public level 2 chargers to DCFC is appropriate, ratios from other geographies were benchmarked. Table 4 summarizes these ratios from low to high, including the existing Dublin ratio.

Table 4: Existing and Target Level 2 to DCFC Port Ratios

SOURCE	LEVEL 2 TO DCFC RATIO
California Goal	25:1
US DOE	25:1
EEl Goal	25:1
Dublin Existing	12:1
S&P Global	12:1

8

instead mirror the EV adoption curves that show more exponential growth later in time. Another important note is that this table represents the recommended number of ports in the Dublin area, which includes public and private facilities.

Table 6: Public Level 2 and DCFC Recommended Implementation Targets by Year

YEAR	LEVEL 2 PORTS	DCFC PORTS
2023 (existing)	83	6
2025	150	15
2028	300	22
2030	559	29

Source: HNTB

### Locations and Usage Type

The following section addresses how the assumptions presented in the previous section translate into opportunities for level 1, level 2, DCFC, and private parking use cases. Based on the recommended electrification scenario, the following types of chargers could be implemented for the applications shown below.

#### Level 1 Charging

Although specific level 1 recommendations are not included above, there are some use cases where this level of charging can serve as a low-cost solution. Level 1 charging is ideal for applications where EVs have very long dwell times or when the vehicle has a small battery. Since PHEVs rely on both an electric motor and an internal combustion engine, the battery sizes are typically much smaller than a BEV. Micro-mobility solutions such as e-scooters or e-bikes can also use level 1 charging due to the small battery sizes. Locations that could be applicable for level 1 charging could include:

- Mobility hubs that accommodate micro-mobility
- Fleet hubs, particularly for PHEVs or EVs that have smaller daily duty cycles and are able to charge overnight or are not used on a daily basis

#### Level 2 Charging

Level 2 charging is the most common EV charging level, where vehicle dwell times are typically a couple hours to overnight. These types of chargers are ideal for the following types of publicly available applications:

- Restaurants
- Retail stores
- Parks
- Public parking (on-street, parking lots, parking garages, park and rides)
- Mobility hubs (for EVs with long dwell times)

The following private applications are also ideal for level 2 charging but not part of the recommended electrification scenario presented in Table 5 with 559 level 2 ports:

- Single-family housing
- Multi-unit dwellings
- Workplaces
- Fleet hubs, including for on-road vehicles, off-road vehicles, and micro transit shuttles (the City of Dublin's existing fleet chargers are level 2)

10

DCFC

This charging level is best suited for BEVs with short dwell times. Relevant public applications should be along major arterials and interstates and near high-population density areas such as:

- High turnover retail (e.g. grocery stores)
- High turnover restaurants
- Mobility hubs (for Transportation Network Company vehicles or vehicles with short dwell times)

Private applications for DCFC include:

- Fleet charging with aggressive duty cycles (e.g. police vehicles)
- Transit buses

Private Parking

Since the City of Dublin has limited influence on which private businesses decide to install EV chargers, the recommended private location EV charger deployments referenced in the recommended projection scenario section just show a representation of a couple general commercial areas within Dublin.

Recommended Projection Scenario

Figure 5 and Figure 6 show the recommended public and private level 2 charging locations and public DCFC ports based on the recommended electrification scenario of 34:1 EV to EVSE ratio and 20:1 level 2 to DCFC ratio. Table 7 also summarizes these recommendations.

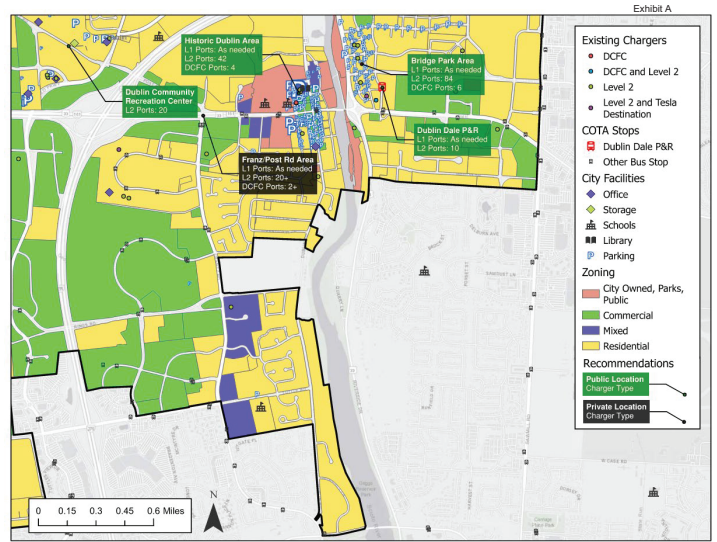


Table 7: Recommended Charging Locations and Estimated Costs

PROPERTY TYPE	LOCATION	LEVEL 2 PORTS	DCFC PORTS	ESTIMATED LEVEL 2 COST†	ESTIMATED DCFC COST‡
<b>Public &amp; Private</b>	Existing	83	6	-	-
<b>Public</b>	Historic Dublin Parking	42	4	\$283,500	\$800,000
<b>Public</b>	DCRC	20	0	\$135,000	-
<b>Transit</b>	Dublin Dale Dr P&R	10	0	\$67,500	-
<b>Public</b>	Darree Fields	20	2	\$135,000	\$400,000
<b>Public</b>	Dublin Chiller	6	0	\$40,500	-
<b>Public</b>	Avery Park	6	0	\$40,500	-
<b>Public</b>	Bridge Park Garages	84	6	\$567,000	\$1,200,000
<b>Public</b>	Other Public Locations*	64+	0+	\$432,000	-
<b>Private</b>	Avery-Muirfield Dr Area	30+	4+	\$202,500	\$800,000
<b>Private</b>	Franz/Post Rd Area	20+	2+	\$135,000	\$400,000
<b>Private</b>	West of Sawmill Rd Area	20+	4+	\$135,000	\$800,000
<b>Private</b>	Other Private Locations*	154+	1+	\$1,039,500	\$200,000
		<b>559+</b>	<b>29+</b>	<b>\$3,213,000</b>	<b>\$4,600,000</b>
					<b>\$7,813,000</b>

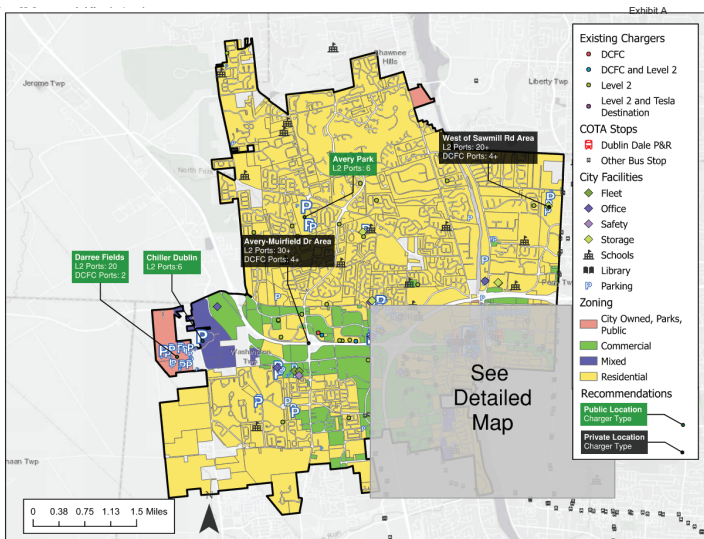
\*: Not shown on maps  
 †: Assuming level 2 cost per port of \$6,750  
 ‡: Assuming DCFC cost per port of \$200,000  
 Source: HNTB

These targets are meant to be the minimum recommendations to support 20,000 EVs in Dublin by 2032. Dublin should also look for opportunities to distribute EV charging throughout the Dublin area to be used by both the public and fleet vehicles. In areas without an abundance of commercial activity, where a private company may not be able to justify a business model for installing chargers, the City should consider installing their own chargers in that area if a city-owned facility exists. For example, both level 2 and DCFC are recommended for Darree Fields, an area further away from commercial activity. Dispersed charging locations like this could be used by the public but also by Dublin fleet vehicles (such as police vehicles) as needed so they wouldn't necessarily need to go back to the depot to charge. Level 1 charging locations are also shown in the maps at a high level in high density areas as needed for micro transit and other uses as needed.

Note that the estimated costs shown in Table 7 can vary widely based on specific site characteristics. Various funding options to install charging infrastructure also currently exist and will likely be available in the future to offset costs.

EV Charging Station Ownership

Dublin's existing model for public and private EVSE ownership is to contract with a third-party to have chargers located on city property. This contract allows Dublin to purchase and own the chargers, but the installation, operations, and maintenance are covered by the third-party. Dublin has taken advantage of grants to support a portion of the cost. This model allows Dublin to benefit from owning the EVSE while not having to carry specialized staff or contracts to operate and maintain the chargers.



Currently, no fees exist for public EV charging in Dublin – users may charge for free. This may help spur EV adoption in the short term, but as adoption increases, and with it the demand for more public charging, a fee structure is recommended. Charging a fee at public charging stations is a best practice for both level 2 and DCFC stations for the following reasons:

- Free charging can lead to poor charger etiquette where users may plug in even if they don't need to, resulting in less charging options for drivers that actually do need a charge, or people unplugging other vehicles to charge their own.
- A fee structure can offset demand charges incurred during peak electricity usage periods.
- Free public charging can hinder private investment in charging since site hosts can't compete.
- Free charging (especially DC fast charging without idle fees) does not incentivize drivers to move their vehicle after charging is complete (or at least 80%).

While there are myriad ownership options, three are discussed below: Dublin owned and operated, Dublin owned but services contracted out, and third-party owned but leases land from Dublin.

**Dublin Owns and Operates EVSE**

Charging infrastructure is purchased, installed, and maintained by Dublin, which allows for full control over the station and the ability to keep all revenue from the station (if applicable). In this scenario, Dublin is responsible for all associated costs, including any maintenance<sup>19</sup> or payment transaction fees. Challenges of this model are high up-front capital investment; needing highly skilled personnel for installation, operations, and maintenance; and worrying about changing out equipment as vehicles change how they interact with EVSE.

**Dublin Contracts Full-Service EVSE**

This is the existing setup in Dublin and allows for predictable overhead costs to the City while maintaining a level of service spelled out in the contract. The City has less control over the station and possible revenue from charging, but also has less overhead cost and can take advantage of any data collection that comes with the EVSE. Favorable contract terms, such as uptime requirements and electric metering and billing, can make or break the public's impression of the chargers. Challenges of this model are long contract terms, which may not allow for a change out of equipment as frequently as preferred and relying on a third-party to perform maintenance which may be slower and less reliable than expected.

**Third-Party Leases Site from Dublin and Owns and Operates EVSE**

Charging infrastructure owned by a third-party is installed on Dublin property through a lease and maintained by the third-party, which minimizes responsibility to Dublin as the site host. In some cases, the lessor may earn revenue instead of or on top of lease payments. Many of the National Electric Vehicle Infrastructure (NEVI) partnerships are structured this way, and it may be preferred by charging vendors who are used to this structure. The party who pays for the electricity can vary between the site host and the third-party based on the arrangement. Contract terms also make or break this type of arrangement, with additional key considerations being access by the site host if needed, restoring the site to its original condition after the lease ends, and ownership of the chargers after the contract

<sup>19</sup> [https://afdc.energy.gov/fuels/electricity\\_infrastructure\\_maintenance\\_and\\_operation.html](https://afdc.energy.gov/fuels/electricity_infrastructure_maintenance_and_operation.html)

period. The main challenge with this model is loss of control of all charging activities (i.e., fee charged) unless negotiated in the lease agreement.

Table 8: EVSE Charging Ownership Types

CONSIDERATION	DUBLIN OWNS AND OPERATES	DUBLIN CONTRACTS WITH THIRD-PARTY FOR FULL SERVICE EVSE	THIRD-PARTY LEASES SITE FROM DUBLIN AND OWNS AND OPERATES
<b>Equipment Cost</b>	High up-front cost for EVSE	High up-front cost for EVSE	Low to no up-front cost for EVSE
<b>Installation</b>	Need to contract with someone to install (with proper experience)	Installation handled by third-party	Installation handled by third-party
<b>Operations &amp; Maintenance</b>	Need to train existing staff or contract someone to operate and maintain	Operations and maintenance are handled by third-party	Operations and maintenance are handled by third-party
<b>Revenue from Fees</b>	If a fee is charged, Dublin can keep all fees. If site-host is a government, fees made for services need to be reasonably in line with the cost of providing such services.	If a fee is charged, Dublin can keep all fees. If site-host is a government, fees made for services need to be reasonably in line with the cost of providing such services.	Depending on contract terms and if a fee is charged, revenue may first go to third-party to pay for equipment, installation, operations and maintenance then to Dublin.
<b>Measuring Performance</b>	May need additional software to track charging data	Contract allows access to charging data dashboard	Minimal data will be shared unless negotiated
<b>Cost of Electricity</b>	Responsible for electricity cost	Typically responsible for electricity cost, depending on contract terms	May or may not be responsible for electricity cost

Source: HNTB

For Dublin, continuing to contract out full services through a third-party is recommended. This contract type presents the lowest risk due to lower overall costs, skilled professionals maintaining equipment, and changing out third-party providers if the EVSE does not meet needs or expectations. EVSE equipment, like most technologies, is expected to get better, more efficient, adapt to the new vehicle technology, and provide better service to the users. Until that level of service is achieved, contracting out for this service is recommended.

**Conclusion**

Dublin is growing quickly, and EV adoption is expected to remain ahead of the rest of the state. It is estimated that Dublin will need roughly 588 public EVSE by 2030, depending on EV adoption. Dublin is already well positioned to meet this target based on the existing number of chargers currently available but should reassess often to align with actual EV adoption trends and funding opportunities. Fleet

deployments, specifically for city operations, will be another area for Dublin to focus on. Assumptions used to determine the recommendations presented here should be updated at least every couple years to ensure they are in line with the latest EV market factors.