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Local Authority
Electrification of Fleet and EV Charging Guidance Document

CCMA
Cumann Lucht Bainistíochta Contae agus Cathrach
County and City Management Association

LGMA
Local Government Management Agency

Údaráis Áitiúla Éireann
Local Authorities Ireland

Disclaimer

This guidance document has been prepared in good faith based on the feedback from the local authority (LA) sector on fleet electrification and the installation of fleet and public electric vehicles (EV) charge points. The document is not intended as a step-by-step guide for LAs to develop an EV strategy, but should provide useful information sources and recommendations when considering projects in this area. Professional assistance should be employed when making decisions concerning the installation and electrical connection of EVs.

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Executive Summary

Local government has been identified as key in the delivery of Ireland's National Climate Action ambition. Each local authority (LA) has expressed their commitment to drive and lead climate action change by signing a Local Authority Climate Action Charter and committing to achieving 'net zero' greenhouse gas (GHG) emissions by 2050.

The 2020 Programme for Government enhanced this goal by setting an ambitious target to achieve a 51% reduction in GHGs by 2030, more than doubling the annual emission reduction target from a previous 3% to 7%. These goals will be strengthened further in the forthcoming Climate Action Plan 2021.

Increasing the number of electric vehicles (EVs) on our roads is one of the Government's key interventions in the move to reduce fossil fuel energy consumption and GHG emissions. In this regard, LAs can demonstrate exemplary behaviour by investing in and developing sustainable transport. Electrifying the LA fleet where technology, cost differential and resources allow, and assisting with the provision of EV charging infrastructure are two important areas where LAs can make a significant contribution to the national decarbonisation effort.

While it is recognised that LAs will play an important lead role in the initial roll out of electric vehicle charge points (EVCPs), particularly for homeowners who are not in a position to charge their EVs at home, this would need to be accompanied by and in time overtaken by the energy market, who will need to fulfil the longer-term objectives for the provision of public EV charging infrastructure. There is a need for stronger commitment from energy suppliers, possibly incentivised by Government, to install public EVCPs.

To advance the leadership role by the LA sector, the CCMA, through the Climate Action, Transport and Networks (CATN) committee and the EV Charging Working Group has prepared this guidance document to provide information and recommendations on both the electrification of the local authority fleet and the provision of public EV charging infrastructure. The focus of the guidance is to outline key areas that local authorities should consider. The aim is for a user friendly and concise document of information, supported by appendices with more detail and specifics. Useful links are provided throughout the document for further review.

Role of LAs in Electrifying their Fleets and installing EV Charge Points:

LAs have a leadership role in climate action and have made commitments to support the Government in attaining goals to address climate change. This guidance document outlines why LAs should get involved in EVs and EVCPs, subject to the provision of resources, advances in technology and mechanisms to address the cost differential in the shift towards vehicle electrification.

In 2019, the transport sector was responsible for 20.4% of Ireland's greenhouse gas emissions. Tackling the energy use of the transport sector will make a significant contribution in Ireland's efforts towards a net-zero carbon society. For the LA sector, the decarbonisation and electrification of the LA fleet is an important component.

Research for this document indicates that an estimated 20% of homeowners are not in a position to charge their EVs at home and these homeowners should be afforded access to low cost, night saving charging facilities in accordance with the principles of a just transition. The government considers that this can be facilitated through shared on-street residential charging and have made grant funding available to LAs through the SEAI for the installation of such on-street EVCPs.

The adequacy of this grant support is the subject of debate and accounts for some of the low uptake by LAs of this grant provision. It has become clear through the work of this CCMA EV Charging Group that the provision of EVCPs for public usage is financially challenging for the sector under current funding support. However, LAs are already leading in the initial roll out of electric charging facilities to help kick-start the provision of EVCPs and support the concept of a just transition.

Although the network of EVCP locations has improved over the last two years there is still a lack of adequate EV charging infrastructure around the country, particularly in rural areas and at visitor locations. LAs are in a position to lead in bridging this gap by assisting in increasing the number of EVCPs in their areas. In the longer term it is market forces that will ultimately sustain the provision of EVCPs across communities. Commitment by energy suppliers with respect to both network capacity and EV charging infrastructure will likely be a vital component going forward.

To begin with, LAs should consider the development of an EV and EVCP strategy for the deployment of EVs as part of their fleet, and to assess the optimum locations of public EVCPs within their city and county boundaries. The role of LAs in the medium to longer term will potentially graduate to providing support and assistance to EVCP operators in the operation and maintenance of installed public charging facilities.

General Guidance and Understanding the Basics

To support LAs, extensive consultation has been made to source the most up to date information on what is currently available in terms of EVs, EV charging and charge point installation. This section of the guidance provides an overview on EVCPs and EV capability, currently available EV types, charge connectors, electrical connection guidelines and future trends.

LA Fleet Electrification

In this section of the document, options for LAs considering the transition of their fleet to EVs, where viable, are outlined. Information is provided on procurement frameworks, available funding to secure the EVs and considerations LAs should take into account prior to the installation of supporting EV charging infrastructure for the LA fleet.

Public Charging Infrastructure

The information presented in this part of the guidance relates to public charging infrastructure and is separate to the installation of EV charge points deployed for LA fleet use only. The information is set out to assist LAs in the development of their EV and EVCP strategies.

Information to address assessment of needs, planning considerations and recommendations from the Low Emission Vehicle (LEV) Task Force is outlined. The availability of data on trends and usage from existing charge point networks e.g. ESB ECars and CSO statistics on licensed EVs will be an important first step resource. Some EVCP trend analysis from existing LA areas is included, as well as consideration of a number of Business Model scenarios for the operation of EVCPs.

Costs associated with EVCPs, local authority EVCP case studies, current funding and sample payback scenarios are also laid out in this chapter. A fundamental consideration for an EVCP strategy will be the capacity of the national electricity network and LAs are strongly advised to review the 'Electrical Connection Considerations' section of the guidance document.

Conclusions and Recommendations

The final chapter summarises the information of the guidance document and presents a number of conclusions and recommendations for LAs to consider. Additional expertise will be required to advance the electrification of the LA fleet and installation of EVCP infrastructure, but LAs need to take the first steps towards this transition now.

Fundamentally, LAs should consider the development of an EV and EVCP strategy for their administrative areas or regions, including governance and reporting structures. The department and individuals within the LA who are best placed to progress the fleet transition and the implementation of the EV charging infrastructure need to be identified at the outset.

An assessment of needs and the planning and siting of EVCP locations are very important. LAs should familiarize themselves with relevant planning legislation, particularly SI 115 of 2021, as well as Part L of the Building Regulations and EU Clean Vehicles Directive. Particular attention should be paid to the electrical connection considerations for public EVCPs with ESB Networks. Consideration should also be given for the inclusion of appropriate policies in County Development Plans for the provision for EVCPs by developers. Guidance from the Department of Housing Local Government and Heritage (DHLGH) on policy matters will ensure a consistent approach across all planning authorities.

There are existing frameworks for the procurement of EVs, but there is currently no national OGP framework for EVCPs. Consideration may be given to a future procurement framework for EVCPs but at present, where LAs wish to proceed with EV charging infrastructure, this will need to be tendered on an individual basis.

Outside of private operators, the provision of publicly accessible EVCPs by LAs has largely been confined to pilot projects or fully funded projects with EU support and without a tariff for usage. It is considered that charging for the use of EVCPs installed by LAs, managing the maintenance, customer service and back-office support for charging infrastructure is outside the remit of the LA sector and more appropriate for charge point operators (CPOs).

LAs will lead in the initial roll out of electric charging facilities to help kick-start the provision of EV charging infrastructure and support the concept of a just transition. In the medium to longer term the role of LAs will likely graduate to provide support and assistance to EVCP operators in the operation, maintenance and customer support for installed public charging facilities.

The work of this CCMA EV Charging Group has demonstrated that the provision of EVCPs for public usage is a challenge financially for the sector under current funding support. The civil works in particular, to facilitate EVCP installation at optimum locations, have proved to be significant. Notwithstanding this, a number of LAs are already leading the way and have commenced the installation of public EVCPs in their areas.

Fast or medium-fast charging hubs are recommended for consideration by LAs on the outskirts of urban areas to support visitors and tourists using EVs. Charging hubs may also be an alternative for LAs to complement or as a substitute for on-street EVCPs. Outskirt charging hubs are also recommended to support the longer-term objectives for the revitalisation of urban centres, public realm and town centre considerations, as well as assisting with the overall modal shift in transport.

1. Introduction

Increasing the number of electric vehicles on our roads is one of the Government's key interventions in the move to reduce fossil fuel energy consumption and GHG emissions. In this regard, LAs can demonstrate exemplary behaviour by investing in and developing sustainable transport. Electrifying the LA fleet where technology, cost differential and resources allow, and assisting with the provision of EV charging infrastructure are two important areas in which LAs can make a significant contribution to the national decarbonisation effort.

CCMA EV Charging Working Group

The CCMA Environment, Climate Change & Emergency Planning (ECCEP) committee established a LA Electric Vehicle Charging Working Group (EV WG) in 2020 with a view to consider and assist LAs in respect of their role in EV charging infrastructure. Following the restructuring of the CCMA committees, the EV WG chaired by Breege Kilkenny, Director of Services with Wicklow County Council, now reports to the CCMA's Climate Action, Transport and Networks (CATN) committee.

Arising from the work of the EV WG, it was considered that the most appropriate way to assist the sector was to prepare a guidance document, providing information and recommendations on both the electrification of the LA fleet and the provision of public EV charging infrastructure. It is envisaged that the document will also assist LAs in meeting their obligations as leaders on climate action.

In preparing the guidance document, the EV WG has been informed by a variety of sources including:

- Low Emissions Vehicle Taskforce Phase 2
- Draft Dublin LA EV Strategy Report
- Questionnaire to the sector by the Department of Environment, Communications and Climate on behalf of the EV WG (see Appendix A)
- A profile of Local Government Climate Actions in Ireland (January 2020)
- On-Street Residential Charging, SEAI/AIEA October 2020
- Switching to Electric Vehicles, SEAI October 2020
- Phase One of Go Ultra Low, Oxford Pilot Project Report

Scope of the guidance document

The principal scope of this guidance document is to assist LAs on emissions reduction by decarbonisation of LA fleet vehicles through electrification, as well as the provision of EV charging infrastructure to promote EV use and ownership as part of a LA's overall EV and EVCP Strategy.

The document outlines:

- Role of local authorities
- General guidance on EVs and EVCPs
- Information on the electrification of the LA fleet
- Information on the provision of public charging infrastructure
- Future EV trends
- Assessment of needs
- Planning and legislative considerations
- Business models of operation
- Potential costs, funding streams and investment payback for EVCPs
- Issues and useful information for the siting of publicly accessible EVCPs
- LA case studies
- Conclusions and recommendations.

The document has been devised having considered differing views and research. The recommendations are meant as guidance for LAs when considering investment into electrifying their fleet and in the provision of publicly accessible EVCPs. The guidance document aims to be as accurate as possible at the time of publication, however this is a rapidly evolving area in terms of the both the technology and the business models of operation on offer.

By collaborating at a national level and working locally, LAs can deliver a real and lasting impact for sustainable transport. It is hoped that this document will assist LAs in achieving this ambition.

2. Role of the Local Authorities

Championing EV fleets and charging infrastructure

The vision and mission of LAs, outlined in **Delivering Effective Climate Action 2030** (DECA), is to deliver transformative change and measurable climate action across our cities and counties, as well as within our own organisations, through leadership, example and mobilising action at a local level. The broad operational remit of LAs, providing over one thousand services, positions the sector well to work alongside communities and businesses to drive the change necessary to address climate adaptation and mitigation.

Strategic Goal 2 of DECA specifically sets out the measures required to ensure LAs 'adhere to carbon budgets and collaborate as a sector to achieve our 2030 and 2050 targets', aligning with the commitments made by LAs in the **Climate Action Charter**.[1] A key objective of this goal is to reduce greenhouse gas emissions from our transport fleet.

LAs can lead on the national climate action ambition for decarbonisation by electrifying their LA fleet, where feasible, and by providing infrastructure within LA areas to promote EV use and ownership, as well as reduce emissions. The further benefits for LAs in generating a pro-EV environment for employees and the public include:

- Raising awareness – educating people on the capabilities of EV transport and their benefits over fossil fuelled vehicles
- Achieving climate goals – LAs can demonstrate their commitment to transitioning to a greener and cleaner Ireland, working towards Irish and EU targets
- Pollution/health – use of EVs improves air quality and reduces noise levels, contributing to better health and lower pollution
- Renewable energy usage – EVs charged at night allow for use of renewable energy available from the national grid
- Planning – promoting delivery on climate action through the provision of sustainable development of EVCPs in new builds and public charging infrastructure
- Financial sense – the lower, whole of life cycle costs of EVs make them financially competitive
- Reduced wear and tear – overall, EVs have fewer moving parts than conventional petrol/diesel vehicle equivalents, so servicing is easier, less frequent and cheaper.

[1] Commitments C, D, E, G and H of the LA Climate Action Charter

Electrification of the LA Fleet

The latest SEAI Energy Report (2020) states that transport has had the largest share of final energy demand in Ireland since 2014. In 2019, at 5228 ktoe, transport accounted for 42% of all final energy consumption in the state. This is represented below on Figure 1, Energy Flow balance diagram taken from the SEAI 2020 report. This flow diagram also presents the inflow or source of Ireland's energy requirements in 2019. It can be seen that the largest source of energy consumed in Ireland in 2019 was from fossil fuels, with oil alone accounting for over 7,193 ktoe of energy or 57% of all energy use.

As transport in Ireland remains almost entirely dependent on oil, there is a significant impact by the Irish transport sector on climate change and greenhouse gas (GHG) emissions, as well as on air and noise pollution. According to the latest **EPA Greenhouse gas inventories** for 2019, Ireland's GHG emissions are estimated to be 59.78 million tonnes carbon dioxide equivalent (Mt CO2eq). In 2019 the transport sector was responsible for 20.4% of Ireland's greenhouse gas emissions.

Within local authorities, the LA fleet is a significant consumer of petrol/diesel fuel energy with a consequential contribution to GHG emissions by the sector. Fleet vehicles include passenger cars, vans, lorries, specialist road maintenance plant, parks maintenance plant etc. As EV and other low carbon technologies improve, options to replace traditional petrol/diesel powered vehicles are becoming more widely available and affordable.

Where possible, transitioning the LA fleet to EVs, especially the lower-powered vehicles like cars and vans, will contribute to reduced energy costs and lower GHG emissions by the sector. A number of LAs have already invested in the purchase and or lease of EVs as part of their fleet. In June of 2020, with 76 EVs, Cork City Council established the largest local authority EV fleet in the country. This generated widespread positive media[2] and interest by the public. More LAs should follow Cork City's lead and begin the EV transition. The OGP has established national frameworks for the supply of EVs to assist not just the LAs, but all public sector bodies in the procurement of EVs for their fleet. Details are presented in Section 4.

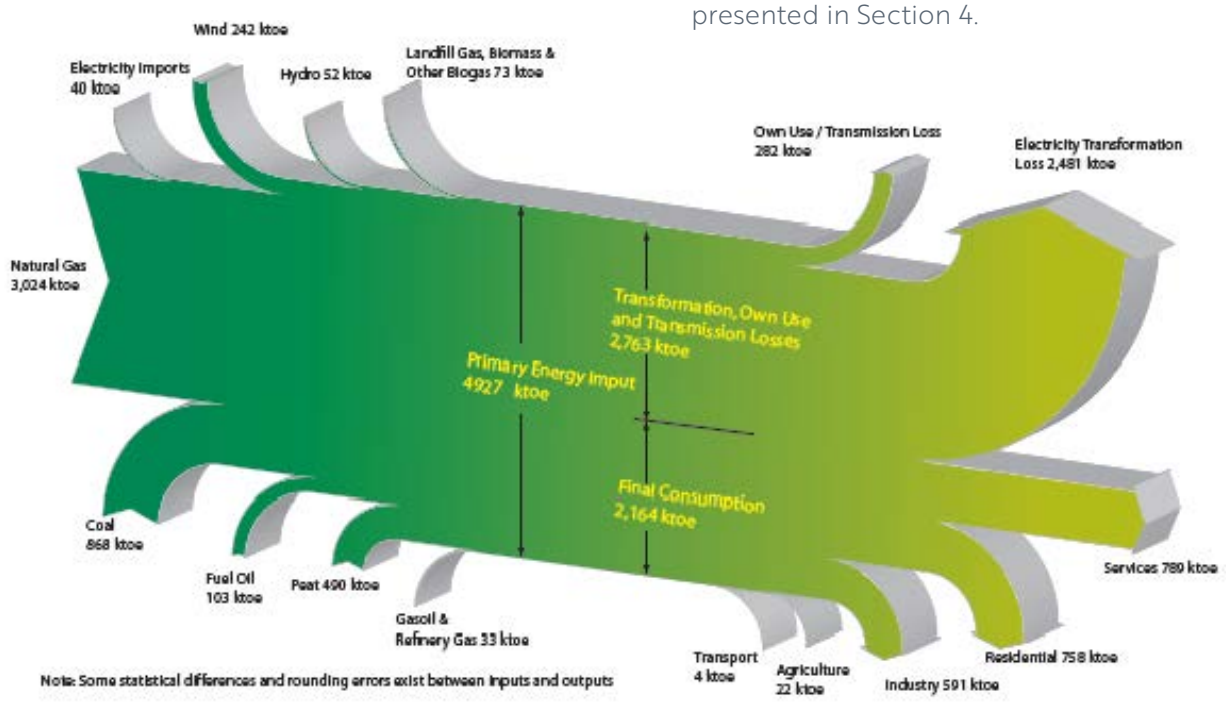


Figure 1: Energy Flow balance diagram (Source SEAI)

[2] https://www.rte.ie/news/2020/0607/1145990-electric-cars-cork/

Figure 2: Example of LA Electric Fleet (Source Cork CC)

Local authorities and EV charging points

As of 31st March 2021 there were almost 32,000 EVs under taxation in the State. Although growing year on year, this number is some way off the government's target for 936,000 EVs, which includes BEVs (battery EVs) and PHEVs (plug-in hybrid EVs) on Irish roads by 2030. It will be important for EV charging infrastructure to stay ahead of demand for EVs in support of this ambitious target.

Research for this document indicates that an estimated 80+% of drivers have access to off-street parking at home (see Appendix B). As the number of privately owned EVs increases, it is anticipated that most of these EVs will be charged at home.

The Department of Transport's Low Emissions Vehicle Taskforce (LEVT) report in 2019 stated *'The vast majority of the Climate Action Plan 2019 target of 1 million electric vehicles will be charged at night at home at the cheapest possible rates'.*

The estimated 20% of homeowners who are not in a position to charge their EVs at home should be afforded the opportunity to avail of publicly accessible charging facilities. Furthermore, these homeowners should be afforded access to low-cost, night saving charging rates, in accordance with the principles of a just transition. Homeowners with EVs who only have access to on-street parking will require shared on-street residential charging.

The SEAI is administering a **Charge Point Grant** for standalone on-street public EV charges that local authorities can avail of. The adequacy of this grant support is the subject of debate and accounts for some of the low uptake of the grant by LAs. It has become clear through the work of this CCMA EV Charging Group that the provision of EVCPs for public usage poses a financial challenge for the sector under current funding support. The civil works in particular to facilitate EVCP installation at optimum locations have proved to incur significant costs. Notwithstanding this, LAs are already leading in the initial roll out of electric charging facilities to help kick-start the provision of EVCPs and support the concept of a just transition.

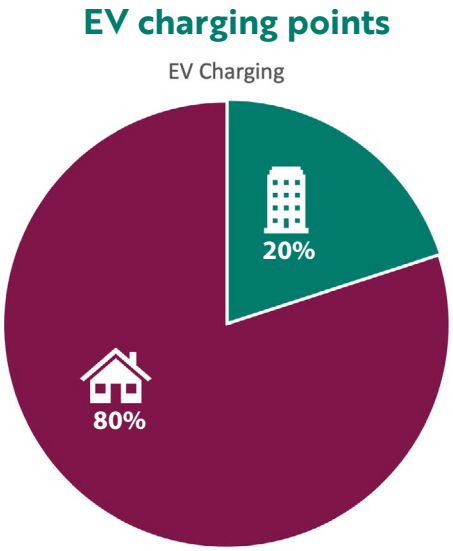


Figure 3: 80% of privately owned EVs are charged at home

In time, public EV charging infrastructure is likely to be provided at existing service stations and at other commercial entities such as hotels, supermarkets and retail parks. However, presently there is some reluctance on the part of service station operators to invest in EV charging infrastructure until there are an increased number of EV vehicles on the roads.

Although the network of EVCP locations has improved over the last two years there is still a lack of adequate EV charging infrastructure around the country, particularly in rural areas and at visitor locations. Many tourist experiences in the country often involve driving long distances to access the rural locations of our counties. The highly successful Wild Atlantic Way and the Ancient East are examples of where visitors may require recharging facilities at strategic locations along these routes. The provision of publicly accessible medium/fast charging stations is considered key to supporting the tourist sector in a sustainable manner for those opting to use EVs as a means of travel. The EU Interreg funded FASTER project in the Eastern Border region will see 73 fast chargers installed across border counties. More detail on this project is provided in Section 5 of this document.

LAs are in a position to lead in bridging the gap in the lack of charging infrastructure, to kick-start the roll out of electric charging facilities by assisting in increasing the number of EVCPs within their county and regional areas. In the medium to longer term, however, it is market forces that will ultimately sustain the provision of EVCPs across communities.

There is a need for stronger commitment from energy suppliers in the provision of public EV charging infrastructure. This commitment is required to address both the installation of public EVCPs and also address network capacity issues. The active involvement of energy suppliers, possibly incentivised by Government, will be a vital component in the coming years.

In terms of the role of LAs, as a first step, each LA should consider the development of an EV and EVCP strategy for the deployment of EVs as part of their fleet and to assess the optimum locations of public EVCPs within their city and county boundaries. In the medium to longer term, the role of LAs will likely graduate to provide support and assistance to EVCP operators in the operation and maintenance of installed public charging facilities.

Outside of private operators, the provision of publicly accessible EVCPs by LAs to date has largely been confined to pilot projects or fully funded projects with EU support and without tariff for usage. It is considered that charging for the use of EVCPs installed by LAs, managing the maintenance, customer service and back-office support for charging infrastructure is outside the remit of the LA sector.

3. General Guidance – Understanding the Basics

This section is a general guidance to EVs, EV charging and charge point installation. The areas covered include: EVCP and EV capability; types of EVs; charge connectors; electrical connection guidelines and future trends.

Charging Technology Overview

EV charge points can be broadly categorised as slow or standard charging and fast charging. You may also hear the term DC charge point and AC charge point. As a rule of thumb, standard charge points tend to be AC, while fast charge points tend to be DC. Standard charging is most suitable for locations where a vehicle will be parked for periods in excess of 1 hour, while fast charging is where a driver may only want to be at the charge point for as short a time as possible, often only 20-30 minutes.

Single-phase AC charging

Single-phase AC charging is the most common and universal method of charging vehicles. Even when a vehicle has the capability to charge at higher levels, it will still be able to charge from a single-phase charge point. Within this category, an output of 7.2kW is most common in commercial applications. Lower outputs of 3.6kW are chosen where the electrical connection to the building is limited. Even at this lower output, where a vehicle is available to charge for 10-12 hours overnight at a standard single-phase charge point, the vehicle will be fully charged in the morning with potential to cover 300-400km, depending on the vehicle's battery range.

Three-phase AC charging

As a rule of thumb, a three-phase charger offers three times the output to its equivalent single-phase unit. Typically, three-phase chargers are supplied with charging outputs of 22kW. However, many vehicles are only able to accept power at a lower wattage of 11kW or lower. While it is possible to install a three-phase charger rated at 11kW, the power output from such a charger to many vehicles greatly reduces the speed of charge. Some three-phase chargers can deliver up to 43kW, however this charging level is not supported by many current EV models available on the Irish market.

DC charging

DC charging is normally the most powerful. It is commonly configured for up to 50kW, however higher power ratings are now available. The economics of installing a higher power charge point is not limited to the cost of the charge point, but also to the additional grid connection costs and standing charges for the electricity supply. DC charging can be delivered with output levels of circa 20kW. This may be a less costly option where turnaround of several vehicles in a short time period is required. The available electrical supply can be shared among a number of lower powered EVCP units.

The list below tries to put these and the other types of chargers in context in terms of cost vs speed:

3-7kW AC lowest costs

- Suitable for residential and commercial charging
- On-street or car parks
- The upper limit (AC) for many vehicles
- Least strain on available electricity infrastructure

22kW AC medium costs

- Suitable for residential and commercial charging
- On-street or car parks
- Allows a faster charge to a limited number of vehicles accepting this level
- Fewer charge points possible to a given electrical connection

~50kW DC high cost

- Suitable for charging between approx. 30 minutes and 1 hour
- Large form factor makes it less suitable for on-street
- Vehicles should vacate charge point as soon as charging is complete
- Compatible with vast majority of vehicles

>100kW DC very high cost

- Suitable for national routes and feeder routes
- Limited number of vehicles can avail of higher charging rates today
- Typically the most expensive refill for customers
- Larger and more expensive electrical connection requirements

Figure 4: Type of chargers by power output division

Electric Vehicle Capabilities

Apart from the familiar vehicle characteristics such as size and layout, there are some electrical differentiators, which impact how drivers can use or charge their vehicles. Larger battery sizes are becoming more common and therefore, for many drivers there is less requirement to charge while away from their home or workplace. Typically, electric cars are now reaching driving ranges of between 200km and 500km on a single charge.

Another consideration is the power level that the vehicle can accept from a standard AC charge point. While a small number of vehicles currently on the market are capable of accepting 22kW from a suitable charge point, many vehicles are restricted to between 7kW and 11kW. This means that the distance enabled from an AC charge point in 1 hour for most vehicles is between 40km and 60km, as opposed to 120km if the vehicle could accept 22kW.

DC fast charging is possible on almost all fully electric vehicles currently on the market. This means that the vast majority can access 100km of driving range in just 20-30 minutes, with many newer models being capable of accessing 300km from a suitable high-power charger in the same period. However, DC fast chargers are expensive to install.

The range of fully electric vehicles known as Battery Electric Vehicles (BEVs) is continuously expanding. BEVs are equipped with larger batteries and fast charging capabilities. Plug-in hybrid electric vehicles (PHEVs) can use slower chargers for short periods of time as they have smaller batteries.

Types of EVs

The SEAI is leading on information to assist businesses and organisations towards switching their fleet to electric-powered vehicles. To this end, SEAI's guide *'Switching to Electric Vehicles - A Guide for Business'* is a useful document for reference by LAs in their considerations of the electrification of some of their fleet. The link to the guide is available **here** and section 3 of that document describes the types of EVs currently available on the Irish market.

Charging Connectors

In the earlier years of EVs, a small number of differing connectors were utilised. European standards have now been adopted for EV charging connectors, which has helped to reduce compatibility issues.

In the category of AC charging, sockets on all home and business chargers are the same, while the connector on the vehicle side may differ. Vehicles are normally supplied with an AC charging cable, in which case the charge point side of the cable is a standard cable known as Type 2.

AC charge points are sometimes offered with the cable tethered to the charge point. This can have its advantages as the driver does not need to take the charging cable in and out of the vehicle storage. If tethered cables are used, older vehicles may not be able to charge where the newer cable is installed and vice versa.

Connectors used for DC charging are covered by European standards and regulation. The first vehicles delivered with DC charging adopted a specification known as CHAdeMO, which was common at the time. As the industry evolved, the Combined Charging System (CCS2) also known as Combo, was adopted as a European standard and this format is delivered in the majority of the vehicles on the market today.

Public DC fast charge points are normally equipped with both CHAdeMO and CCS2 connectors, allowing any generation of vehicle to charge. If considering DC charging for your fleet, it is wise to equip the charge point with both the Combo and CHAdeMO connectors. The power electronics stay the same and the additional cost should be small, however the EVCP will be more versatile for charging by many vehicle types.

SAE J1772 **Type 2 Connectors** **SAE Combo** **CHAdeMO**

Figure 5: Images of charging sockets

EVCP Electrical Connection Considerations

Connecting an EVCP to a source of power supply is an important health and safety consideration. Professional assistance and advice should be sought in assessing the connection to ESB Networks infrastructure and in mitigating any of the associated risks. Compliance with Irish Wiring Regulations and NSAI standards is required for the installation of EVCPs.

It should be noted that in 2017 the CRU published a Decision Paper[3], which set out that EV charging point operators do not require a supply licence to operate. The use of the charging infrastructure is not considered as a supply of electricity as defined in the Act; the CRU viewed this as a service that operators provide to EV owners and therefore they are not required to hold a supply licence.

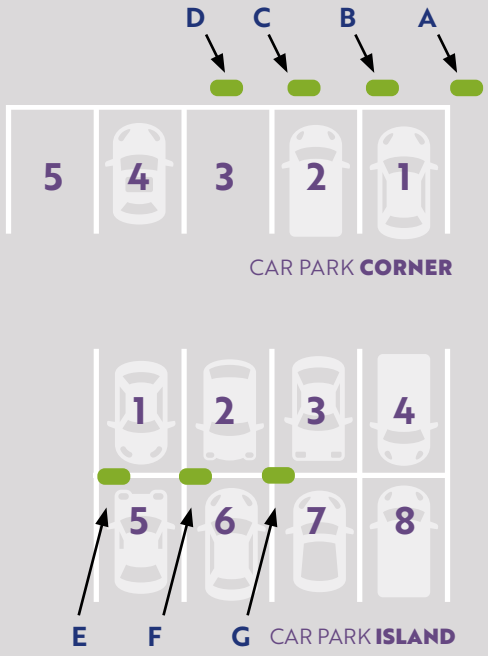
Some suggested specification details for the tendering of EVCPs are presented in Appendix C. However, LAs are reminded that any guidance provided in this document does not replace professional expertise or statutory obligations.

Information outlined in Appendix D highlights issues which LAs should pay particular attention to, e.g. connections to existing lamp posts, ESB mini-pillars and ESB substations

EV Charging Hubs

A key trend in EV charging is the shift to a more co-ordinated, hub-based arrangement of EVCPs. This is seen across a range of deployments including dedicated rapid charging hubs, scalable car park solutions and on-street charging clusters, some of which may be trialled in Dublin LAs in 2021.

By providing multiple EVCPs at a single location, hubs can be beneficial in reducing installation/ civils costs as well as grid connection costs. Grid capacity can be an issue and LAs should take this into account when considering EVCP hub deployment. Again, useful information for consideration before installing an EV charging hub is outlined in Appendix D. The importance of the layout of charge points within a hub arrangement in determining accessibility is demonstrated below in Figure 6.



EV Charger Location Options

Position	Accessibility Spaces
A	1
B	1, 2, 3
C	1, 2, 3, (4)
D	(1), 2, 3, 4, (5)
E	1, 2, 5, 6
F	1, 2, (3), 5, 6, (7)
G	(1), 2, 3, (4), (5), 6, 7, (8)
() denotes 'just about'	

Conclusion: Careful planning can increase the number of spaces with access by 4 fold.

Figure 6: Public parking example of how charger location choice can influence availability

[3] https://www.cru.ie/wp-content/uploads/2017/10/CRU17283-Decision-paper-on-ESBN-Electric-Vehicle-Pilot-Associated-Assets.pdf

Future Trends

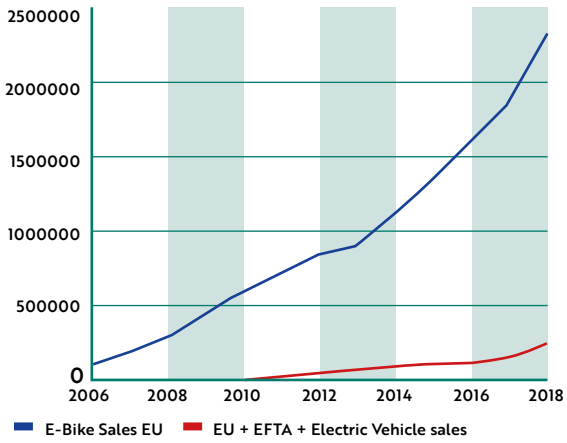
It is not possible to predict what changes or technologies will dominate over the coming years i.e. the rate of change is out of the LAs' control and should not delay action on the ground with regard to infrastructure. Below is an outline of what is currently envisaged.

Technology change

To quote General Motors CEO Mary Barra in 2017: 'I have no doubt that the automotive industry will change more in the next five to 10 years than it has in the last 50,' she said. 'The convergence of connectivity, vehicle electrification, and evolving customer needs demand new solutions.' This is illustrated with many major manufacturers of internal combustion engines (ICE) committing to the net zero carbon targets of the Paris Agreement, whilst some have decided to completely stop manufacturing ICE vehicles by 2030.

What's selling?

The fastest selling EV is not an electric car, it is the electric bike or pedelec[4] i.e. many potential car users and second car homeowners may shift to using electric bikes for shorter journeys. Whilst lifestyle may play a role, lower costs, ease of parking etc. will also be drivers for change. Electric bikes generally have more than sufficient range and do not need dedicated charging however, they may need secure parking.



Mobility as a service (MaaS)

Led by the Dublin Bikes scheme, LEAP cards and commercial initiatives such as Car Clubs, MaaS allows users to pay for mobility by the hour i.e. its widespread uptake is leading to changes in ownership patterns, such as reducing the need for second cars.

Autonomous vehicles

Self-driving technology is advancing quickly in many diverse ways, however, all forms of autonomous vehicles will induce increase in traffic congestion as vehicles do not need to be parked up.

Induction charging

Wireless or induction charging has been defined by the US Society of Automotive Engineers (SAE) in the emerging standard SAE J2954. It is considered that it will be some time before we see widespread uptake or need for this type of charging mechanism. The standard only applies to AC charging 8: Wireless EV and does not apply to DC fast charging. It offers up to 11kW across a 25cm air gap at 94% efficiency i.e. 6% losses.

Due to the increase in the use of induction charging for pacemakers for heart conditions, induction car charging will require additional health and safety risk assessment before being recommended for use.

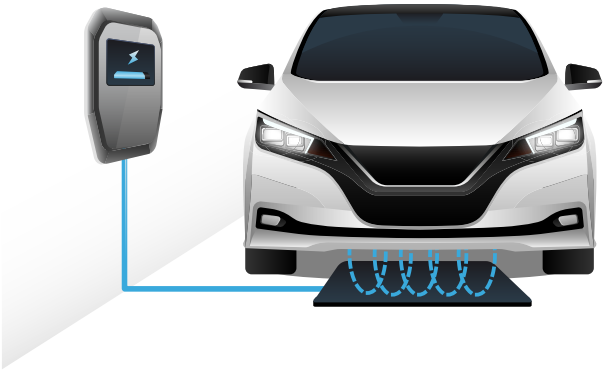


Fig 8: Wireless EV

[4] https://www.statista.com/statistics/276036/unit-sales-e-bikes-europe/

4. Local Authority Fleet Electrification

This section outlines options for LAs to transition their fleet to electric vehicles, where viable in terms of resources, technology and the cost differential. It provides information on procurement frameworks and funding to secure the EVs, as well as prior considerations for the installation of supporting EV charging infrastructure.

Fleet Transition

As outlined earlier, to meet the required level of emissions reduction by 2030 from the transport sector, there is a need to:

- Reduce CO_2 eq. emissions from the sector by 51%
- Increase the number of EVs on Irish roads to 936,000, consisting of:
  - 840,000 passenger EVs
  - 95,000 electric vans and trucks
  - 1,200 electric buses

Already a number of LAs are leading in this area with the transitioning of their fleet from petrol/ diesel fuelled to electric vehicles.

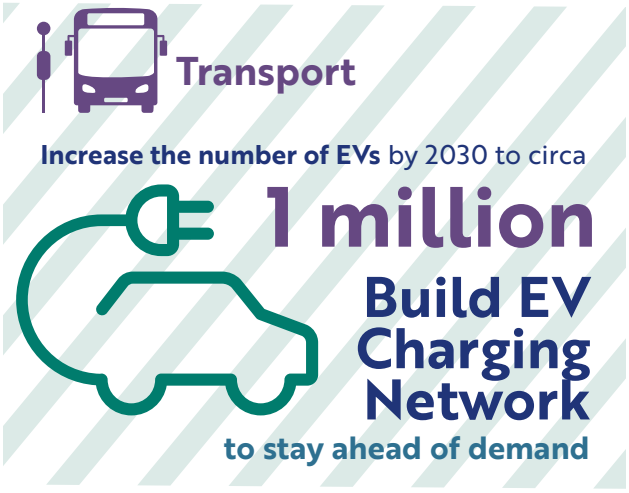


Figure 9: Image taken at SEAI public Sector Conference in DCU in February 2020 (Source: Dublin CARO)

Procurement for EVs

The Office of Government Procurement (OGP)

The OGP has drawn up fixed price procurement frameworks for the supply of long and medium range battery electric passenger cars and vans for public sector bodies. LAs can use these frameworks to expedite the electrification of their fleet, but the extent of the individual LA's transition will be dependent on the available technology, cost differential and their own resources. Where LAs choose not to use these frameworks they will be required to tender for the purchase or lease of EVs in accordance with public procurement rules.

Full details of the frameworks, including prices, are on the **www.ogp.gov.ie** website. Click on the 'Buyer Zone' when the website in accessed:

1. A username and password are needed to access the buyer zone. If you do not have an account, there is a register link on the page and an account will be set up for you.
2. Once in the 'Buyer Zone' search for 'cars' or 'vans'.

EV vehicles are available for direct drawdown on a 'cascade' mechanism. On each occasion that you want to drawdown goods from this arrangement, you are obliged to engage with the highest-ranked supplier (Hyundai Cars Ireland) in the first instance. If Hyundai cannot supply the vehicle, then you can engage with KIA.

Supply of long-Range battery electric passenger cars with a 350-550km range Click here for further information	
 HYUNDAI KONA EV PREMIUM	 KIA e-NIRO
Supply of **medium range** battery electric passenger cars with a 250-349km range, click here for further information	 HYUNDAI IONIQ PREMIUM
Small battery electric vans with a payload volume in the range of 3.5 m³ to 4.5 m³ (nominal)	 Electric - Nissan Sv Premium Env200
Medium Electric Battery Vans with a payload volume in the range of 5.5 M³ to 8.5 M³ (nominal)	 Electric - PEUGEOT E-EXPERT LONG PROFESSIONAL 75kwh AUTO

Table 1: Examples of EVs

LAs are reminded of the current requirement to provide for Green Public Procurement (GPP) in tender assessment. Information and details on GPP for use by LAs are in Appendix E.

Funding Support for EVs

HDVs - DoT/TII Alternatively Fuelled HDV (AFHDV) Purchase Grant

Whilst the EV alternatives for small cars/vans are readily available, cost effective alternatives for larger heavy-duty vehicles are still coming to market. Other technologies such as biogas and hydrogen are being considered for larger heavy-duty vehicles in the public sector. Dublin Bus has trialled the use of hydrogen fuelled vehicles on some of their bus routes. However, currently there is a threefold price difference between traditional fossil fuelled vehicles and their equivalent powered through hydrogen.

To assist businesses and commercial entities to bridge this cost differential, the Department of Transport announced a new alternatively fuelled heavy duty vehicle (HDV) purchase grant on the 15th March 2021. The scheme supports the purchase of new, non-retrofitted large vans, trucks, buses and coaches with an unladen design gross weight of more than 3.5 tonnes. The AFHDV Grant provides support for a range of eligible BEVs, Plug-in Hybrid electric (PHEV), hydrogen (FCEV), Compressed Natural Gas (CNG) and Liquified Natural Gas (LNG) fuelled vehicles over diesel or hybrids. Diesel only and conventional diesel-hybrid vehicles do not qualify for grant aid.

Under the AFHDV Purchase Grant Scheme, only the commercial arms of LAs, or vehicles used by them to carry out commercial activities or services (i.e. a fee must be charged for the service they provide e.g. passenger carriage, refuse collection etc.) are eligible for grant support. This is due to the alignment of the scheme with State Aid rules and the limitations on supports that can be provided by governments under the provisions of the European Union's *General Block Exemption Regulation*. To accord with EU State Aid rules, grant levels under the scheme are calculated as a percentage of the cost differential between a conventionally fuelled HDV and its alternatively fuelled equivalent. Given that most services involving HDVs provided by LAs no longer have a commercial basis, this grant is likely to be of only limited value to LAs.

Maximum grant levels per vehicle will also be dependent on whether the undertaking can be categorised as 'small', 'medium' or 'large'. A LA or commercial arm of a LA applying for an AFHDV Grant to purchase vehicles used for commercial purposes will be required to supply evidence of turn-over and staff count in relation to these activities. This is so that their relative size as a small, medium or large entity can be determined. Details of the new scheme, including terms and conditions, grant eligibility, supported vehicle categories and grant support levels are published on the website of the TII, who are administering the scheme and **can be found here**.

Daimler trucks and buses

Electric HDVs are coming and will challenge parking arrangements

Figure 10: HDV charging parking issues – all at fast charging stations on motorways or main roads (source: images taken from YouTube videos from Sweden)

LA Fleet - EV Charging Infrastructure

Transitioning the LA fleet with EVs will necessitate the installation of charging points or EVCPs. This can be facilitated at depots, staff car parks, machinery and maintenance yards. The following outlines what LAs should consider in terms of location and siting, as well as the power and installation requirements of EVCPs for their fleet.

Figure 11: Wexford County Council – 7kW Single phase EVCP installed in a machinery yard (Source: Wexford CC)

What is involved in installing a charging point?

Planning the installation of charge points gives LAs the opportunity to optimise the setup and avoid pitfalls at a later date. Equipment suppliers should fully understand LA requirements and LA fleet needs. Prior to the installation of an EVCP, the following should be considered:

1. Identify the location
2. Determine the power requirements
3. Identify an electric connection point
4. Procure the charge points
5. Route the cables - this may involve groundworks
6. Install the charge point
7. Connect the supply

1. Identifying the location involves a combination of parking convenience, business logistics and proximity to available power supplies. Shorter cable runs may reduce installation costs, however there may be logistical reasons why a vehicle must park and charge in a particular location further away from the power supply. If you require multiple charge points in one area of the site, it is worth considering the installation of a sub distribution board in the area of the EV charging bays. Another consideration is whether you need wall mounted or ground mounted charge points. Wall mounted are typically easier to install and reduce the cost of the installation, as foundations and ground works are not required.

2. Determining the power of the charge points requires a review of the vehicle energy needs over each day or over a shift. Further consideration is required of when, where and for how long vehicles will be recharging. Reasonable contingencies to allow for less typical occurrences, such as an unplanned diversion in the vehicle's daily routine should be provided for. Where the likelihood for a recharge is very low and the resultant negative impact is also low, investment for contingency measures may not be warranted.

Similarly, the installation of fast charging EVCPs for a LA fleet may not make economic sense where fast charging is rarely required. The use of public fast chargers to address this risk instead is considered a more cost-effective option. In addition, installing higher power DC charge points is not a guarantee for future proofing the EVCP installation. The path to be adopted by vehicle manufacturers for the next generation of EVs is not certain and may focus on either AC or DC charging.

3. Once the power requirements for charging the EVs is determined, you will need to identify where you can connect the EVCP to the grid. In some cases, the first preference connection point may not be sufficient to supply the required power. If you are looking at a large fleet of EVs, you may need to consider an upgrade to your supply or a new connection.

A further bills analysis of the existing site Maximum Import Capacity (MIC) is required alongside analysis of site energy use across the day, the night and at weekends. It may be possible to have a lower MIC where the vehicles are only charged at night using SMART charging technology when offices are closed. However, additional MIC may be required where there is a charging need and also a high active load from usual activities e.g. depot night works, winter gritting works. Consultation with ESB Networks should be sought.

4. Having worked out the power and siting requirements you will need to **procure the charge points.** Currently there is no national OGP framework of EVCPs. Consideration may be given to a future procurement framework for EVCPs, but at present where LAs wish to proceed with EV charging infrastructure this will need to be tendered on an individual basis.

Laois County Council tendered for their EV infrastructure as part of their programme for the development of Laois as a low carbon town. They have already shared their tender documents with a number of LAs.

Consideration for the tendering of EVCPs should include accessories required to control who may use the charge point and how to measure the energy demand of the EVCP. Smart integrated electric charging solutions that allow for energy monitoring and demand load management are recommended as electrification of the LAs' fleet increases.

Charge points should be equipped with sufficient electrical protection in accordance with the latest electrical installation regulations. LAs should be clear about what is required from the charge point supplier. As with most products, if the price from one supplier is drastically different to another, then it should be assumed the product offerings differ in their function, build or operation. Price difference should be investigated.

5. Routing cables to the charge points is fairly straightforward. In some cases, you need to choose between excavating a trench directly to the area of the charge points or following the perimeter with a surface mounted cable in suitable containment. Longer cable runs typically require larger cable diameters, thus increasing the cost. Conversely excavations incur significant expense, particularly where the excavation is in concrete or tarmac. The electrical installer will be able to advise on the cable sizes. Ground and civil works for trenching and ducting should be assessed from the outset.

6. Install the charge point - as car parking charge points will generally be installed outdoors, you should ensure that they meet a sufficient IP (ingress protection) rating for the environment. This typically requires a IP54 rating or better. Also, it is advisable to include bollards or rubber bump strips to protect the charge point from collision.

7. Connect the supply - when the equipment is in place, the electrician or suitably certified installer will need to connect the power supply to the charge point. This should be carried out in accordance with the electrical installation regulations. Cables should be tested prior to connection and once connected, the circuit should be tested for both electrical safety and charge point function. A qualified and registered electrician should be used and a Safe Electric Ireland Certificate Number 1 should be provided complete with the Test Certificate following installation.

Have you thought about these charge point requirements?	Yes	No
Number of EVs		
Depot overnight charging		
Home parking / charging		
Number of charge points		
Duration vehicles parked and available for charging		
Available power at charging locations		
Amount of energy required by the vehicle each day/shift		
Choose power output		
Wall mounted / ground mounted		
Ground works required		
Safety bollards required		
Connection to the electricity network		

Table 2: Charge Point Requirements Checklist

Recharging of fleet vehicles

Fuelling petrol or diesel vehicles is a straightforward and familiar task facilitated at fuel depots and stations. EVs require a somewhat new approach by fleet managers. For many LAs, the most obvious place and the time to recharge is in the fleet yard and overnight. A big advantage in this is the opportunity to use night rate electricity at lower tariffs to maximise fleet fuel savings. The addition of a controlled smart charger would also ensure the lower overnight rate commencing at 11pm can be availed of, even though the EVs may have been plugged in earlier in the evening.

A number of LAs have made provision for fleet EVs to be charged overnight at the homes of staff members. This can be achieved through the installation of smart home charge points that transmit the charging records to a back-office system, allowing the reimbursement of staff for electricity consumed by fleet vehicles. Cork City Council has installed such a system for some of its EV fleet. However, with regard to charging at home solutions for Council vehicles, at present there is no benefit in kind (BIK) on EVs. Should the BIK exemption for EVs be removed at some point in the future, this could provide difficulties for LAs who have installed chargers for staff at home.

While many fleet EVs will not require a top up during the average working day, it may be necessary from time to time to recharge the EV while away from the LA base charging point. Use of the public EV charging network of EVCPs may be necessary and access to this public infrastructure should be provided for drivers of LA EV fleet vehicles.

Types of recharging infrastructure

As outlined in Section 3 *General Guidance* of this document, charge points come in a range of sizes and formats, from 3.6kW AC to 50kW DC and greater. It is common for fleet managers to desire the highest power output as it is assumed that this would provide the best solution for a busy fleet. However, as pointed out previously, many EVs can only accept a maximum AC charge of 11kW.

Power	Charge Type	Voltage	Current Rating	Charging Time for 100km Driving range
3.6kW	Single Phase AC	230V	16 Amps	6-8 hours
7.2kW	Single Phase AC	230V	32 Amps	3-4 hours
11kW	Three Phase AC	400V	16 Amps	2-3 hours
22kW	Three Phase AC	400V	32 Amps	1-2 hours
50kW	DC	~400V (DC)	~125 Amps	20-30 minutes

Table 3: Charging level comparison

To evaluate the benefits of one charge point's power level against another, it is helpful to think in terms of driving distance rather than the percentage of charge. For example, how long will it take to charge a vehicle so that the EV can cover a driving distance of 100km. Table 3 above gives an indication of what can be expected.

EV Charging Maps

As the number of LA EVs increases, it will be necessary to undertake the mapping of fleet charge points. Such live mapping will not only assist staff in locating the nearest EVCP available for use, but will also allow for more efficient maintenance and back-office management of the LA EV charging infrastructure.

The image in Figure 12 below is an online map that has been prepared by Dublin City Council to map the location and status of existing slow and fast chargers at depots and other LA locations. These EVCPs are for LA use only and are not publicly accessible.

Outside of fleet depots it is important that staff are aware of publicly accessible EVCPs should they need to use them. For example, ESB owns, operates and maintains approximately 1,100 public charge points across the island of Ireland. An interactive map to find the nearest ESB charge point is accessible through the ESB ECAR Connect App and is **accessible here**. **Open Charge Map** and **Zap Map** are other online maps that show public and private ECVPs in Ireland.

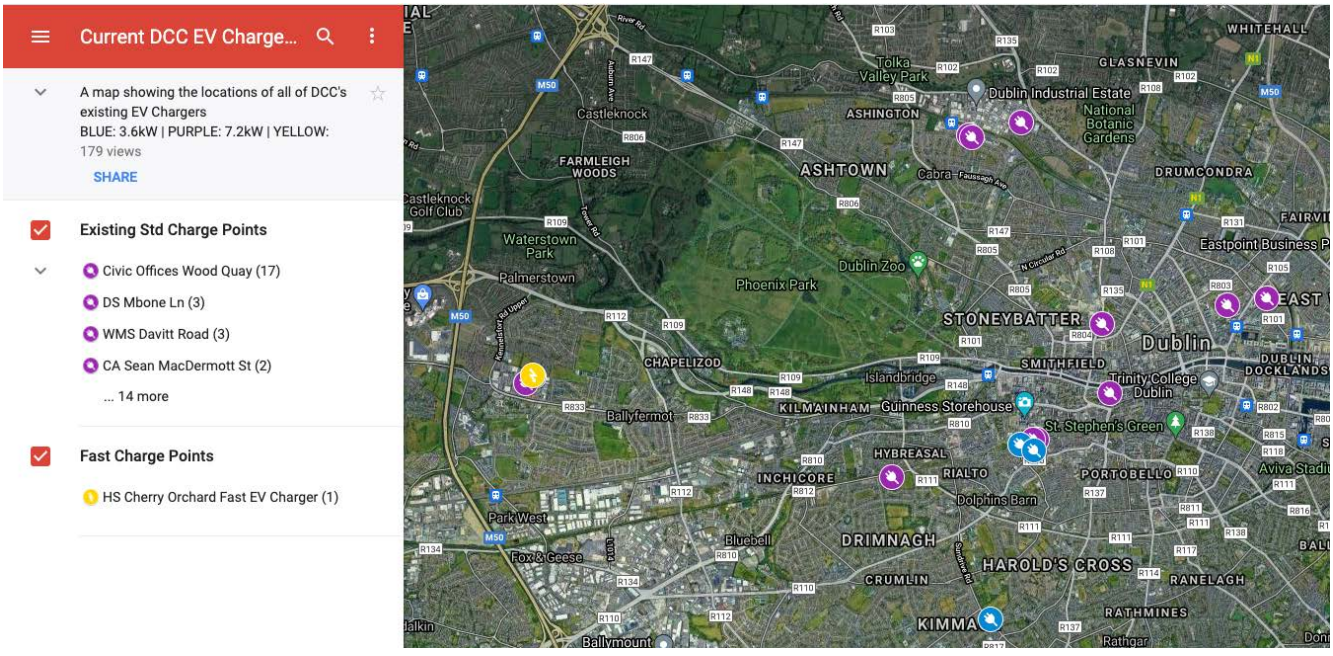


Figure 12: Online Map of EVCPs for Dublin City Council Fleet (Source: Dublin CC)

5. Public Charging Infrastructure

This section addresses public charging infrastructure, which is separate to the installation of EV charge points deployed for LA fleet use only. It is divided into two parts:
The first part covers assessment of need, planning considerations and recommendations from the Low Emissions Vehicle (LEV) Task Force supporting EV roll out. Also provided is an EVCP trend analysis from Dun Laoghaire Rathdown CC, as well as an outline of a number of Business Model scenarios for the operation of EVCPs.
The second part covers costs associated with EVCPs, LA EVCP case studies, current funding and payback scenarios.

LAs have an important role to play in supporting the Government to achieve the country's climate action goals. Providing EV charging infrastructure within LA areas will help to promote both interest and confidence in EV ownership. The Department of Housing, Local Government and Heritage (DHLGH), the Department of Environment, Climate and Communications (DECC) and the Department of Transport (DoT) are providing support to the sector.

Assessment of needs for EVCP infrastructure

A fundamental requirement for all LAs considering the installation of EVCPs is to make an assessment of the need for the infrastructure within their functional area. To this end, Figure 13 below aims to assist LAs map out these needs.

Map existing chargers

- Map locations of existing EVCP's in the LA area i.e. petrol stations, supermarket carparks etc.
- Consider EV Stock Modelling to assess where the different categories of charge points should occur – targeting EV users and existing EVCP usage trends
- Consider current ESB Networks infrastructure and associated maps
- Consider SEAI data on existing EVCP and associated maps
- Consider the location and availability of existing LEV infrastructure

Model likely demand as part of development masterplans

- Model demand as part of the LA's Energy Masterplan
- Consider Modelling the demand at train stations and motorways
- Identify appropriate LA car parks for public use as part of the models
- Consider Modelling to include future decarbonisation zones

Draft design for on-street charging

- Consider the number of residential units that a single slow charger can provide for.
- Consider directing residents to a hub location
- Review SEAI M&R reports for data on electricity consumption for transport and assess for EVCP locations
- Assess appropriate procurement options, include Green Procurement criteria.

Figure 13: Assessment of needs

Planning Considerations

Following the assessment of needs, consideration of the planning requirements for the public EVCPs will need to be undertaken.

City and County Development Plans

The contents of City and County Development Plans (CDPs) are determined under Section 10 of the Planning and Development Act 2000. To support LAs in the preparation of CDPs, the DHLGH issue Development Planning Guidelines. A review of existing Planning Guidelines is on-going by the DHLGH.

CDPs are already required to support the promotion of measures to reduce greenhouse gas emissions and address the necessity of climate change adaptation. A number of planning authorities have already incorporated measures that support the roll out of EV infrastructure in their CDPs. Examples are presented in Appendix F and this is acknowledged as being a key enabler for the growth of EV usage.

In contributing to the preparation of this guidance document, the DHLGH has recommended that City and County Development Plans should:

- Take into account Government policy in relation to EVs and other low emissions vehicles (LEVs) as set out, inter alia, in the National Planning Framework, the National Policy Framework on Alternative Fuels Infrastructure for Transport in Ireland, the Climate Action Plan and the National Energy and Climate Plan.
- Support the provision of an adequate number of EV charging points and facilitate the future installation of EV charging points (e.g., through the installation of ducting) at all appropriate locations where parking is provided for passenger vehicles including homes, businesses, on-street parking and car parks.
- Support the provision of an adequate number of public EV charging points that are 'accessible for all'.
- Make provision that locations which cater for traditional fuelling of vehicles (i.e. filling stations) provide charging facilities for EVs and, where applicable and in line with Government policy, fuelling for other low emission vehicles (LEVs).
- Allow for the safe use of EV infrastructure by both the public and homeowners; and safeguard against injury post installation of this infrastructure, guarding against the bad practice indicated in the following pictures (Figures 14 and 15).

Figure 14: EV charging cable running from private residence to Traffic sign to EV in Dublin (Source: Twitter)

Figure 15: Charging cable running on residential footpath in new housing estate (Source: Fingal CC)

Recommendations from the Low Emission Vehicle Taskforce - Phase 2 Report

A Low Emission Vehicle Taskforce (LEVT) was established in December 2016 to consider the range of measures and options available to Government to accelerate the take-up of low carbon technologies in the transport sector. The recommendations of this LEV Taskforce in the Phase 2 Report are currently being addressed by the different stakeholder leads as indicated in Table 4.

Recommendations	Lead
Planning	
Update Development Plan Guidelines with reference to updated LEV policies to support the roll out of LEV infrastructure through Planning Authority functional areas.	DHPLG*
Issue guidance to planning authorities to ensure a consistent and future proofed approach to the rollout of EV charging infrastructure through planning decisions.	DHPLG*
Present draft Regulations to the Houses of the Oireachtas for approval to future proof existing provisions in the Planning and Development Regulations 2001, exempting specified EV charging infrastructure from the requirement to obtain planning permission.	DHPLG*
Building	
Publish requirements of the Energy Performance of Buildings Directive EU/2018/844 for public consultation in Q4 2019 and take account of submissions received in the transposition of requirements for recharging infrastructure of the Directive to ensure the requirements consider the future demand for EV infrastructure.	DHPLG*
Provide and maintain targeted capital grants for publicly accessible EV charging infrastructure, in particular for on-street chargers.	DCCAE**
All local authorities to consider roll out of EV infrastructure at appropriate locations based on the experience of local authority pilot projects.	Local authorities

* Now DHLGH ** Now DoT

Table 4: LEV Taskforce Recommendations

Review of Planning Policy – SI 115 of 2021

Current planning legislation and policy supports the roll out of EVs. The development of charging infrastructure for EVs is exempt from requiring planning permission under Section 4(1)(h) of the Planning and Development Act 2000, as amended, where development does not materially affect the external appearance of the structure and is consistent with the character of the structure or of neighbouring structures.

Planning and Development (Exempted Development) (No.2) Regulations 2021 (S.I. 115 of 2021)[5] – Electric Vehicle Charging Points and Hubs was enacted on 16 March 2021. These new Regulations increase the existing provisions in the Planning and Development Regulations 2001, as amended (the Principal Regulations), to exempt specified EV charging infrastructure from the requirement to obtain planning permission. More details on these regulations and other relevant Irish and EU legislation are included in Appendix G.

Bye laws

All LAs have parking bye laws as prepared under the Road Traffic Act 1994, stipulating details such as hours of parking, parking payments, parking prohibitions etc. The installation of EVCP infrastructure in LA areas may require the amendment of existing bye laws and/or the stipulation of new bye laws. For example, designation of EV parking and charging areas such as hubs, facilitation of EV charging payment, prohibition of 'EVCP hogging' (i.e. whereby an EV remains parked in an area connected to an EVCP, even though the battery is fully charged). Such amendments should be considered by a LA when bye laws are being reviewed or when EVCP infrastructure is being considered.

EVCP Trend Analysis from Dun Laoghaire Rathdown

Dun Laoghaire Rathdown County Council (DLR) completed a review of their EV charge point distribution, operation and utilisation in the county in June 2020. This trend analysis is being used to inform potential future investment in EVCPs in DLR. It is recommended that all LAs undertake a similar type analysis of the existing EVCPs in their own areas.

The distribution of the EV charging points within the DLR county boundary follows two main patterns. The charge points are located either in close proximity to major transport nodes (Dart or Luas) or within close proximity to retail centres. There are some exceptions where a small number of EVCPs are located in hotels. Some key findings of the review were:

- The busiest three charging locations were on-street units in Cabinteely village and in the car parks at Dalkey town Dart Station and at Blackrock village Dart Station.
- The charging locations with some of the lowest usage were at the three Luas Park & Ride points in Carrickmines, Sandyford and Stillorgan.
- The review also indicated the usage profiles for particular EVCP locations. Some charging locations had clear usage patterns during the typical working day, and not overnight or at the weekends. Other locations indicated charging profiles spread out over a day and some were regularly used overnight.

[5] S.I. No. 115/2021 - Planning and Development Act 2000 (Exempted Development) (No. 2) Regulations 2021 (irishstatutebook.ie)

EVCP Electrical Connection Considerations

For power supply, the public EVCP will require a connection to the ESBN distribution network, and this has important health and safety considerations. Professional advice should be obtained prior to any decisions by LAs concerning the installation and connection of EVCPs to ESBN networks. There are also obligations under Irish Wiring Regulations and NSAI standards for EVCP installation. LAs are reminded that any guidance provided in this document does not replace professional expertise or statutory obligations in meeting required standards.

However, specific information outlined in Appendix D highlights some potential difficulties LAs need to be aware of when connecting publicly accessible EVCPs to the network. This includes useful information on potential pitfalls for connections to existing lamp posts or at ESB mini-pillars or ESB substations, as well as providing for EV charging using channels cut in public pavements. Prior consultation with ESB Networks is essential when considering any grid connection for an EVCP.

The further research of the provision of adequate power at on-street locations and the subsequent requirement for evaluating use will be key to the overall deliverable of providing on-street charging facilities to the citizen.

Business models for operation of EVCPs

There are several ways in which LAs can facilitate the deployment of EVCPs. The role the LAs can play varies in terms of risk, public funding, resource requirement, complexity, responsibility, and council control over aspects such as pricing and siting. This can range from a LA led approach, where the LAs have a significant involvement in siting, constructing, managing and maintaining the EV charging infrastructure, to a more market led approach where the provision of EVCPs would essentially be left to market forces.

LAs who adopt a more market led approach need to be aware of issues with regard of EVCP control within their functional area. This includes regulation of the parking spaces at the EVCP location, planning and development control of the new EV charging installations and road opening licences.

Less involvement by the LAs may also limit their influence on the broader objectives for the electrification of the transport sector. There is potential conflict allowing the installation of EVCPs in urban centre locations, 'locking-in' car use and frustrating necessary efforts to switch to more sustainable transport modes and the encouragement of the public to move to cycling, walking and the use of public transport.

LAs who may be considering a more LA led approach need to be aware that the supply, installation, management and maintenance of EVCP infrastructure is costly and has significant risks around the provision and upgrading of technology in a rapidly changing environment and the requirements to provide an adequate public service. Table 5 below provides a comparison of a number of business models for consideration by LAs.

Type of Business Model	Description	Typical Duration	Funding
LA install & maintain	LAs install civil & electrical infrastructure, charge point units, ongoing management & maintenance	Ongoing	LAs + Govt or State Agency Funding (Potentially the highest proportion of public funding)
Concession – LA & EVCP Partner	LAs may be involved in elements of installation while all ongoing management & maintenance would be carried out by EVCP Partner through a procurement process. Underpinned by SLA between LA & EVCP Partner.	5-10 years	LAs + Govt or State Agency + EVCP Partner Funding (medium public funding element)
Lease – LA & EVCP Partner	LAs procure a partner who would provide an all-in package to install EVCPs and related infrastructure and manage and maintain EVCPs, upgrading as technology or customer demands indicate. Underpinned by SLA between LA & EVCP Partner.	15-25 years	LAs + Govt or State Agency + EVCP Partner Funding (Potentially the lowest proportion of public funding)

Table 5: Comparison of EVCP business models for LAs

From information gathered in the research for this guidance document, a future sustainable model of EV charging infrastructure delivery does not envisage LAs with responsibility for significant installation, operation or maintenance of EVCPs. In particular, the back-office operation and maintenance of EVCPs is considered beyond the scope and expertise of most LAs - there is insufficient experience, skills or resources to manage the back-office billing requirements or maintain an EVCP network at scale.

Looking at potential business models, it is important to bear in mind that it will be possible to charge a tariff for vehicle charging in the future and so derive an income. Some public on-street chargers are currently free to use, but that will change. Since August 2020, ESB ecars have **introduced pricing** on the standard chargers to support continued EV network expansion. The revenue from charging for EVCPs could be combined with parking charges to provide a potential additional revenue source to LAs.

Research reviewed in preparing this guidance document included a comparison of a number of different business model types for LAs across capital expenditure, operational costs and the potential revenue share. Table 6 below may be helpful to LAs when evaluating different business model types. It may be that a mix of business models is required as LAs assess their individual need, considering the type of technology, location and state of the market.

	CAPEX*			OPEX**				
Example fast & rapid charging business models	Hardware	Install	Ground & grid	Back office	Electricity	Maintenance	Revenue	Contract length
Private sector match funding	Typically, split Council (or Gov) 75% and supplier 25%			Supplier	Supplier	Supplier	Varies	Varies
Concession A	Council	Supplier	Supplier	Supplier	Supplier	Supplier	Share to Council	5 – 10 years
Concession B	Supplier	Council	Council	Supplier	Supplier	Supplier	Share to Council+ min payment	
Concession C	Supplier	Supplier	Council	Supplier	Supplier	Supplier	Share to Council	
Lease model (rapid)	Supplier	Supplier	Supplier	Supplier	Supplier	Supplier	Share to Council	15-25 years

Table 6: Comparison of different fast & rapid charging business models (Source: Element Energy UK - draft Dublin LA EV Strategy Report)

*CAPEX: Capital Expenditure **OPEX: Operational Expenditure

Table 6 legend:

- *Where costs are assigned to 'Council' it is expected that these would be covered by funding support.*
- *In the business models shown* ***the Council would not be expected to take on the responsibility of installing and operating / maintaining the charging infrastructure from its own resources.***
- *The concession arrangements (A-C) represent different contractual agreements developed in major UK cities and highlight the flexibility offered by this model – it is also* ***better suited to large scale deployments*** *i.e. within cities.*
- *Retaining ownership of Ground & Grid may be attractive to LAs and is best practice in the UK (e.g. London)*

Taking the above information, a summary of current business models available for EV charging is outlined below:

- **Own & operate:** The LA plans, owns and operates the network and is responsible for the maintenance. They retain all revenue and pay for hardware / software support in order to run the network. The LA chooses where EVCPs are installed and set tariffs. This option is not recommended for LAs at this time as operation and maintenance (O&M) of the EVCPs are beyond the expertise of most LAs
- **External operator:** Essentially a combined 'own & operate' model. The LA owns the infrastructure, but engages a 3rd party Charge Point Operator (CPO) to provide full O&M service, alleviating the council of this responsibility

- **Private sector match funding:** A specific case using government grant schemes to deploy EVCPs. Funding is issued to pay for a share of the capital costs, then the CPO (or in some case the council) funds the remaining 25% and the two parties negotiate arrangements around ownership of the network. The CPO takes on full O&M responsibilities
- **Concession agreement:** This can vary from LA to LA. The supplier and the LA agree split of capital costs, ownership and risks. The supplier typically takes on full O&M responsibility. The LA receives a revenue share. The model is typically used to deploy relatively high EVCP volumes
- **Lease arrangement:** The supplier funds, owns, operates and maintains EVCPs. This service is leased to the LA, based on a long-term leasing agreement. The LA may be able to negotiate ownership of the below ground infrastructure. Suppliers will target attractive locations and may need to take on less attractive locations as an overall packaged agreement.

Based on experience in other cities, 'concession' type business models are effective in achieving city or region-wide deployment requiring large volumes of EVCPs and offering flexibility in terms of the contractual arrangements around ownership, revenue shares etc. This type of model may be more suitable for the cities of Dublin and Cork or where a region has come together to consider a regional approach to EV charging infrastructure.

Further on in this guidance document, under the section on *'Costs of EVCP Installation'*, a number of case studies demonstrate that it is financially challenging for LAs to provide EV charging infrastructure with the current level of government funding support. This is further demonstrated under the section on *'EVCP Investment Payback'*. As indicated in Table 6 above 'Council' costs will require better public funding support to bring credibility to the consideration of any of the business model types outlined.

EV Charging Demand by Differing Users

Prior to the consideration or engagement with CPOs, LAs should ascertain as full a picture as possible of the proposed EVCP installations prior to committing to a business plan for public EVCPs. Table 7 below presents different scenarios where the LAs can become involved in public EVCPs, based this time on charging need or user demand at different locations.

							
Type	**Home charging**	**Residential on-street charging**	**Residential charging hub**	**En-route charging**	**Destination charging**	**LA only location**	**Workplace charging**
Use case	Charging at home (driveway garage, shared car park) typically overnight.	***Charging at a public on-street EVCP near to the driver's house, typically overnight.***	***Charging at public EVCPs in the driver's local area. In rapid case, similar to petrol refuelling.***	***Charging along major roads or main roads in urban areas. Quick turnaround.***	***Charging in car parks at the end journey. "Top-up" charging.***	***Charging at public EVCPs in the LA area - locals/ visitors.***	Charging while parked at workplace. Not strictly public charging
Key user groups	Residents with off-street parking.	***Residents without off-street parking.***	***Residents without off-street parking, taxis, car clubs.***	***All residents.***	***All residents.***	***Employees and general public.***	Employees (particularly those without off-street parking)
Typical site	Driveway, garage, apart-ment block car.	***Along residential street pavement.***	***Along urban roads public car park, forecounts, etc.***	***Service station, forecourt, sites near main roads.***	***Supermarkets, shopping centres, etc.***	***LA car parks, libraries, community centres, leisure facilities...***	Employee car park.

Not a focus of strategy

Council led and focus strategy

Council may play a role hence a focus of strategy

Note for residents in shared car parks (apartment blocks) the ability to charge at home will depend on the landlord or management company enabling an EVCP to be installed.

Table 7: Summary of EV charging at different locations (Source: draft Dublin LA EV Strategy Report)

EVCP Costs and EVCP Procurement

Currently there is no national OGP framework for EVCPs. Consideration may be given to a future procurement framework for EVCPs but at present, where LAs wish to proceed with EV charging infrastructure, this will need to be tendered on an individual basis. With ambitious targets for the adoption of EVs and the banning of internal combustion engine vehicles by 2030, installing the necessary infrastructure to support this step up is important.

Laois County Council tendered for public EV infrastructure as part of their programme for the development of Laois as a low carbon town. Other local authorities have procured EVCPs as part of pilot projects or larger decarbonisation projects in their areas.

Suggested minimum specification details to assist LAs who want to proceed through a local tendering process are presented in Appendix C. LAs are reminded that Green Public Procurement (GPP) rules should also be incorporated into the tendering process for EVCPs and some information on GPP is provided in Appendix E.

The following case studies outline some existing experiences of the costs of installation of EVCPs in a number of LAs across the country.

Case Study: Laois County Council

As part of the Portlaoise Low Carbon Town project, Laois County Council are implementing a number of sustainable initiatives, including the installation of ten on-street public EVCPs (20 x 22kW as two ports per charge point). This initiative is part funded by the Urban Regeneration and Development Fund (URDF)[6] as part of a pilot project. The information below outlines the costs of a pilot charger at county hall in Portlaoise.

Is there a charge for public car parking at the EVCPs? Where there is existing public free parking, for example at the Tax office car park of County Hall.

Is there a charge for the public to use the EVCP? Charge points are managed by a private operator. Formal charging costs have not yet been introduced for this pilot location. Once a pricing structure is in place with the Charge Point Operator (CPO), charging costs will be introduced, which is anticipated to be in line with the ECars pricing structure of 26.8c per kWh for 22kW chargers.

Date of commissioning and installation dates – installation in October 2020, commissioned and operational in March 2021.

Pilot charger at County Hall

EVCP description: *22kw dual port EV charger*

Total cost: approx.
€30,536.00 ex vat

- Equipment charge: €4,500
- Civil / installation costs: 100mm 2 way ducts – €17,000 approx. to bring power from the nearest mini pillar
- New connection and upgrade from single to 3 phase including ESB service pillar and chamber: €8,000 approx.
- Protective post and socket and lining: €1100

Figure 16: 2 x 22 kW on-street EVCP, Portlaoise - Laois CC (Source: Laois CC)

[6] https://www.gov.ie/en/publication/56ef8-urban-regeneration-and-development-fund-urdf/

Case Study: Dun Laoghaire Rathdown County Council

As part of a trial into the feasibility of council provided EV charging units and co-locating the technology to reduce street furniture, DLR Council installed an EVCP in a street lighting column on Crofton Road in October 2018. The charging website is outsourced and fully GDPR compliant.

Is there a charge for the public to use the EVCP? Not at present

Is there a charge for public car parking at the EVCPs? There are currently no parking charges for EV vehicles that are actively charging. There is a 2hr limit on the charging as a default setting.

Date of installation: October 2018

EVCP description: *1 x 7kW Smart Pole charger*

Total cost: approx. **€14,000**

- Equipment: € 6,500 included lighting column EV charger and back office website managed by contractor.
- Civil/installation costs: approx. €7,000, ducting, traffic management, painting of car parking space and miscellaneous.
- No connection ESB & supply pre-existing metered supply with additional capacity.

Figure 17: 7kW Smart Pole EVCP Dun Laoghaire – DLRCC (Source: Dublin CARO)

Case Study: Fingal County Council

FCC have installed six on-street EVCPs at pilot scale including at Swords, Blanchardstown, Howth (2 x EVCPs) and Skerries (2 x EVCPs). Figure 18 below shows a smart pole EVCP installed by FCC in Blanchardstown, North Co. Dublin.

Is there a charge for the public to use the EVCP? Not at present

Is there a charge for public car parking at the EVCPs? Free parking is in operation

Date of installation: November 2019

EVCP description: 1 x 5.5kWh on-street Smart pole charger.

Total costs: approx. **€7,600**

- Equipment cost approx. € 2800 including meter cabinet etc.
- Civil /installation costs approx. €2800
- ESB connection costs: €1974.90 for 3 phase 15kVA new supply
- Back office costs – there is currently no back office system in place for this EVCP. Back office system is currently being investigated.

Figure 18: On Street Smart pole EVCP installed by Fingal CC at Blanchardstown, North Co. Dublin (Source: Fingal CC).

Under the current terms and conditions of the **SEAI Electric Vehicle Public Charge Point Grant** each charge point is only eligible for a €5,000 grant. However, a charge post may contain two charge points, in which case a charge post would receive up to €10,000 per post. From the case studies shown above, this level of grant funding still falls short of the total costs incurred by the LA for the installation of the EVCPs, especially where there are considerable civil works required.

In all of the LA case studies presented above, EV charging is currently free for public use. Providing free EV charging is not sustainable in the long term. However, charging for the use of EVCPs installed by LAs, managing the maintenance and customer service and back-office support for charging infrastructure is considered outside the remit of the LA sector and more appropriate for CPOs. In the medium to longer term, it is envisaged that the role of LAs will likely graduate to provide support and assistance to EV CPOs in the operation, maintenance and customer support service required for the installed public charging facilities.

EVCP Investment Payback

Research reviewed in preparing this guidance document has provided useful information on payback times for various types of chargers. The figure below compares the cash flows (non-discounted) for a single 7kW lamppost EVCP, and a 7kW and 22kW standard bollard charger. It is based on a 2021 deployment and considers the case without funding and with 100% and 75% funding for 7kW and 22kW chargers, respectively.

The analysis shows that without funding support, the business case for slow on-street charge points is currently not viable. This is driven by low utilisation, particularly in the early years, which means the revenue is not sufficient to pay off the initial outlay. Under the conditions tested, none of the 7-22kW technologies pay back within 10 years.

When 100% of the capital expenditure is funded, the 7kW lamppost and standard 7kW chargers are shown to break even around year 6 and 5 respectively. The lamppost charger reaches cumulative cash flow of ca. €2,000 in year 10 while the standard 7kW device reaches ca. €4,000, both reflecting reasonable business cases. A 75% funded 22kW charger is shown to also payback in ca. 6 years and due to the faster charging speed enabling more electricity to be delivered, is able to reach a cumulative cash flow of around €10,000 in year 10.

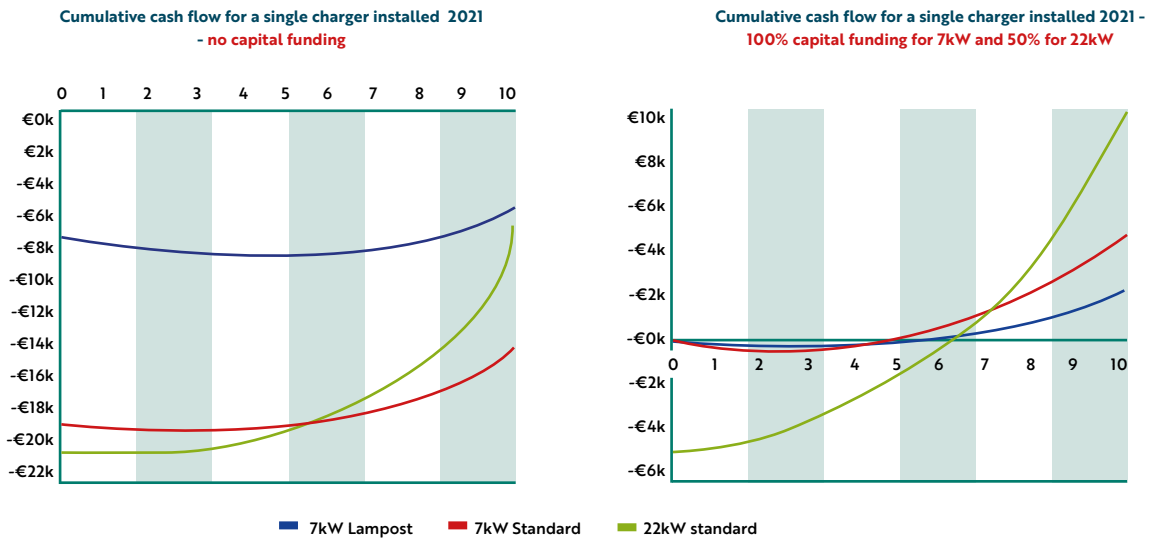


Figure 19: Cumulative cash flow with no / 100% capital funding (Source: Element Energy UK - Dublin LA EV Strategy)

The analysis presented in figure 20 below shows that in 2025, despite the projected increase in utilisation, the business case for 7-22kW chargers is still very challenging without funding support. 75% capital funding is shown to provide a reasonable business case for 7kW lamppost and 7kW standard chargers, with payback period of ca. 5-6 years. 22kW charger would again need a lower share of the upfront costs met through public funding in order to be financially viable, with 50% funding resulting in a payback of ca. 5 years and a 10-year non-discounted cumulative cash flow of ca. €16,000. The 2021 and 2025 business cases for 7-22kW EV chargers explain why these technologies are typically only deployed with funding support.

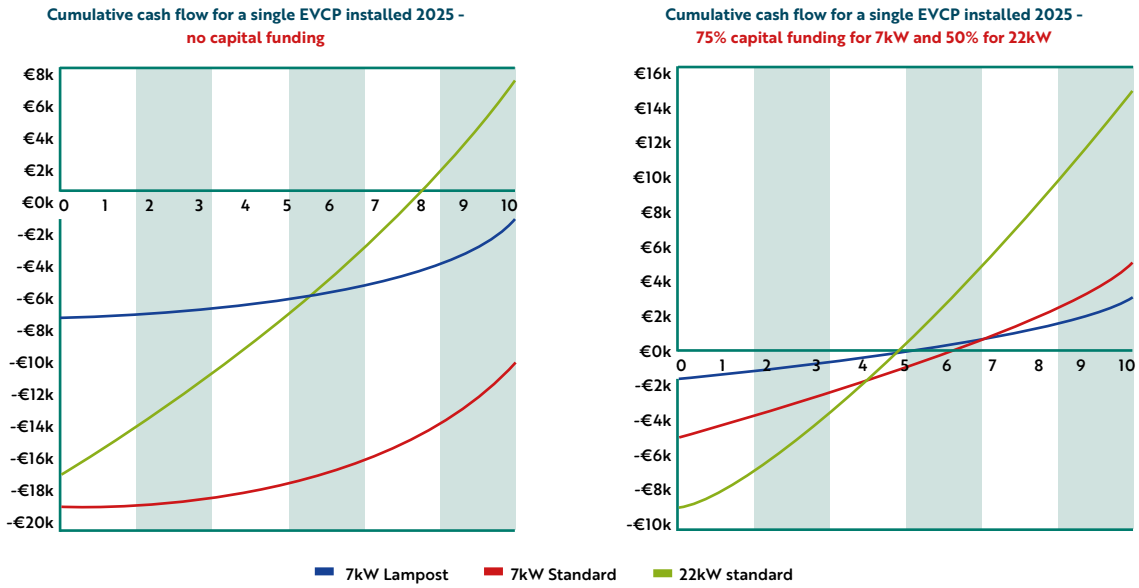


Figure 20: Cumulative cash flow with no / 75% capital funding (Source: Element Energy UK - Dublin LA EV Strategy)

Funding for EVCPs

There are a number of funding sources which support LAs in the installation of EVCPs in the public domain, as well as at LA offices and depots for LA staff and fleet.

The main sources of funding at present are via grants from the SEAI, DHLGH via the URDF fund and through Interreg for border LAs. A list of climate action funding streams is currently available on the **CARO website**.

Like the EVCP technology, the grants available for LAs for supply and installation of EVCPs is constantly changing and it is essential for LAs to keep informed of the opportunities. It must be noted that at present all grants require match funding from the LA, at different percentage levels of capital expenditure. There is currently no funding available for maintenance of EVCPs or for the back-office service required for customer support and this cost must be borne by the LA after the EVCP has been installed.

Funding under the SEAI Electric Vehicle Public Charge Point Grant has been in place since September 2019 to support LAs in the development of on-street public charging points. However, uptake of this funding stream has been slow to date. Information from the survey questionnaire of LAs (see Appendix A), undertaken as part of the work of the EV WG, indicated that this grant scheme does not provide sufficient financial support to LAs for the installation of public EVCPs, particularly in respect of associated civil costs. This has been further demonstrated through the case study examples outlined in this document.

Table 8 summarises some of the key sources of funding available for EVCPs.

FUNDING SOURCE	DESCRIPTION	AMOUNT OF FUNDING & MATCH FUNDING REQUIRED	OPEN FOR APPLICATIONS
SEAI	Grants available to LAs for the installation of on-street EVCPs where off street parking is not available.	Grant support is offered for each charge point (i.e. a single EV plug socket). A total of 75% of the capital costs will be provided, capped at €5,000 per single charge point. Note a charge post may contain two charge points, in which case a charge post would receive up to €10,000 per post.	Ongoing
SEAI	BEC Application: Include EVCPs at Area Offices, Libraries, Depots etc. for staff and LA Fleet.	Grant of 35% of capital cost. Payback period approx 15yrs for EVCPs, therefore increasing overall payback period of application.	Click here for more information.
DECC Climate Action Fund	The Climate Action Fund (CAF) was established to provide assistance and financial support to projects which will help Ireland achieve its climate and energy targets.	Presently unknown for 2021 applications.	DECC is working towards opening the next call for applications in 2021 and it is anticipated that there will be a category for LAs.
Interreg Europe	Interreg is one of the key instruments of the European Union (EU) supporting cooperation across borders through project funding. Its aim is to jointly tackle common challenges and find shared solutions in fields such as health, environment, research, education, transport, sustainable energy and more	Case study: FASTER Programme (see below)	
DHLGH - Urban Regeneration and Development Fund (URDF)	The aim of the URDF is to support more compact and sustainable development, as set out in Project Ireland 2040, through the regeneration and rejuvenation of Ireland's five cities and other large towns, in line with the objectives of the NPF and NDP	20% Match funding required. Case study: Laois Co Co, Portlaoise Zero Carbon Town Project. 6.5% of total grant allocated to EVCPs.	No calls at present

DHLGH - Rural Regeneration and Development Fund (RRDF)	The purpose of the fund is to support job creation in rural areas, address de-population of rural communities and support improvements in our towns and villages with a population of less than 10,000, and outlying areas.		No calls at present
European Investment Bank. ELENA – European Local ENergy Assistance	ELENA provides technical assistance for energy efficiency and renewable energy investments targeting buildings and innovative urban transport.	Large Scale Projects greater than €30M so this option would be suitable for large scale regional projects.	Ongoing
Public Private Partnerships	Through a partnership arrangement, the public and private sector can combine to provide quality public services and infrastructure in the most economically efficient manner.		

Table 8: Funding sources

The FASTER project is funded through the EU's INTERREG VA programme and will see the installation of 73 electric rapid charging points at areas of defined need across the 3 partner regions of Northern Ireland, the Republic of Ireland and Scotland. The project will be delivered on a cross border basis by a consortium of partners led by the East Border Region and includes the SEAI, Highlands & Islands Transport Partnership, Ulster University, South West College, University of Strathclyde and Dundalk Institute of Technology. Match funding for the project has also been provided by the Department for Infrastructure in Northern Ireland and the Department for Transport in Ireland, as well as HITRANS and the University of Strathclyde.

LAs and Public EV Charging summary

Whilst there may be concern about the economic viability of the EV charging infrastructure, it is expected that over time, as the number of EVs on our roads increase, the provision of publicly accessible charging points will become more economically viable leading to wider provision by the private sector.

In the interim however, where significant gaps in EV infrastructure coverage are identified, there is a role for LAs to lead on initiatives to provide appropriate EVCPs for the benefit of our citizens and visitors to our counties.

A variety of factors need to be considered when planning for the provision of public EV Charging infrastructure. This includes:

- EV user and Assessment of Need
- Location and planning
- Electrical connection considerations
- Charger type
- Business model for operation
- Cost
- Available funding
- Future proofing

LAs will be well-advised to review the following specific publications as part of their considerations for the provision of public EV Charging infrastructure:

- **'On-Street Residential EV Charging' document**, which provides technical guidance for LAs.
- 'Switching to Electric Vehicles – A Guide for Business' **SEAI October 2020**
- **'Phase One of Go Ultra Low, Oxford Pilot Project'**

A list of public stakeholders supporting the roll out of publicly accessible EVCPs and an indication of their role is outlined in Appendix H. The reporting requirements for LAs specifically with respect to EV charging infrastructure on the Public Sector Monitoring and Reporting (PSMR) platform is outlined in Appendix I. The details of further useful links are presented in Appendix J.

Figure 21: Switching to Electric Vehicles - A Guide for businesses, SEAI October 2020

6. Conclusions and recommendations

This guidance document has attempted to collate the most relevant and up-to-date information for use by LAs with regard to electrification of their fleet and the provision of Public EV charging. This section presents the conclusions and recommendations drawn.

Role of LAs in electrifying their fleets and installing EV charge points:

- LAs can both **lead and assist** with the national effort on decarbonisation by the electrification of the LA fleet where technology, cost differential and resources allow, and by the provision of EV charging infrastructure to promote zero emission EV ownership and use.
- To **initiate the decarbonisation** of their fleet, LAs should consider the electrification of their lower-powered vehicles such as cars and small vans, be that replacement of LA-owned or leased vehicles.
- **On-street charging** should be considered for homeowners with no options for home charging and to support the principles of a 'just transition'.
- LAs will play an important lead role in the initial roll out of EVCPs, however, it is likely that the **energy market will need to fulfil the longer-term objectives** of the provision of public EV charging infrastructure.
- LAs would like to see a **stronger commitment from energy suppliers** in the installation of publicly accessible EVCPs.

Getting started:

- Fundamentally, LAs should consider the development of an **EV and EVCP strategy** for their administrative areas or regions that include governance and reporting structures.
- From the outset LAs should identify the **department and individuals** within the LA who are best placed to progress the fleet transition and the implementation of the EV charging infrastructure.
- As a first step, an **assessment of needs** should be undertaken. LAs should become familiar with EVs and EV charging infrastructure currently on the market and existing in their areas.
- LAs should assess data on trends and usage from existing charge point networks eg ESB ECars and CSO statistics on licensed EVs.
- The capacity of the national electricity network is an important consideration.
- Frameworks for the **procurement of EV vehicles** have been established by the OGP for use by LAs.
- There are currently **no EVCP frameworks** available for the installation of EV charging points. Consideration may be given to a future procurement framework for EVCPs but at present, where LAs wish to proceed with EV charging infrastructure, this will need to be tendered on an individual basis.

- **Tender documentation** is available from a number of LAs who have already commenced EVCP installation.
- A number of potential business models of operation are outlined in this document for consideration by LAs for the effective **installation, maintenance,** servicing, customer support and operational **management of EVCPs.**

Installing EVCPs

- The **siting location for EVCPs** is considered the most important decision when it comes to investing in EV charging infrastructure, paying attention to the required civil works and existing ESB networks infrastructure.
- Particular attention should be paid by LAs to **electrical connection considerations** for public EVCPs, especially at public lighting lamp posts or for EV charging using channels cut in public paving.
- Amendments to Irish Wiring Regulations are currently under review by a NSAI working group to consider potential electrical shocks at some EVCPs.
- Fast or medium-fast **charging hubs** are recommended for consideration on the outskirts of urban areas to support county visitors and tourists using EVs. Charging hubs may also be an alternative for LAs to complement or instead of on-street EVCPs.
- Outskirt charging hubs are also recommended to support **longer term objectives** for: the revitalisation of urban centres, public realm and town centre considerations, as well as assisting with the modal shift.

EVCPs Planning Legislation and EU Directives

- LAs are recommended to familiarize themselves with the recent amendments to the Planning and Development Act 2000 under **SI 115 of 2021** with respect to EV charging infrastructure classes of exempted development.
- LAs should also be aware of the updated guidance as part of amendments to Part L of the Building Regulations, **TGD L – Conservation of Fuel and Energy in Dwellings** giving effect to the EU Energy Performance of Buildings Directive 2010/31/EU (EPBD).
- LAs need to be cognisant that compliance with the revised **EU Clean Vehicles Directive** (EU) 2019/1161 will be required for all publicly procured contracts from 2nd August 2021 with respect to vehicle purchase, lease, hire-purchase or rent.
- Consideration should be given for the inclusion of appropriate policies in County Development Plans **(CDPs) for the provision of EVCPs by developers.**

Funding:

- **Direct funding to assist** LAs in the installation of public EVCPs is currently only available through the SEAI Electric Vehicle Charge Point grant. This is only for on–street charging and for a maximum grant of €5000 per single EVCP.
- Based on the research undertaken by this EV charging WG, the provision of **EVCPs for public usage is financially challenging for the LA sector** under current funding support.
- **Civil works** in particular, to facilitate EVCP installation at optimum locations, have proved to **incur significant costs.**
- **Notwithstanding** current funding support, **LAs** are already leading the way and have kick-**started EVCP provision** in their areas.

Medium to Long-Term:

- The provision of public **EVCPs by LAs to date** have largely been confined to pilot projects or fully funded projects **without tariffs for use.**
- It is considered that charging for the use EVCPs installed by LAs, **managing the maintenance, customer service and back-office support** for charging infrastructure is **outside the remit of the LA sector.**
- In the **medium to long term** the role of **LAs will likely graduate to provide support and assistance to EVCP operators** for the operation, maintenance and customer support required for public EVCPs.

Source: South Dublin CC

Appendix A – Summary report of LA EV Charging WG survey

Overview

The County and City Management Association (CCMA), Land Use and Transportation Committee (LUTS) and the CCMA Environment, Climate Change and Emergency Planning Committee (ECCEP) have established a Local Authority EV Working Group advising local authorities on their role of in the provision of EV charging infrastructure including sites and siting for such infrastructure.

The scope of the working group is to provide high level recommendations which will ensure consistency of approach nationally regarding location, funding, installation and regulation (through the planning process) of electric vehicle charging points.

To assist in their work, the EV Working Group sought information from local authorities in the form of a survey. The online survey was open to local authorities to answer questions on existing and planned EV infrastructure provided by local authorities including its own fleet vehicles.

The survey opened to local authorities on August 20th 2020 and yielded responses from 25 local authorities as of 27th October 2020. The responses have been downloaded from Alchemer (formerly Survey Gizmo) and collated into individual Word documents and an excel spreadsheet.

Survey Findings

EV Ownership

The findings of the survey yielded varied results with some local authorities further into their transition to EV use. It was found that 56% of respondents already own and/or lease EVs or hybrids for their day to day operations. 40% have yet to purchase or lease an EV and 4% are in the process of adding an EV to their fleet.

Of the respondents that own or lease an electric vehicle, the percentage of the total fleet ranged between < 1% to 20% with most being on the lower end of the scale. Interestingly, it was found that the majority of local authorities that responded do not own or lease a hybrid vehicle with only one response confirming its use of hybrids with 2.2% of the total fleet.

These results would suggest that local authorities are bypassing the use of hybrid vehicles in their fleet in favour of the more energy efficient battery electric vehicles.

Of the remaining 40% who do not yet have EVs or hybrid vehicles as part of their fleet, the question was put forward as to why they had not yet transitioned. The most common response was that EVs are not suited to replace existing vehicles as these vehicles are used for road maintenance and used to transfer heavy goods There is not yet confidence in battery capacities to drive heavy vehicles long distances.

Charge Points

LAs were queried on the number of EV charge points available for public use on local authority property. Circa half of respondents had EVCPs available for public use. However it should be noted that some responses counted charge points installed by ESB eCars. The rest of the LAs who participated in the survey either had no publically available CPs or did not respond.

Almost half (48%) of those who responded have designated charge points for staff to use with 40% having no designated CPs. The remainder were either a work in progress or did not respond to the question. Of the charge points for staff use, the main types are 7kW and 22kW and the majority are wall mounted.

Finance & Pricing

52% of respondents have installed council funded EV charge points in their area. The majority procured these charge points through quotations with some using an existing contract. Most funded the charge points through their own resources with one local authority borrowing finance.

44% of the survey participants charge customers fees for using EV charge points while 16% provide a free service. 40% did not respond which may have a correlation with the 40% who do not have designated staff CPs. The pricing structure is mainly by kWh with many respondents still considering their options. Of the local authorities who provide use of their charge points, access is provided through smart cards, credit cards and phone apps. Otherwise they are open access. There are more local authorities who do not provide customer services and technical support for charge points in place (28%) than those who supply support (20%). The other local authorities either did not provide a response or it was not applicable to them.

It should be noted that while the majority of local authorities advised that they use a charge point operator for their customer service, some of those that answered 'no' or 'not applicable' to having this service advised that they have a charge point operator in place so these results are flawed.

Of the local authorities who have EVCPs available for public use, 20% charge fees for car parking while 24% do not charge to park. The remaining responses were listed as not applicable or the local authority did not respond.

Looking Ahead

The local authorities were questioned on whether they have undertaken any studies related to EV charging infrastructure needs. A majority of 76% have not carried out any studies whilst 20% indicated that they have studied these needs. 4% did not respond. Of the respondents who have carried out studies, the majority are hoping to install mainly 22kw charge points between 2020 and 2022.

Many local authorities (32%) are unsure if the provision of EV charging infrastructure currently considered as part of planning conditions for commercial/residential development is being approved for the Local Authority. For those who are unsure, some have stated that this is due to it still being under consideration. However, almost two thirds (64%) have confirmed that this provision is currently being considered. Only one respondent advised that this provision is not currently being considered.

In regards to the 2020-2022 Three Year Capital Programme only 20% of respondents have provided for public infrastructure. 60% have not included it in the programme and 20% did not respond. Of the respondents who have included EV infrastructure in their three year programme, details of financial provision include:

- Road levies
- SEAI grant
- Capitalised funding
- Grant aid from the Climate Action Fund

Looking forward, the local authorities were questioned on whether they are planning to propose to provide for public EV infrastructure in their Three Year Capital Programme 2021-2023. 60% of respondents confirmed that they are planning to provide for this infrastructure while 20% of respondents are not planning to include this in their programme. 20% did not respond.

Of the respondents who are planning to include EV infrastructure in the 2021-2023 three year programme, details of financial provision include:

- SEAI grant funding
- Own resources
- Road levies
- URDF grant

Of the respondents who are not planning to include EV infrastructure in the 2021-2023 three year programme, reasoning why not include:

- EV policy is still being developed
- Match funding will not be available
- Competing demands on capital investment
- Infrastructure requirements are still being assessed

SEAI Public Charge Point Scheme

Most local authorities (76% or 19 respondents) who have participated in the survey are aware of the SEAI public charge point scheme. Of these 19, eight local authorities intend to make an application for funding in 2021, three in 2022 and one in 2020. The remaining did not respond. One local authority who was previously unaware of the scheme intends to apply in 2021. Many respondents are still considering how many charge points they intend to seek funding for whereas others already have numbers of CPs, type and when they will be installed. The responses are likewise in regards to how much funding will be requested.

Some of the reasons why local authorities will not be applying for the SEAI grant include:

- Absence of a guidance document or billing system
- Lack of experience of other Local Authorities
- Lack of clarity on regulation
- Limited access, e.g. gated car parks
- Ongoing costs for back office and maintenance support
- Lack of internal resources

Additional Comments

Participants were invited to include any additional information comments that they felt may be relevant to the questionnaire. Some of the comments included:

- Lamp post charging is not viable due to insufficient power and electrical issues relating to non constant loads.
- The local authorities need guidance on the role of providing publicaly available EV infrastructure.
- There is difficulty assessing where there will be a demand for EV charging infrastructure.
- Identifying sources of match funding and resources to deliver the infrastructure and maintenance/arrangement costs will be challenging.
- Additional issues need to be considered before the roll out of a charging network such as upfront capital investment, determining suitable locations, the long term maintenance that will be required, fee structure and contractual arrangements with ESB.

Conclusion

This questionnaire has provided valuable insight into the current status of EV infrastructure in local authorities, their future plans and any concerns that may be present. It is clear from the survey that while just over half of respondents already have EVs as part of their fleet, the numbers are still very small with most local authorities only having 1-2% EVs. Additionally it should be considered that local authority fleets may never have more than a certain percentage of EVs as it was pointed that that many vehicles are heavy duty and not suitable to run on a battery. It may be necessary to consider the transition of HDVs at another point in the near future.

Although only half of respondents have publically accessible charge points, it was encouraging to see that many local authorities plan to apply for grant funding under the SEAI public charge point grant scheme. The concerns that local authorities have in relation to installing CPs in the area should also be addressed especially in relation to lack of guidance and lack of experience.

It is clear that financing is a concern for many participants, particularly in regards to ongoing maintenance costs. Lack of resources is also a concern in regards to setting up and maintaining a back office and customer service support.

These results indicate that the local authorities are still hesitant to fully invest in EV charging infrastructure also might not have the means to do so. The results also indicate that local authorities are hoping for a national strategy or guidance document to be in place before they begin the venture into EV investment.

Source: Fingal CC

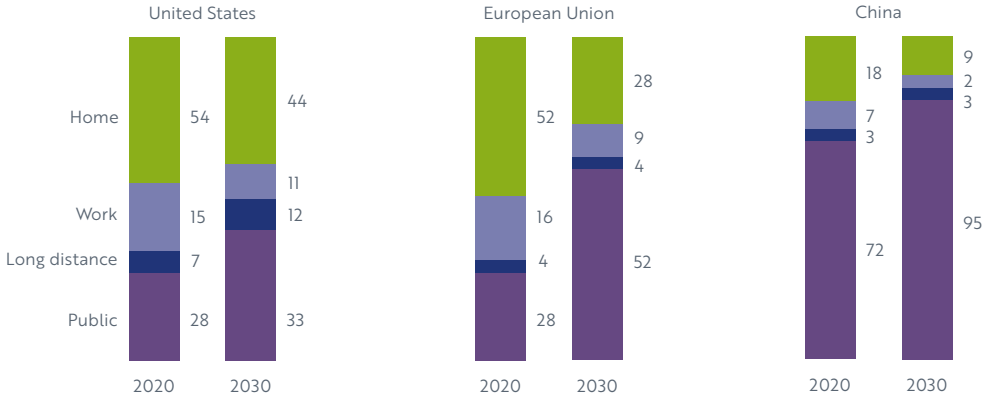
Appendix B - Proportion of charging at home

A number of references below cite between 75% and 95% of residential EV +charging happening at home:

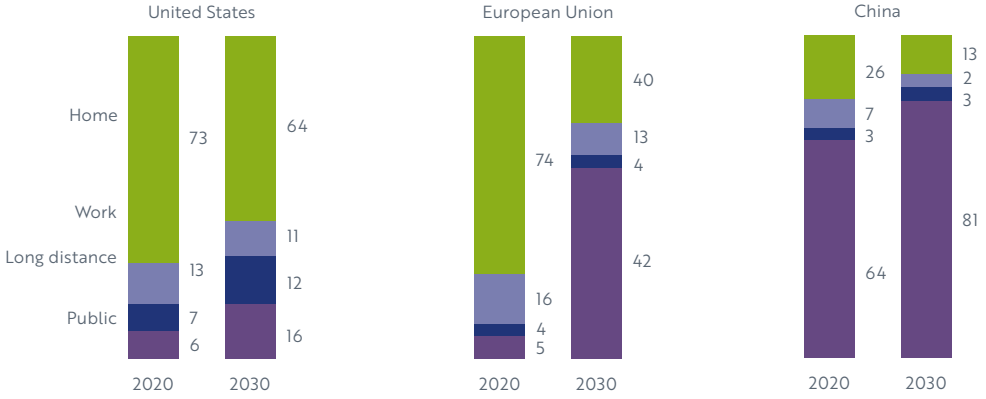
- **SEAI has indicated on their website that approx. 80% of charging** is being done from home.
- PWC UK: **'The majority of UK drivers (84%) have access to off-street parking at home'.**
- EU **'Only 5 percent of EV charging happens at public charging points'**.....public chargers are only used for about 5% of public charging events, including on-street city parking, car parks and fast charging along road corridors'.
- DTTAS **Low Emissions Vehicle Task force 2019 report**.
- McKinsey: **'In a home-centered base case, approximately 75 to 80 percent of EV owners in the United States and European Union should have access to home charging....** (Exhibit 3).'

There are home or public-based scenarios for electric vehicle charging by region.

Energy demand, public-centered scenario, % of killowatt-hours



Energy demand, home-centered scenario, % of killowatt hours



Figures may not sum to 100% because of rounding. *McKinsey & Company.*

Appendix C – Suggested specification details for EVCPs

Compliance obligations to be included in EVCP specification

LAs are reminded that this is a guidance document only and each LA needs to seek expert advice with regard to the specification details in advance of any tendering process. As a minimum, LAs should include the following compliance obligations in any specification document:

- S.I. No. 414/2018 - European Union (Deployment of Alternative Fuels Infrastructure) Regulations 2018.
- Open Charge Point Protocol (OCPP) version 2.0 https://www.openchargealliance.org/
- Connect to a Charge Point Management System configured to disseminate information relating to availability and pricing.
- Installation must comply with ESB Distribution Code Version 7.0 October 2020 or later.
- Electrical connections must be compliant with the latest National Rules for Electrical Installations (currently NSAI I.S. 10101)[7]
- Plugs and sockets must comply with IEC 62196
- All applicable Health & Safety Regulations
- All EV chargers must be installed in full compliance with the requirements of the Planning and Development Act, 2000, as amended and associated regulations
- It is a condition of the Licence that all products being procured by the grantee, shall comply with the European Communities (Energy Efficient Public Procurement) Regulations (S.I.151 of 2011) [Triple E]
- A dedicated clearly marked parking space must be provided per charge point with adequate enforcement measures in place to ensure access to EV which require charge. Markings must be compliant with Article 19B of the Road Traffic (Signs) Regulations, 1997 (S.I. No. 181 of 1997) as amended by the Road Traffic (Signs) (Amendment) Regulations 2015 (S.I. No. 444 of 2015)
- Each charge point must be **accessible and operational 24 hours per day** with contact details provided to the user in case assistance is required
- Ensure each charge point must be remotely accessible with an ability to resolve issues remotely. The location of each charger must be provided to SEAI
- SEAI will be required to prepare a publicly accessible online EV charger map. This map, at a minimum, must display information about the charger and its current status in as close to real time as possible. Operators must provide access to this information to SEAI in order to facilitate Terms of Reference Rev. 01 30/09/2019 development and ongoing operation of this EV charger map.
- Ensure that each charge point is accessible to all users including ad hoc users who are not members of any membership scheme or subscribers to any service provider

[7] National Rules for Electrical Installations I.S. :2020 [a.k.a. wiring rules] | NSAI

- Where fees are charged, these must be structured such that:
  a. **Fees should not be lower than would arise for a domestic electricity customer** with off-street parking and a home charger. Operators must publish their fees online and these should be easily accessible and understood by consumers
  b. **Ad hoc users** (i.e. those not members of any scheme or subscribed to any service provider) **must be able to access any charger supported** under this scheme at any location. This can be via a phone app or other appropriate method
  c. **Information on parking** and charging fees and special terms must be **clearly displayed** and accessible to potential users
- All electrical work must be undertaken by a fully qualified and authorised electrician who is registered with Safe Electric Ireland.
- Upon completion of an installation, a Safe Electric Ireland Certificate Number 1 complete with Test Certificate must be provided for each installation.

Specification - on-street charging

The category 'on-street charging' refers to situations where a charge point is located on public streets and roads. On-street charging shall be publicly available and can be used by any EV user. On-street charging shall be connected to an ESB Networks metered connection point. In line with the specification of charge points installed by ESB Ecars from 2012, the chargers will be specified to supply 32A per phase to the vehicle. On-street charge points can be single-phase or 3-Phase. All on-street charge points shall be capable of connecting to a Charge Point Management System via open protocols.

Supply

The equipment covered in this specification is an on-street charge point suitable for charging EVs. The charge point shall be connected to a single-phase AC electricity supply at 230V phase to neutral voltage or a 3-phase AC electricity supply at 230V phase to neutral (400V phase to phase). The default current to be supplied to the EV is 32A per phase. The materials and components within the charge points shall be capable of supplying 32A per phase charge to a suitable EV. Any such protective devices will be rated at 32A. The charge point should be configured so that only authorized personnel can adjust the current rating of the device. Equipment installed for on-street charging must have undergone a validation process with at least two of the EV manufacturers distributing electric vehicles in Ireland. Proof of the validation process should be provided.

The charge point shall support Mode 3 charging and be capable of charging electric cars that conform to the Control Pilot Function as described in IEC 61851-1 Edition 3.0 in all respects.

The following basic function shall be provided by the charge point:

- Verification that the vehicle is properly connected
- Continuous protective earth conductor continuity checking
- Energisation of the system
- De-energisation of the system
- Selection of charging rate
- A means to ensure that the charging rate does not exceed the rated capacity of the mains
- Connector cable, vehicle or battery capabilities
- The charge point shall have a socket conforming to the dimensions as set out in IEC 62196-2 for a Type 2 plug. Functionality will conform to IEC 61851-1 Mode 3

- The socket shall be behind a door or cover
- The charge point shall implement control pilot functionality as described in Annex A and Annex B of IEC 61851-1 Edition 3 and SAEJ1772
- It must be demonstrated that the pilot signal parameters of the charge point (timings, voltages etc.) have been validated by one or more electric vehicle manufacturer
- The charge point shall be able to identify the maximum current capability of the cable assembly by means of measuring the resistor between the proximity pin and earth in the Type 2 plug according to IEC 61851-1 Edition 3. The current supply shall be interrupted if the rating of this cable is exceeded
- In the case of multi-outlet charging solutions, each charging outlet shall be equipped with suitable protection to ensure disconnection of supply to the outlet in case of overload
- In the case of multi-outlet charging solutions, each charging outlet shall be equipped with protection against earth leakage fault currents above 30mA
- The charge point shall be equipped with the appropriate equipment that ensures disconnection of the supply in the case of DC fault current above 6mA
- A locking mechanism shall be used to prevent disconnection of the plug from the charge point under load. The plug shall unlock when the user indicates that they want to finish charging e.g. pressing a stop button. In the event of a power failure, the locking mechanism shall be released
- The charge point exterior shall comply with the tests as detailed in IEC 61439 parts 1 and 7. These tests consist of but are not limited to mechanical strength, resistance to corrosion, temperature variations, resistance to UV radiation and environmental tests
- The entire charge point shall provide a minimum degree of protection of IP44 with the plug both connected and removed. However, a rating of IP 54 or higher is required when the socket cover is shut
- The charge point shall be protected against mechanical damage (impact severity AG2). The equipment shall comply with a minimum degree of protection against external mechanical impact of IK07 in accordance with the requirements of I.S. EN 62262
- Barriers against vehicle impact shall be installed between the charge point and the road
- The charge point shall maintain full functionality after an electrical supply interruption
- LEDs shall communicate the status and availability of the charge point to the user
- An LCD display shall communicate to the user, information including charging status and power delivered and energy consumed
- The device shall be supplied with operating instructions and installation instructions
- The charge point, including all components and accessories, shall be fully guaranteed against all defects arising from faults in design, manufacture and workmanship for a period of no less than 48 months from delivery
- The charge point shall be capable of operating on Open Charge Point Protocol (OCPP) 2.0 or later
- Charge points should be remotely upgradeable as new versions become available. Equipment should be tested with at least two OCPP back office systems. Verification of successful testing must be provided
- The charge point shall comply with accessibility best practice where the parking space is designed /assigned to be disabled accessible. Further guidelines are set out by the Irish Wheelchair Association. In addition, the charge point shall comply with Disability Discrimination Act (DDA) and/or American Disabilities Act (ADA).

Installation

The charge point shall be connected to a single-phase or 3-phase (nominal 230V phase to neutral, 400V phase to phase) metered supply. The electrical connection shall be made in accordance with the latest electrical installation standards (currently NSAI I.S. 10101).

Particular attention shall be paid to assessing and mitigating the risks posed by the installation of an EV charger outside an equipotential zone, which has a load in excess of 2kW, and which by its nature is likely to be frequently handled by the public. A break in the ESB Mains Cable Neutral or in the service cable neutral could result in an unacceptably high voltage on the chassis of the equipment, and this needs to be anticipated and protected against. This requires specialist design expertise as the approaches in the NSAI Wiring Regulations do not specifically address this issue at present.

Connection shall be to an Electricity Distribution Network Operator Mini Pillar or as otherwise provided by ESBN. All electrical works shall adhere to ESB Networks Distribution Code Version 7.0 October 2020.

Maintenance

Maintenance shall be carried out in accordance with the manufacturers' guidelines.

Periodic electrical safety testing will be carried out in accordance with national safety rules. These tests include, but are not limited to insulation testing, earth quality testing as well as leakage device function and timing tests. Testing periods will be maintained in accordance with applicable safety standards. Records of all statutory testing and inspections should be retained for a period of no less than five years.

Fleet charging examples

Figure 22: Wicklow CC Fleet EVCP (Source: Dublin CARO)

Figure 23: 3.6 kW ABL Charger at DCC Depot (Source: Dublin CC)

Appendix D - Electrical Connection Considerations

The following information discusses technical considerations associated with electricity connection to ESBN Networks, as well as the responsibilities of the customer connecting under the NSAI Wiring Regulations. However, it is not to be taken as a substitute for professional expertise in the assessment of EV connections and the mitigation of any associated risks. It does however highlight issues which need particular consideration.

Lamp post charging:

EV charging integrated into lamp posts has been implemented in a number of countries and minimises the need for additional street furniture. However, this approach to EV charging comes with some potential difficulties, which LAs need to be aware of, as outlined below.

The standard connection to a lamp post is often unsuitable for EV charging. The electrical earthing for lamp posts uses what is referred to as Protective Multiple Earths (PME). This means that the neutral connection is connected to earth at multiple points on the circuit. In order to avoid a scenario where a broken neutral could cause a vehicle to be 'live', it is necessary to ensure that suitable protective measures are taken to guard against such risks:

(a) Modifying the earthing with the introduction of additional earth rods at the lamp post is one possibility, but in practice it is likely to be very difficult and expensive to install sufficient earth rods to reduce the impedance of the customer earth connection to the low values required. The UK IET Code of Practice (4th Edition) on EV Charging Equipment installation states that *'it is not usually practicable to achieve a sufficiently low earth electrode resistance for this approach to be effective above 5kW',* and for 5kW single phase, this requires less than 5 Ohms, which with a soil resistivity (say) of 50, would require 8 earth rods of 1.2m length spaced at 3m.

(b) Modifying to a TT earthed connection, (TT from French: terre-terre) is also theoretically possible, but again will be very difficult in practice. This is because it is very difficult to find an area in which the TT earth can be installed, and which is outside the influence of existing PME connected equipment. This is an important consideration because the TT will be a different potential than the PME in the event of a fault, e.g. if the PME equipment rose to 70V the TT would stay close to zero, and anyone touching the TT connected equipment and any other PME connected equipment may receive a shock.

In practice this means having a separation of over 2.5m between all TT connected equipment, including the TT earth and all other PME connected equipment. Accordingly, a distance of over 2.5m is required from all cars connected to the charge point in all directions as well as similar distance surrounding the charge point. Within this zone no PME equipment can exist now or in the future. This will be difficult and expensive to establish.

Additionally, the protection requirements for TT equipment are different from PME connected equipment so these considerations will also need to be addressed.

Given the much higher predominance of PME earthed connections in Ireland against the UK, the difficulties of establishing a TT zone will be much greater. Consequently, a new protective device (OPEN) which disconnects the EV/EV charger in the event of such faults is finding favour in the UK as it provides a much cheaper and more reliable solution. However, this is new and no product standards exist for such devices.

The deployment of such devices for street charging may require a separate protection cabinet from which the EV charger and EV is fed, as the device operates by disconnecting phase, neutral and earth.

Additionally, the UK Wiring Regulations were altered in 2018 and 2020 to allow the deployment of such devices, but the Irish Wiring Regulations do not currently reference this approach. However, an NSAI Working Group is now considering these issues.

A second consideration is the available power to the lamp posts. A public lighting circuit where multiple lights are fed from the same circuit is not likely to have sufficient spare capacity to supply EV charging. Typically, only single lighting standards on a dedicated connection from ESBN could be considered, as it may be possible to increase the capacity provided at the street lamp. As a meter will be required to be installed due to the size of the load this must also be accommodated, and additionally a connection agreement[8] provided for the EV Charger.

Examples of international implementation:

- Czech Republic – a new utility cable is brought to the lamp post and connected to a 'bolt-on' box. While this reduces the need for additional street furniture, it does not utilise the public lighting cable, due to insufficient capacity.
- United Kingdom – here the existing lighting posts on existing cables are used to connect multiple EVs. For metering, the customer carries their own electrical meter attached to the cable (this methodology is not currently possible in Ireland). The available power to the vehicles is very limited due to the comparatively low power of the lighting for which the circuits were designed. Typically, 5.5kW is the total available power to the UK circuit, including all lighting. However, the issue of broken neutrals was not initially addressed as TT was felt to be sufficient, but use of OPEN solutions is now more common.

[8] The existing PL will be on an unmetered connection with load estimated, whereas any new meter installed will now include both the EV load and the PL load (very small by comparison). So some arrangement will be required with ESBN regarding how two separate load s at the one connection point would be treated in an economic manner.

Using the approach taken in the Czech Republic is a feasible option in the Irish context, as it essentially becomes an EV charge post with a lamp attached above. It should be noted that the existing public light will be on an unmetered connection with only load estimated. Any new meter installed will now include both the EV load and the public light load. The public light load is very small by comparison. An arrangement will be required with ESB Networks with regard to how to separate the 2 types of loads at the same connection point.

Fig 24: ESB Mini pillar (Source: ESB Networks)

The UK approach in Ireland on the other hand becomes problematic as the public lighting network is not under ESB Networks control. Additionally, the use of the public lighting network in this manner would form a private distribution network, which is not allowed under current legislation in Ireland. It is also understood that the UK no longer use street lamps which are not individually connected to the power supply directly. This is because the power available is too low (25A is only 5.5kW whereas an EV could be 7.4kW). On such a public light circuit with multiple EVs the cable would be grossly overloaded and there would be resulting severe voltage drop issues.

Researching the capacity of the national electricity network is essential when planning EVCP infrastructure. Another consideration is that lamp posts in some areas e.g., Dublin City Centre, may be heritage lamp posts and it may not be possible to 'retrofit' them as an EV charge point.

EV charging using channels cut in paving from home to car:

In some cases, EV drivers wish to provide a cable from their home to a vehicle parked on the public pavement outside. This could be facilitated by cutting a channel from the home to the car, although this may give rise to Public Liability issues associated with 'trips and falls'. An alternative might be to use a 'rounded cable cover', which is used during construction work in the street to temporarily protect electric cables to appliances. This is designed not to be a trip hazard as it has rounded edges that do not impede pedestrians or buggies. Additionally, as the cable cover is only in place when the EV is being charged any risk of tripping is further reduced. The only maintenance required is the periodic replacement of worn out cable covers.

Another issue is the potential for electric shocks and this requires careful consideration. Where the vehicle is not located within the equipotential zone of the house, the potential for electric shock is increased should a broken neutral occur. It is possible to mitigate this by installing additional earth rods or more practically by using a device that disconnects the supply in the event of a Neutral Fault. This is a Wiring Regulation issue and is currently under review by an NSAI Working Group.

Apartment / Office Block / Car Park EV Charging:

The most effective way to provide EV charging in an apartment, office block or car park is to take power from a new ESB Networks three-phase metered connection from the existing main board. Multiple metered connections are possible so long as the areas being fed are distinct - for example, in separate zones or on separate floors. The EV service provider responsible for the new metered supply can then charge for the use of the EV charging service. The legal permissions and insurance requirements for running the EV charging network in the car park, the installation of the EV chargers and the maintenance of the infrastructure are the responsibility of the EV aggregator providing the EV charging service.

DC Fast Charging 44kW-150kW – on-street:

Generally, the ESB networks mini-pillars visible on the street are capable of delivering 44kW, so long as there is available capacity at the local substation. Commonly, at least one such connection would be possible on a network node from a transformer. The supply required for 150kW may be possible if the charge point is located at the substation. The length of cable will typically need to be less than 50m due to voltage drop reasons. It is important that the EV charger is not positioned in the immediate vicinity of the substation doors as this would impede access by ESB Networks staff.

Consultation with ESB Networks is essential prior to the consideration of the vicinity of a substation as an EVCP location. To assist LAs in the siting of EVCP locations, ESB Networks provides a useful Capacity Heat Map tool, which provides approximate information on available capacity in the network. This mapping tool is **available here**.

Figure 25: Typical Unit substation in a housing estate (Source: ESB Networks)

EV Charging Hubs:

For installations of up to three / four 44kW DC chargers, a unit substation of less than 11m3 might be feasible. This size of charging hub is exempt from planning permission. Provision of larger charging hubs however, such as four 150kW charge points will likely require the construction of a Medium Voltage (MV) substation, including installations to allow for stepping down to Low Voltage (LV). ESB MV Substations and ESB MV/LV substations used for single customer connections are typically constructed in masonry brickwork and the size of the substation is in excess of the planning permission exemption of 11m3. Where an MV supply is already available in the vicinity, this can assist in reducing the cost of this type of connection.

To enable the transition to a lower carbon future and meet the targets set out in the Programme for Government and Climate Action Plan, ESB Networks is developing standard substation module connection options to facilitate the faster connection of customers deploying low-carbon technology.

The current footprint for MV substation buildings means most sites in urban locations cannot readily accommodate electric vehicle charging points without the service station operator making significant changes to their existing operations/site layout. In 2021 ESB aims to introduce a space saving solution that ESB Networks is piloting with a number of EV charging hub customers.

EV charging hubs allow for the utilisation of load management at the grid connection point, where multiple EVCPs share a single grid connection, but communicate through inbuilt smart capability. This allows charging to be co-ordinated, which in turn provides the chargers with the capability to manage their individual and total charging load within the limits of the fixed power supply.

This kind of deployment approach offers several benefits, such as allowing more chargers to be installed for a given grid connection than would normally be the case. Each EVCP can reduce its power as required to prevent the available supply being overloaded, avoiding expensive grid upgrade costs if limited capacity is available, and providing a cost effective and scalable way of expanding charging infrastructure.

Source: Dún Laoghaire-Rathdown CC

On-street charging examples

Figure 26: 7kW Smart Pole EVCP Dun Laoghaire – DLRCC (Source: Dublin CARO)

Figure 28: Smart Pole Charging Blanchardstown - (Source: Fingal CC)

Figure 29: 2 x 7kW on street EVCP Skerries - (Source: Fingal CC)

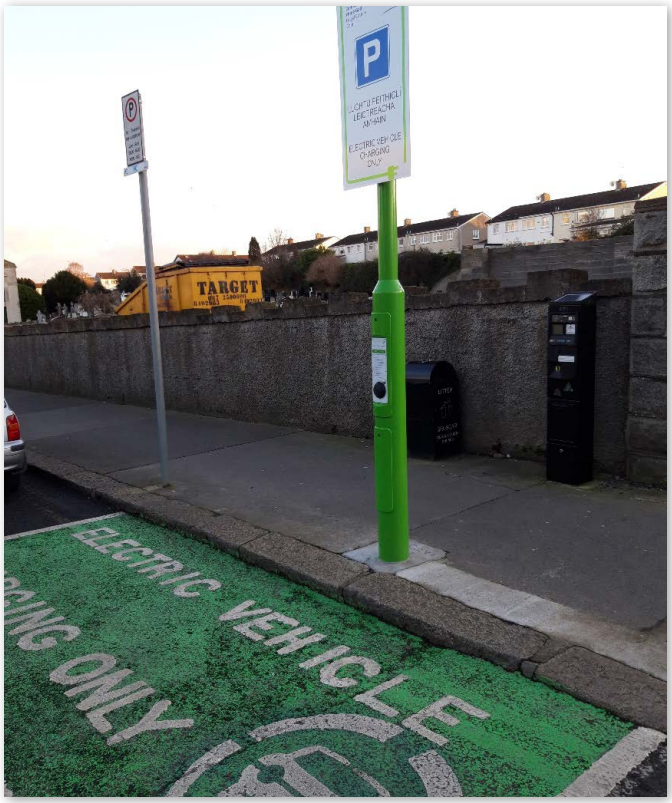


Figure 27: 7 kW Smart Pole EVCP Swords– Fingal CC (Source: Dublin CARO)

Figure 30: 2 x 22 kW on-street EVCP Portlaoise - Laois CC (Source: Laois CC)

Appendix E – Green Public Procurement (GPP)

Whilst detailed guidance and laws exist for vehicle procurement (see Clean Vehicle Directive section), specific (GPP) guidance for EV infrastructure does not as of yet.

However, much work has already been done in this area - a category on SEAI (and ACA) Triple E list, namely Electric and Alternative Fuel Vehicles/Electric Vehicles and Associated Charging Equipment. The technical description is at: **https://www.seai.ie/publications/Electric_Vehicles_and_Associated_Charging_Equipment.pdf** Whilst the full list is at **https://www.seai.ie/business-and-public-sector/triple-e-register-for-products/categories-and-criteria/**

The forthcoming EPA GPP criteria address the impacts of **vehicles** in the following ways:

- Setting maximum CO_2 emissions based on vehicle type for cars and vans
- Requiring low or zero-emission technologies for heavy duty vehicles
- Setting maximum air pollutant emissions based on real driving conditions
- Requirements for tyre pressure monitors and rolling resistance of tyres
- Minimum energy efficiency and battery warranties for electric cars and LCVs
- Addressing the climate impact of air conditioning gases
- Maximum vehicle and tyre noise emissions
- Lower impact lubricants and maintenance activities

None of the above directly impact on the charging equipment, a reasonable checklist for scoring EV chargers over and above minimum eligibility criteria such as Triple E might be:

1. **Efficiency** i.e. what are the losses in charging from supply to vehicle; e.g. future wireless induction charging equipment will incur higher losses than DC or AC cables.
2. **Repairability** e.g. can units be swapped by non-technical staff or must a visit by a specialised technician be made. Equipment that is difficult to repair may lead to early replacement, extra miles travelled or costs.
3. **Recyclability** CE and ROSH marking takes care of much of the concerns with regard to EU rules, on recycling however tenderers may wish to award extra points for same.
4. **Future proofing** is a difficult area to score as criteria are of necessity in the future and may never arise. However, some aspects may be worth considering in tenders:

- Vehicle to grid or bidirectional charging capability to provide power to building or smart grids
- Induction charging compatibility – very early days but a standard is in place.

The GPP process is just beginning, the above suggestions should not be taken as a definitive list nor as a reason to delay the roll-out of EV charging infrastructure, which has after all been on the market for many years and compliant with EU regulations.

Appendix F – Examples of EV objectives in City/County Development Plans

Examples of facilitation of EV infrastructure in current LA County Development Plans.

The example from Wicklow is included in the proposed chapter on Transportation in the new CDP 2022 to 2027 as follows:

<table>
<tr><td>CPO 10.7</td><td>To facilitate the development of services and utilities for electric vehicles and alternative fuel vehicles types, including the roll-out of additional electric charging points in collaboration with relevant agencies at appropriate locations.</td></tr>
<tr><td>CPO 10.8</td><td>To require the implementation of the following standards for EV charging in new developments:
<table>
<tr><th colspan="2">Building type</th><th>• Requirement</th></tr>
<tr><td rowspan="2">New buildings and buildings undergoing major renovation</td><td>Non-residential buildings with more than 10 parking spaces within property boundary.</td><td>Installation of at least 1 recharging point.
Installation of ducting infrastructure for at least 1 in 5 parking spaces.</td></tr>
<tr><td>Residential multi-unit buildings.</td><td>Installation of 1 recharging point for every 10 car parking spaces (with a minimum 1 for developments under 10 spaces)
Installation of ducting infrastructure for every parking space within property boundary.</td></tr>
<tr><td>New (single-unit residential) buildings</td><td>New dwelling with car parking space located within the property boundary.</td><td>Installation of recharging points for electric vehicles on site.</td></tr>
</table></td></tr>
<tr><td>CPO 10.9</td><td>To seek to ensure all new or upgraded transport infrastructure is climate resilient.</td></tr>
</table>

Table 13: Inclusion of EVCPs in CPD (Source: Wicklow CC)

Fingal County Council already have the following objectives in their existing County Development Plan:

Objective MT10

Facilitate the provision of electricity charging infrastructure for electric vehicles both on street and in new developments in accordance with car parking standards.

Objective MT11

Support the growth of Electric Vehicles and EBikes, with support facilities, through a roll-out of additional electric charging points in collaboration with relevant agencies at appropriate locations.

Appendix G - Planning Regulations and relevant EU Directives

Planning and Development (Exempted Development) (No.2) Regulations 2021 (S.I. 115 of 2021)[9] – Electric Vehicle Charging Points and Hubs was enacted on 16 March 2021. These new Regulations increase the existing provisions in the Planning and Development Regulations 2001, as amended (the Principal Regulations), to exempt specified EV charging infrastructure from the requirement to obtain planning permission. The Regulations amend the existing Principal Regulations as follows:

Article 2(a) of these Planning Regulations amends CLASS 29A to replace the current conditions and limitations for charging units for electric vehicles. The threshold for exempting 'off-street' single charging units from the requirement to obtain planning permission has been increased from 3 cubic metres to 3.6 cubic metres. The corresponding threshold for exempting 'on-street' charging units has been increased from 0.5 cubic metres to 0.75 cubic metres.

Article 2(c) of these Regulations inserts a new CLASS 29B to set out the exempted development conditions and limitations in respect of 'charging hubs' for EVs. The exemption for charging hubs enables up to four charging units to be provided, subject to the parking location having been developed in accordance with the Planning and Development Act.

In addition, Article 2(c) also inserts planning exemptions in respect of the provision of bollards not exceeding specified height and volume limits to protect EV charging units.

In addition to these conditions and limitations, any development under Article 6 of the 2001 Regulations cannot be considered exempted development, if it does not comply with the restrictions on such development under Article 9 of the *2001 Regulations*[10], which include that the development cannot endanger public safety by reason of traffic hazard or obstruction of road users or obstruct a public right of way.

Works being undertaken to install infrastructure for LEV charging/refuelling must also comply with the requirements of the following:

- Building Regulations
- EU Energy Performance of Buildings Directive 2010/31/EU (EPBD)
- Building Regulations - Technical Guidance Document L – Conservation of Fuel and Energy – Dwellings

[9] S.I. No. 115/2021 - Planning and Development Act 2000 (Exempted Development) (No. 2) Regulations 2021 (irishstatutebook.ie)

[10] S.I. No. 600/2001 - Planning and Development Regulations, 2001 (irishstatutebook.ie)

Class 29A	Conditions and limitations
Development consisting of: *(a) the construction of a charging point for electric vehicles that –* (i) in the case of a charging point situated on a public road, does not exceed 0.75 cubic metres by volume above ground, and (ii) in all other cases, does not exceed 3.6 cubic metres by volume above ground, (b) the adaptation of a street lighting pole for the purposes of the provision of both street lighting and a charging point for electric vehicles, (c) the adaptation of a car parking payment machine situated on a public road for the purpose of both the making of payments for car parking and a charging point for electric vehicles, or (d) the construction of bollards not exceeding – (i) 1.2 metres in height, and (ii) 0.2 cubic metres by volume above ground, for the purpose of protecting such charging point, provided that such electrical construction or adaptation is carried out by a registered electrical contractor within the meaning of section 9D of the Electricity Regulation Act 1999 (No. 23 of 1999).	Advertising signage or other advertising material shall not be affixed to, or placed at, a charging point situated on a public road other than for the purpose of (a) identifying the charging point, (b) providing instructions in relation to fees and to the use of the charging point, or (c) providing the contact details of the operator, manager or owner of the charging point.
Class 29B – Charging hub	**Conditions and limitations**
Development consisting of – (a) the construction of a charging hub for electric vehicles that contain – (i) not more than one substation or mini pillar to which Class 29 applies, and (ii) not more than 4 charging points to which Class 29A applies, or (b) the construction of bollards not exceeding – (i) 1.2 metres in height, and (ii) 0.2 cubic metres by volume above ground, for the purpose of protecting each such charging point, provided that such electrical construction is carried out by a registered electrical contractor within the meaning of section 9D of the Electricity Regulation Act 1999 (No. 23 of 1999).	The development shall be situated – (a) at a place (other than a public road) where parking facilities are provided, the development of which was carried out in accordance with the requirements of the Planning and Development Act 2000 (No. 30 of 2000), and (b) not closer than 500 metres to any charging hub that forms part of any other development to which Class 29B applies.

Table 9: Class 29A and Class 29B

EU Energy Performance of Buildings Directive 2010/31/EU (EPBD)

The revised EU Energy Performance of Buildings Directive (EPBD) contains new provisions, which aim to accelerate deployment of EVs and the installation of EV infrastructure:

- Article 8(2), (3) & (5) - EV Infrastructure[11]
- Article 8(7) - Measures to simplify deployment of EV recharging points

Article 8 requires the provision of appropriate infrastructure to enable the installation at a later stage of recharging points for EVs, for new residential buildings and residential buildings undergoing major renovation, by 2020. It also requires member states to lay down requirements for the installation of a minimum number of recharging points for all non-residential buildings with more than 20 parking spaces, by 2025.

The proposal to amend Part L of the Building Regulations[12] is necessitated by the mandatory requirements of the EPBD and will include reference to the requirements of *EPBD EU/2010/31* and amending *Directive EU/2018/844*.

The Directive does not permit member states discretion to derogate from these measures in their national building regulations.

Articles 8(3), 14(4) and 15(4) of the EPOB Directive also set requirements for existing non-residential buildings to have Building Automation and Control systems installed by 2025. These Articles will not be transposed in the Building Regulations, but will be implemented under a separate statutory instrument.

Building regulations - Technical Guidance Document L – Conservation of Fuel and Energy – Dwellings

The amendments to the Building Regulation and associated Technical Guidance Document L (TGD L), will stipulate that the minimum requirements of the directive are adopted.

The introduction of EV recharging requirements for new buildings, buildings undergoing major renovation and existing buildings as set out in the Energy Performance of Buildings Directive is summarized in Table 10.

Scope		MS obligation
New buildings and buildings undergoing **major renovation**	**Non-residential** buildings with more than 10 parking spaces	Ensure the installation of at least 1 recharging point. Ensure the installation of ducting infrastructure for at least 1 in 5 parking spaces
	Residential buildings with more than 10 parking spaces	Ensure the installation of ducting infrastructure for every parking space
Existing buildings	**Non-residential** all buildings with more than 20 parking spaces	Lay down requirements for the installation of a minimum number of recharging points –applicable from 2025

Table 10: Summary of draft electric infrastructure requirements for electric vehicle recharging within property boundary from the EPBD Directive

[11] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32018L0844

[12] S.I. No. 292/2019 - European Union (Energy Performance of Buildings) (No.2) Regulations 2019 (irishstatutebook.ie)

In implementing the above requirements, provisions are included for disability access in accordance with Part M of the Building Regulations for new buildings.

The amended guidance in TGD L will also provide for future space requirements for duct sizing and electrical distribution to ensure that any infrastructure installed during construction works is practical to use at a later date.

The Specification for EV recharging points is as set out in I.S. 10101, National Rules for Electrical Installations, published by the NSAI.

It will be the responsibility of the building owner or occupier to ensure that existing buildings are upgraded with the required EV recharging points, Building Automation and Control systems by 2025.

Clean Vehicle Directive (EU) 2019/1161

The original Clean Vehicle Directive or CVD has been in force since S.I. No. 339 of 2011 was enacted. This required public bodies to score whole life cycle costs for all publicly procured vehicles i.e. include the whole life fuel use in the cost calculations used in the scoring of tender evaluations. A number of public service transport contracts to which the revised CVD applies with their corresponding CPV Procurement Description Code are presented on Table 11 below. LAs should already be familiar with these public contracts:

The revised 'Clean Vehicles Directive' (Directive (EU) 2019/1161) entered into force on 14 August 2019 and is required to be transposed into Irish law by the Minister for Transport before 1 August 2021. The new legislation will:

- provide for the setting of **binding minimum targets** for the share of 'clean' vehicles, as defined in the Directive, in **procurements undertaken by public sector bodies** over the relevant service contract value thresholds
- allow for the expansion of the scope of the Regulations to apply to **vehicle purchase, lease, hire-purchase and rental contracts,** as well as vehicles supplied to carry out works under certain types of service contract
- provide for the **repeal of the common rules for calculating the whole of life costs** linked to the operation of vehicles set out in S.I. No. 339 of 2011
- provide for the **granting of exemptions** to certain types of vehicles
- allow for the identification of an **appropriate monitoring body** for public procurements of 'clean' vehicles to establish the reporting obligations upon public sector bodies to the appropriate monitoring body; and the reporting obligations upon the State to European Commission.

Contract award date is the reporting date i.e. **all contracts awarded from 2nd August 2021 onwards must comply with the revised CVD.**

CPV Code	Description
60112000-6	Public road transport services
60130000-8	Special purpose road passenger transport services
60140000-1	Non-scheduled passenger transport services
90511000-2	Refuse collection services
60160000-7	Mail transport by road
60161000-4	Parcel transport services
64121100-1	Mail delivery services
64121200-2	Parcel delivery services

Table 11: Service contracts to which the revised CVD applies

Targets by Category	From 2 August 2021 to 31 December 2025	From 1 January 2026 to 31 December 2030
Light vehicles (cars, vans)	38.5%	38.5%
Minimum criteria to qualify as clean vehicles	< 50gCO2/km	0 g CO2/km
Trucks (vehicle category N2 and N3)	10 %	15 %
Buses (vehicle category M3) (*1)	45 %	65 %
Minimum criteria to qualify as clean vehicles	Alternative fuels	

Table 12: CVD targets and categories

Vehicle CO2 emission performance standards - EU Directive 2019/631

Vehicle manufacturers have had fleet average gCO2e/Km emission targets for car and van fleet since the early 2000s, i.e. the total sales of all their vehicles must meet this average. Most manufacturers easily met or exceeded the 130gCO2e/km targets set at that time.

The EU Commission has since set a tougher fleet average emission target of 95gCO2e/km for vehicle manufacturers with interim review dates to ensure manufacturers can achieve even higher emission reduction targets by 2030. These targets will ensure sufficient numbers and model ranges of low emission vehicles will be available in the market in the years to come.
The fleet wide targets across manufacturing sales for all vehicles are as follows:

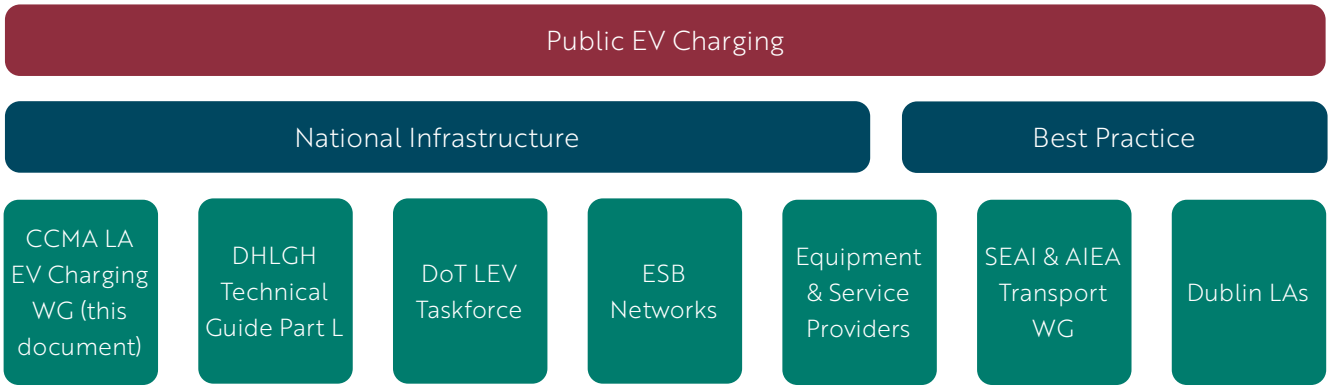
- Light Duty Vehicles (LDV) account for 15% of EU Total CO2 emissions and have a 2021 phased in target of **95g/km 3.6L/100km.**
- Heavy Duty Vehicles (HDV) account for 5% of total EU CO2 emissions and the agreed first ever CO2 emissions targets for HDVs were adopted in February 2019 of -
  - **15% reduction vs 2019 by 2025** and
  - **30% reduction vs 2019 by 2030** (with a target review in 2022)

Note the use of alternative fuels with low CO2 emissions count towards the target for HDVs to 2025, thereafter they will be a requirement for zero CO2 emissions. For HDVs this may well be through hydrogen powered zero emissions vehicles.

As part of the overall package, fuel quality is to be reduced in GHG intensity by 10% to 2020.[13] Ireland already enjoys diesel and petrol fuels with 4-6% biofuel by volume (emissions reductions are often cited as double this due to the double credits awarded for biofuels made from waste products such as that used in cooking oil. As a result, the vast majority of biofuel added in Ireland is from waste products).

[13] https://ec.europa.eu/clima/policies/transport/vehicles/proposal_en

Appendix H – Stakeholders supporting EV Charging Infrastructure



- **Department of Heritage, Local Government and Housing** is updating its Technical Guidance Document Part L. The updated document will provide information on the installation of charge points at dwellings. A recent public consultation has closed and the sector is awaiting the final version of the Technical Guidance. In the meantime, a draft version is available from the department website.
- **The Low Emissions Vehicle Taskforce** has been considering a range of measures and options to accelerate the take up of low carbon transport technologies including EVs. One element of the taskforce's work was to consider infrastructure requirements.
- **ESB Networks** acts as Irelands Electrical Distribution System Operator (DSO). In this role ESB is tasked with managing and facilitating requests for connection to the electricity network. This includes requests to connect EV charging equipment. ESB Networks does not provide the charging equipment.
- **EV charging - equipment & service providers:** there are many companies active in the supply and service of EV charging equipment. This includes provision of payment systems with access to roaming on other networks.
- **SEAI & AIEA Transport Working Group** has been formed to equip LAs with high quality information that enables each authority to make progress regarding EV charging provision. A key aim of the working group is to assist LAs to facilitate a smooth user experience by each following the principal of interoperability.
- **Dublin Region EV Working Group** is comprised of the four Dublin LAs, Smart Dublin and the Dublin CARO. They have grouped together regionally to examine business models and routes to engaging with EV charging across the county and exchange experiences on fleet and EVCPs. Consultancy support from Element Energy in UK was procured to work with the group on a Dublin Local Authority Electric Vehicle Charging Strategy. A draft report is currently being finalised.

Appendix I - LAs and Public Sector Monitoring & Reporting (PSMR)

Guidance Since 2009 the public sector has been reporting on and reducing its energy use delivering significant financial and carbon savings.

All energy consumed by the public sector or its behalf is reportable and an annual Energy Statement for each public body is published.

The responsibility for complete and accurate reporting lies with the public body providing the information. SEAI facilitates and operates the reporting platform known as the Public Sector Monitoring and Reporting ('PSMR') platform. A request can be made to the local PSMR admin to be added to the system as a read-only user. For most, the publicly accessible Energy Statement is read-only.

The SEAI PSMR platform includes a Frequently Asked Questions guide 2017.[14] The relevant sections with regard to EV charging are listed below; these responses have not changed since their introduction in 2009, but are still very relevant:

9.1 What electricity consumption should be reported?
All of the organisation's electricity **consumption,** which comprises all electricity imported from the grid (i.e. through a meter) less electricity exported by the public body onto the grid, plus all 'nonfuel' renewable electricity generated on site by the organisation (e.g. auto-generating wind turbine, small scale hydro facility) plus the output from landfill gas generations facilities. **Electricity used to charge electric vehicles offsite is also included.**

9.10 We charge electric vehicles offsite. How do we account for this?
Electric vehicles can be charged using:

- Electricity from one or more of your organisation's sites. This electricity consumption is captured by your MPRN electricity consumption. There is no need to self-report this electricity consumption explicitly. However, you should ensure that all of your organisation's MPRNs are included.
- Electricity from public charge points. Any electricity used to charge vehicles from on-street charge stations or from fast chargers in service stations is not accounted for via MPRNs. Therefore, this consumption must be explicitly reported in the relevant section of the system.

Electricity provided to chargers, but consumed by others e.g. private car owners, should be deducted from a public body's overall electricity use, to do this you must meter usage and identify the vehicle consuming the electricity.

[14] https://www.seai.ie/business-and-public-sector/public-sector/monitoring-and-reporting/FAQs

Appendix J - Useful links

SEAI Charge Point Grant for **standalone public** chargers for LAs https://www.seai.ie/grants/electric-vehicle-grants/public-charge-point

SEAI **EVs for business guide** describes the various use cases generally https://www.seai.ie/business-and-public-sector/ev-for-business

SEAI **EV Charging -Technical Guidance for LAs – a short guide** for LAs on the installation of one off on-street charge points in residential areas - https://energylink.seai.ie/document/view/1872 (registration is required, but is open to all with a public sector email address).

SEAI **Home Charger Grant** for owners of new and second-hand vehicles https://www.seai.ie/grants/electric-vehicle-grants/electric-vehicle-home-charger-grant/

Short courses Training in ecodriving, electric vehicles and charging https://www.seai.ie/energyacademy/ for electric vehicles, charging and ecodriving modules.

ESB Networks - ESB application forms and contacts

- https://www.esbnetworks.ie/docs/default-source/publications/guide-to-the-process-for-connection-of-demand-customers-to-the-distribution-system.pdf?sfvrsn=9b4433f0_4
- https://www.esbnetworks.ie/docs/default-source/publications/esb-networks-application-form-nc3-v2.pdf?sfvrsn=2c4433f0_24

Department of Heritage Local Government and Housing updates

- https://www.housing.gov.ie/sites/default/files/public-consultation/files/public_consultation_draft_tgd_l_2020_dwellings.pdf
- https://www.housing.gov.ie/housing/building-standards/tgd-part-l-conservation-fuel-and-energy/technical-guidance-document-l-3

Department of Transport

- DTTAS Low Emissions Vehicle Taskforce (LEVT) https://www.gov.ie/en/publication/564409-phase-2-low-emission-vehicle-taskforce-report/
- Alternatively Fuelled Heavy Duty Vehicle Purchase Grant Scheme (AFHDV) available via TII at https://www.tii.ie/roads-tolling/tolling-information/afhdv-scheme/ for electric and hydrogen powered trucks and buses.

Department of the Environment, Climate and Communications

Climate Action Fund – a €500m fund aimed at large scale projects including charging networks (not one off or private chargers) see https://www.gov.ie/en/publication/de5d3-climate-action-fund/ The design of this programme will be informed by feedback received through the climate conversation and, in particular, the conversations that are taking place at local level through the Public Participation Networks.

LGMA / CCMA publications

- A profile of Local Government Climate Actions in Ireland (January 2020)
- Climate Change – Global issue, local leadership (January 2020)
- Delivering Effective Climate Action 2030

Glossary

AER (All-Electric Range): the distance an EV is able to go solely using electricity.

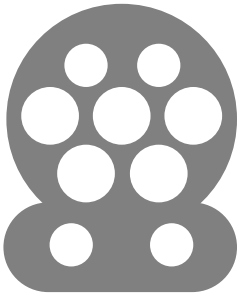
AEV (All-Electric Vehicle): also called BEV (Battery-Electric Vehicle). A vehicle that runs on an electric motor only, using on-board batteries that you can plug in and recharge.

Alternating Current (AC): the type of electricity that comes from the electricity grid. Most EVs have a small onboard charger/ converter that converts that AC electricity to a form of power (DC) that the battery can handle, but it comes in slowly and at low power. AC charging is what most regular home or workplace electricity outlets produce (3.5 to 22 kW). In general, it can fully charge a vehicle over 4–7 hours. Around 80% of EV owners charge their vehicles overnight at home using AC power.

Battery Assisted Fast Chargers: are fast/DC chargers with an auxiliary battery pack, allowing them to draw energy slowly from the grid and store it locally until it is needed to charge a vehicle. By drawing energy slowly from the grid throughout the day, the vehicles put less stress on the grid and can help balance it later.

CCS: this is a DC fast charging standard supported by Volkswagen, General Motors, BMW, Daimler, Ford, FCA, Tesla, and Hyundai.

As of 2017, this charging standard goes up to 350 kW.



Charging Point Operator (CPO): operates physical charging infrastructure, which includes technical and IT maintenance, setting commercial terms for its use, payments for its electrical connection and managing the energy supply. The portfolio of a CPO might consist of its own charging stations and those of 3rd parties.

CHAdeMO: this is a DC fast charging standard developed in Japan which goes up to 62.5 kW. Nissan, Mitsubishi, and Fuji Heavy Industries (which manufactures Subaru vehicles). Toyota later supported the standard as well, and Tesla sells an adapter allowing its vehicles to use CHAdeMO chargers.

Development Plans: Development Plan Guidelines for implementing Government Policy Under Section 9 of the Planning and Development Act 2000 (2000 Act), as amended; all Planning Authorities are required to have a Development Plan for their functional area.

Direct Current (DC): is used for fast charging because the amount of power it can provide to a vehicle is up to 50 kW. DC fast chargers are charging stations or equipment that include an AC–DC converter and send already converted DC power directly to the vehicle's battery. DC fast chargers can power most EV batteries up to 85% in 30 minutes. They are commonly located in public places and on highways and major roads, but are more limited in number (and higher in cost) than AC charging stations.

Electric Mobility Provider (EMP): is oriented towards the EV users, providing them with a seamless access and billing experience on charging infrastructure owned and operated by multiple parties. Its main activities are negotiating and maintaining commercial contracts with CPOs to bring their infrastructure under an umbrella of its own value proposition towards an EV owner, and building an ecosystem of user friendly (access) charge cards, mobile app / web interface and billing system.

EV (Electric Vehicle): a broad category used to describe all vehicles that are powered by an electric motor, but for the purposes of this document, refers to smaller cars and vans.

Fast charging: is the common name for DC charging that provides an EV with up to 50 kW of power at a time.

Fully electric: fully electric cars use only electricity, generally stored in batteries, to power their movement. This means that they also include a plug to charge, just like your laptop and cell phone. Most electric cars can charge using fast chargers, and all of them can charge using normal electricity outlets — with the right cord and plug, of course.

Ktoe: kilotonnes of oil equivalent

Home: 80% of EV charging is done at home, via regular AC power outlets. Public chargers are meant to supplement this home charging and provide 'range extension' to allow people to go further — or if they find themselves in need of a charge sometime during the day. Certain types of residences present challenges to home charging, but there are solutions.

Plug-in hybrid electric: plug-in hybrid electric vehicles can power their movement on electricity or on petrol or diesel (depending on the powertrain). They typically have smaller batteries than fully electric cars with short ranges. Unlike conventional hybrids, they have a plug to be recharged directly from the grid to enable all electric driving, studies have shown they need to have an all range of 90+km to make a material contribution to emissions reduction, current vehicles generally have a range of 60km and can use AC chargers.

Off-Peak Charging: charging your EV during the less busy times of day for a lower cost.

OCPP Open Charge Point Protocol: see here for latest updates.

- Compatibility with major billing platforms – allow for billing from the outset
- Customer Support – resolving issues remotely on 24/7 basis.
- Charging Rate
- Paying mechanisms : credit cards / smart cards/ Phone App

OSCP – Open Smart Charge Protocol: OSCP 2.0 is officially released in October 2020. OCA adopted the Open Smart Charging Protocol (OSCP) in 2015. OSCP 2.0 describes use cases in which the messages are applied in more generic terms than OSCP 1.0, driven by the integration of EVs in larger energy ecosystems, including PV, stationary batteries, heat pumps and other devices. Other changes are the switch to JSON / REST, additional types of forecasts (generation, consumption, fallback) and a message for reporting errors.

Public: this refers to any charging that is done at a public location, not at home or at a private workplace charging location. This does not mean that the charging station can be used for free or without a special access card, just that anybody can drive up to the station.

Range anxiety: the worry that an EV will run out of battery power before you arrive at your destination.

Roaming: most users belong to a home 'network' at which they do most of their charging. They have an access card or code to allow them to charge in public and receive an invoice from their EMP. When they leave the network and charge at chargers in another network they are 'roaming'. This is very common.

Superfast/ultrafast: a newer level of technology, superfast/ ultrafast chargers can provide 100–350 kW of power. They usually include a series of charging stands connected to an auxiliary energy storage/battery pack. The battery pack draws energy slowly from the grid and stores it until it is necessary. Multiple vehicles can charge at the same time, and the smart technology in the charging stands communicates with the battery pack, allowing the energy to be distributed properly among the vehicles based on how much they can handle (some electric cars cannot use DC fast charging and all cars have a limit to how much power they can take).

Workplace: in addition to home charging, the workplace is a favoured charging location, since many people leave their vehicles parked there for several hours at a time. Some parking lots now include special wall box chargers designed for this purpose. Studies in the United States have found that even with low-range electric cars, 97–98% of charging is done at home or work when drivers have access to both options.

Cumann Lucht Bainistíochta Contae agus Cathrach
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