



Rialtas na hÉireann
Government of Ireland

Regional and Local EV Charging Network Plan 2024-2030



Department of Transport



An Roinn Iompair
Department of Transport

Regional and Local EV Charging Network Plan 2024-2030

Table of contents

Acronyms and Definitions	4
Minister's Foreword	7
Introduction	8
The Context	8
The National Strategy	9
The Scope	10
Strategic Environmental Assessment and Appropriate Assessment	11
1. Lessons Learnt from International Experience	12
1.1 Enhance Equitable Access	14
1.2 Setting Clear Targets to Guide Expansion	14
1.3 Coordinated Approach	14
1.4 Provide Funding and Support	15
1.5 Encourage Private Investment	15
1.6 Standardisation and User Experience	15
1.7 Plan for a Resilient and Future-Proofed Network	15
1.8 Continuous Monitoring and Evaluation	16
1.9 Learnings	16
2. Destination and Neighbourhood Charging	17
2.1 Overview of Destination and Neighbourhood Charging Locations	18
2.2 Addressing Multiple User Needs in Destination and Neighbourhood Charging Network Planning	18
2.3 Current Destination Projects	22
2.4 Case Studies of Current Destination Projects	22

3. Charging Requirements at Destination and Neighbourhood Locations	26
3.1 Determining Minimum Charging Infrastructure Targets Based on EU Requirements	27
3.2 Top-Down Charging Needs Modelling Output	28
3.3 Visualising these Charging Requirements	29
4. Regional Approach and Project Lifecycle	31
4.1 Regional Approach to Delivering a Charging Network	33
4.2 Delivering the Local Charging Infrastructure	35
4.3 Collaboration with Stakeholders	40
5. Roadmap to Implementation	41
5.1 National Support for Charging Infrastructure	42
5.2 Roadmap and Timelines for Delivery	45
5.3 Risks to Implementation	46
5.4 What will be delivered	49
A. EV Charging Solutions	50

Acronyms and Definitions

Acronym	Definition
AC	Alternating Current
AFIR	Alternative Fuels Infrastructure Regulation
BEV	Battery Electric Vehicle
CAP	Climate Action Plan
CPO	Charge Point Operator
CRU	Commission for Regulation of Utilities
DC	Direct Current
ESBN	Electricity Supply Board Networks
EU	European Union
EV	Electric Vehicle
EVCI	Electric Vehicle Charging Infrastructure
HGV/ HDV	Heavy Goods/Duty Vehicle
ICE	Internal Combustion Engine
PHEV	Plug-In Hybrid Electric Vehicle
SLA	Service Level Agreement
TEN-T	Trans-European Transport Network
TII	Transport Infrastructure Ireland
V2G	Vehicle-to-grid
ZEVI	Zero Emission Vehicles Ireland

Charge Point

A charge point is a fixed or mobile interface that allows for the transfer of electricity to an electric vehicle. It is only capable of charging one electric vehicle at a time, although it may have multiple outlets in order to accommodate different connector types.

Charge Point Categories

Category	Sub-category	Maximum Power Output	Definition
Category 1 (AC)	Slow AC charging point, single-phase	$P < 7.4 \text{ kW}$	Normal-power charging point
	Medium-speed AC charging point, triple-phase	$7.4 \text{ kW} \leq P \leq 22 \text{ kW}$	
	Fast AC charging point, triple-phase	$P > 22 \text{ kW}$	High-power charging point
Category 2 (DC)	Slow DC charging point	$P < 50 \text{ kW}$	High-power charging point
	Fast DC charging point	$50 \text{ kW} \leq P < 150 \text{ kW}$	
	Level 1 – Ultra-fast DC charging point	$150 \text{ kW} \leq P < 350 \text{ kW}$	
	Level 2 – Ultra-fast DC charging point	$P \geq 350 \text{ kW}$	

Charging Station

A charging station is the physical installation for the charging of electric vehicles. Every station has a theoretical maximum power output, expressed in kW. Every station has at least one charging point that can serve only one vehicle at a time. The number of charging points at a charging station determine the number of vehicles that can be recharged at that station at any given time. Where more than one vehicle recharges at that charging station at a given time, the maximum power output is distributed to the different charging points, such that the power provided at each individual charging point is lower than the power output of that station.

Connector

Connector means the physical interface between the recharging or refuelling point and the vehicle through which the fuel or electric energy is exchanged.

Just Transition¹

The just transition is a concept aiming to shift from fossil fuels to sustainable energy without leaving behind vulnerable communities or workers. It ensures fairness, equity, and inclusion by providing support and opportunities for impacted workers and communities, prioritising social dialogue, and addressing climate change while considering social welfare. By combining environmental responsibility with social equity, a just transition approach seeks to create a sustainable future that benefits everyone, mitigates economic disruption, and empowers those affected by the transformation towards a low-carbon economy.

¹ <https://climatejusticealliance.org/just-transition/>

Publicly accessible charging infrastructure

Publicly accessible charging infrastructure is available to all EV drivers. According to the Alternative Fuels Infrastructure Regulation published in 2023, publicly accessible charging infrastructure is that which *'is located at a site or premises that are open to the general public, irrespective of whether the alternative fuels infrastructure is located on public or private property, whether limitations or conditions apply in terms of access to the site or premise and irrespective of the applicable use conditions of the alternative fuels infrastructure.'*

This includes, for example, privately owned charging points accessible to the public that are located on public or private properties, such as public car parks or supermarket car parks. Charging points for car-sharing schemes should only be considered accessible to the public if they explicitly allow access for third party users. Charging points located on private properties, access to which is restricted to a limited, determinate circle of persons, such as parking lots in office buildings to which only employees or authorised persons have access, should not be considered as publicly accessible charging.

Charge point accessibility restrictions

For the purpose of this plan, the distribution of charging points may be based on unrestricted and restricted accessibility:

Unrestricted accessibility 24/7: Assigned when the locations can be accessed 24/7 by everyone.

Restricted accessibility: Assigned when the charging points are erected on private or public domain that are subject to specific, though non-discriminatory access restrictions, such as the usage of opening and closing hours as a requirement to use the associated facilities. For example, the recharging points in car parks of large warehouses or convenience stores, underground car parks, hotel and catering establishments, etc.

Minister's Foreword

The Government of Ireland is deeply committed to decarbonising transport to address climate change. Electric vehicles will provide the single biggest action measure in the transport sector to deliver on the Climate Action Plan 2024 goal to cut transport emissions by 50% by 2030. The expansion of the electric vehicle charging network at a regional and local level in the coming years is crucial to achieving the electric vehicle adoption needed.

ZEVI, an office based in the Department of Transport, launched the National EV Charging Infrastructure Strategy in January 2023 to steer and coordinate the rollout of a national EV charging network. Expanding this national charging network will ensure that people will also have access to charging opportunities at neighbourhood, destination, and en-route locations. This draft Regional and Local EV Charging Network Plan provides a pathway for delivering charging infrastructure at neighbourhood and destination locations, together with the expansion of high-powered charging at motorway locations through the National Road Network EV Charging Plan.

Complementary to the measures the Government is taking to stay ahead of public charging demand, the European Union has recently agreed the Alternative Fuels Infrastructure Regulation (AFIR), which will come into force in 2024. This regulation introduces charging infrastructure requirements based on the number of light duty and passenger vehicles in the country. Neighbourhood and destination charging locations will play a critical role in equitably delivering the substantial increase in charging capacity required by 2025, by offering conveniently located charging opportunities.

The majority of charging demand is anticipated to be overnight at home while the vehicle is not in use. This draft Plan sets out the principles, targets, and a pathway to expanding public charging infrastructure at neighbourhood locations where EV users will need it most, and at destination locations where top-ups are required to allow for uninterrupted mobility. Working together with local authorities across Ireland, ZEVI will support the subsequent development of the regional and local strategies to translate this Plan into localised on-ground delivery.

The deployment of an equitable and cohesive charging network that meets locals' and visitors' needs presents numerous challenges. Delivering this network in a resource efficient manner will require a focused and collaborative effort across numerous stakeholders to overcome hurdles, including electrical grid capacity and the selection of optimal sites that suit multiple users' needs. The Government welcomes the opportunity to work alongside the public sector, industry, and the private citizen in delivering on the objectives set out in this Plan to expand access to a nationwide public charging infrastructure network.



Eamon Ryan TD,
Minister for Transport

A handwritten signature in dark ink, appearing to read 'E Ryan', positioned below the printed name and title.

Introduction

This plan provides a pathway for the accelerated delivery of regional and local networks of public electric vehicle (EV) charging infrastructure at destination and neighbourhood areas, in line with both national and European ambitions for cleaner transportation. This plan ensures a cohesive and standardised approach. It will be led by local authorities, working together to develop regional and local strategies to promote a unified and efficient rollout of charging infrastructure and to facilitate the equitable transition to EVs.

The Context

As Ireland transitions to a more sustainable future, the electrification of road transport is a key component of reducing carbon emissions in the transportation sector. The widespread adoption of EVs requires a comprehensive charging infrastructure network that is accessible, reliable, and convenient for all users. As of early 2023, Ireland has a growing network of publicly accessible EV charging stations, with over 2,400 public charging points across the country.

At a national level, accelerating the transition to EVs and vehicle technology improvements is a critical part of the transport decarbonisation pathway set out in Ireland’s Climate Action Plan 2024 (CAP24), accounting for approximately half of the total transport emissions abatement by 2030. To achieve these emissions abatement targets, approximately 30% of the vehicle fleet must be electrified by 2030.

A key element for achieving these targets will be delivering a network of public EV charging stations in neighbourhoods and at destinations that meet the diverse needs of EV users. Local authorities will be critical players in equitably and sustainably driving the expansion of charging stations in these locations, given their unique knowledge of their local communities and the local opportunities that can be leveraged.

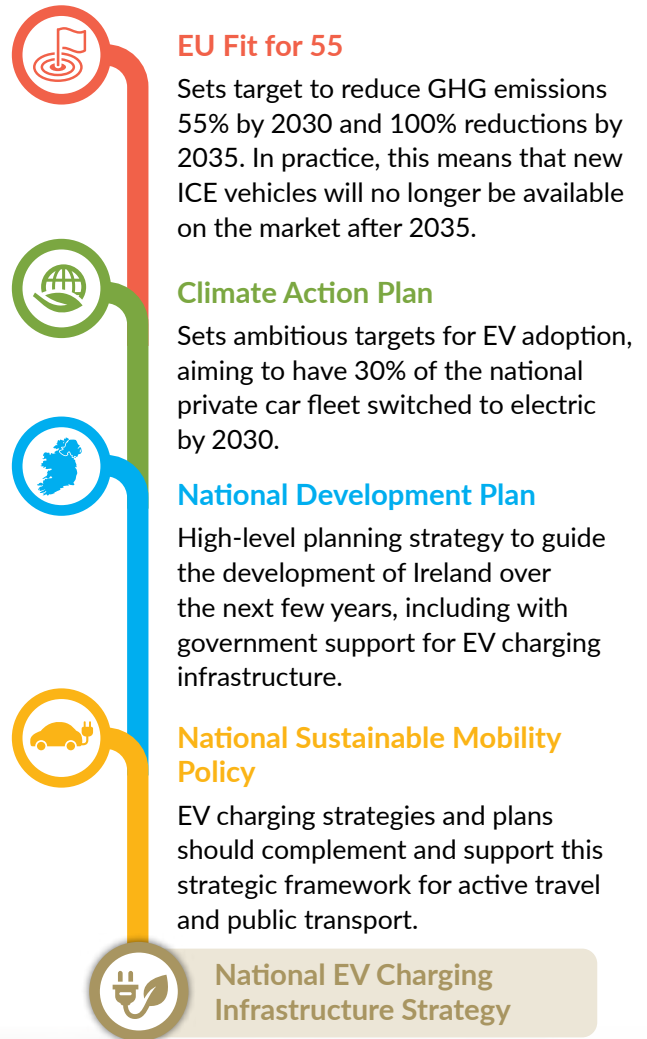


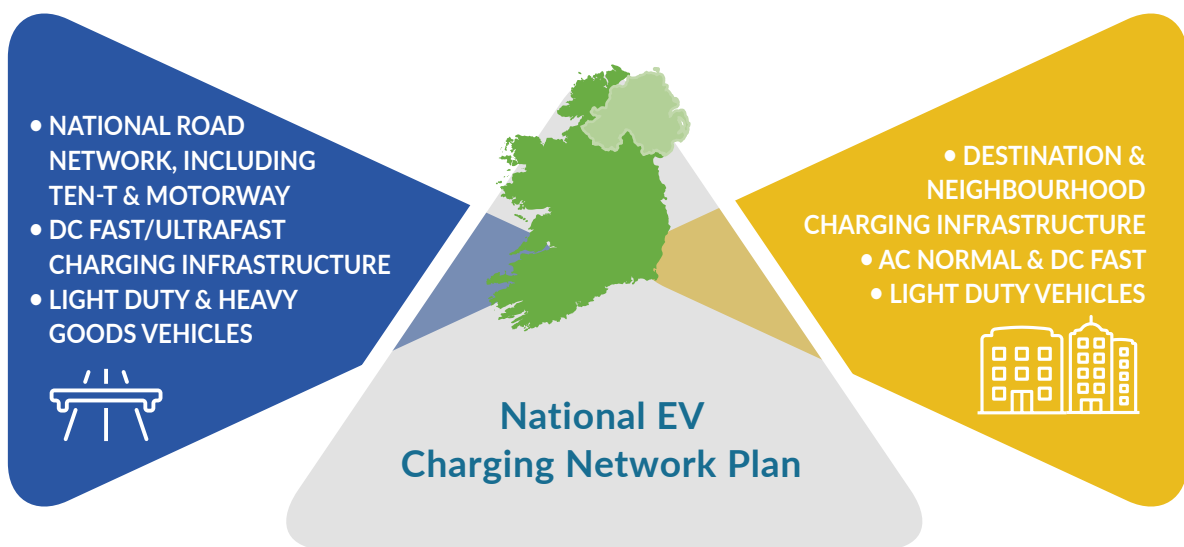
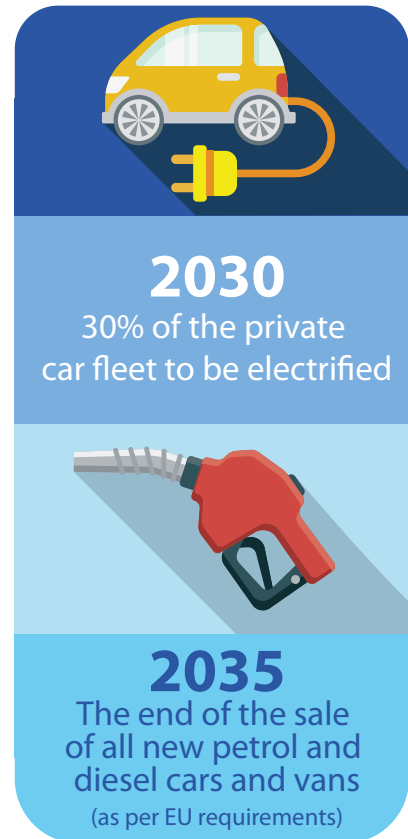
Figure 1 - National and international policy context

The National Strategy

To support the delivery of these targets, in January 2023, Zero Emission Vehicles Ireland (ZEVl) published the EV Charging Infrastructure Strategy 2022-2025. This sets out the national approach to rolling out charging infrastructure across Ireland to drive EV adoption. The strategy focuses on how to deliver home, neighbourhood, destination, and en-route charging for different vehicle types through a mix of delivery groups involving both public and private sector stakeholders, private, and public-private delivery groups.

The National Strategy reflects the urgent need for action to address climate change and the need for a strategic and just transition to sustainable ways of travelling. It is based on a set of fundamental principles (Figure 3) underpinning the roll-out of EV charging infrastructure over the coming decade. These principles were developed against the backdrop of climate change, the urgent need to decarbonise the Irish transport system and the opportunity to maximise the benefits of the electric mobility transition for all.

The National Strategy was accompanied by an Implementation Plan that included an initial set of actions and deliverables to support the strategy's delivery. This included the development of this document and the National Road Network EV Charging Plan, launched for consultation in September 2023. This plan for neighbourhood and destination charging infrastructure is complementary to this, which focuses on the national expansion of the high-powered charging network on the Motorway, Ten-T and National roads.



- NATIONAL ROAD NETWORK, INCLUDING TEN-T & MOTORWAY
- DC FAST/ULTRAFast CHARGING INFRASTRUCTURE
- LIGHT DUTY & HEAVY GOODS VEHICLES



- DESTINATION & NEIGHBOURHOOD CHARGING INFRASTRUCTURE
- AC NORMAL & DC FAST
- LIGHT DUTY VEHICLES



National EV Charging Network Plan

National Road Network EV Charging Plan

Regional and Local EV Charging Network Plan

Figure 2 – National EV Charging Network Plan

The Scope

The Regional and Local EV Charging Network Plan provides a way forward for equitably delivering charging infrastructure at a national and local level to support the national and international efforts to reduce transport-related carbon emissions through the shift to zero emission vehicles for all users. The plan lays out a pathway, adhering to the fundamental principles below set out in the Infrastructure Strategy, to sustainably deliver charging infrastructure at destination and neighbourhood locations.

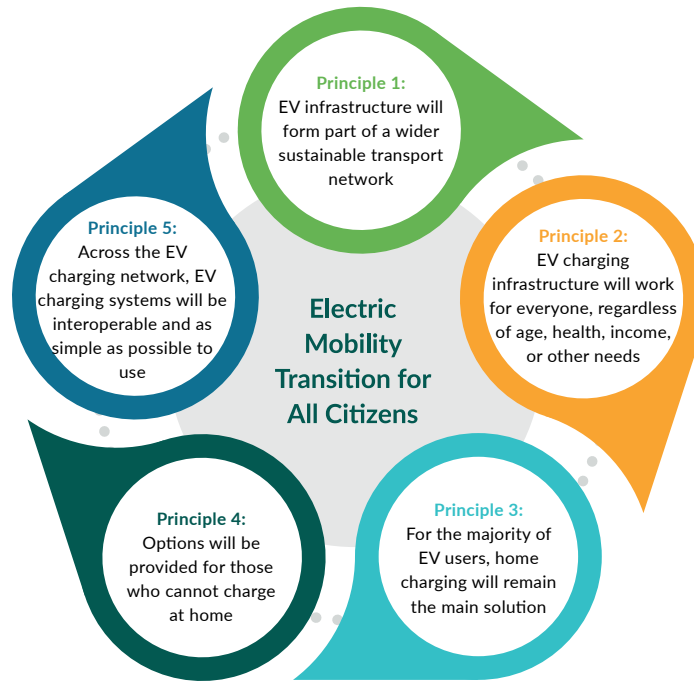


Figure 3 – Fundamental Principles

With EV adoption rates growing and the planned phasing out of carbon-emitting vehicles, a demand for convenient public charging will increase. Particularly in remote areas and those without off-street access to charging opportunities, deploying infrastructure is key to ensuring that residents have access to affordable and convenient public charging – most notably in areas where transport alternatives are scarce. Concurrently, public charging at destination locations can fulfil the charging need and support access to the activities located there by providing a place to top-up, particularly at more remote locations like national parks or at hotels to service overnight and day visitors.

The objectives of this plan are to:

- 1) Support the delivery of well-defined local and regional plans for a resilient, self-sustaining, future-proofed network that minimises public funding supports and meets user needs.
- 2) In partnership with key stakeholders, support the coordinated and accelerated expansion of a destination and neighbourhood EV charging network that aligns with greater e-mobility policies.
- 3) Provide a pathway to deliver on national infrastructure targets in support of both AFIR requirements and Climate Action Plan objectives.

The accelerated expansion of public destination and neighbourhood charging infrastructure will be led by local authorities with the support and in partnership with other public sector bodies, private sector groups and other stakeholders.

Local Authorities' Critical Role in Accelerating Infrastructure Delivery

Local authorities are ideally suited to accelerate the delivery of charging infrastructure at the local level that is financially sustainable and best ensures equitable access for all. Local authorities are well-positioned with:

- a deep understanding of local communities' needs,
- experience in delivering major infrastructure projects,
- ownership of suitable site locations,
- an ability to leverage private resources and funding through contracts and planning functions,
- an ability to align EV infrastructure projects with national and local policies, strategies and projects (e.g., climate action, active travel, e-mobility, demand management, housing and infrastructure projects), and
- an ability to coordinate and deliver projects across county borders in partnership with other local authorities and key stakeholders.

To coordinate the delivery of the National Plan with TII, government agencies, ESB Networks, and other key stakeholders, local authorities and regional areas will develop EV charging infrastructure strategies and implementation plans. ZEVI will be providing guidance to Local Authorities for developing their strategies and subsequent implementation plans. These strategies will complement national and local policies, strategies and plans, including the National Road Network EV Charging Plan and the Regional and Local EV Charging Network Plan, and put forth targets for local charging infrastructure at destination and neighbourhood locations. These local strategies will be critical in supporting progress towards achieving transport-related emissions reductions obligations laid out in each of the Local Authority Climate Action Plans.

Strategic Environmental Assessment and Appropriate Assessment

A Strategic Environmental Assessment (SEA) has been carried out on this plan. The environmental report that has been developed through the SEA process is being published for consultation in conjunction with this plan and submissions will be used to ensure environmental considerations are addressed in the final Regional and Local EV Charging Network Plan.

A Screening for an Appropriate Assessment has been conducted and this plan has been screened out. The impact of the plan (either alone or in combination with other projects or plans) on the integrity of the Natura 2000 sites has been considered with respect to the conservation objectives of the sites and to their structure and function. If any mitigation measures are identified as required from this process, these will be included in the final plan.



1

Lessons Learnt from International Experience

Learning from international experience has been central to developing this plan, enabling the adoption of best practice, identifying potential pitfalls to be avoided, and informing efficient and effective implementation.

To support widespread EV adoption and use, the expansion of publicly accessible charging at various location types is increasingly a focus of efforts across European nations to cater to the growing diversity of EV users. In the process of preparing both the Regional and Local EV Charging Network Plan and the National Road Network EV Charging Plan, successful international experiences have been considered and adapted to inform destination and neighbourhood charging network expansion in Ireland (see Figure 4).



Figure 4 – Lessons Learned from Successful International Experiences



1.1 Setting Clear Targets to Guide Expansion

Setting clear goals underpinned with measurable targets for EV charging infrastructure helps guide focus across diverse stakeholder groups. For example, Norway aims to phase out the sale of all new non-zero emissions vehicles by 2025. To support this goal and smooth the transition to EVs, the focus has primarily been on expanding home and residential charging. In Denmark, the parliament has set the target for one million electric and hybrid cars by 2030 and also requires all new homes to provide an EV circuit to support this target.

1.2 Coordinated Approach


Coordination with stakeholders, including public bodies such as local authorities, energy companies and charge point operators is key to ensure the effective deployment of EV charging infrastructure. In the United Kingdom, the Local Electric Vehicle Infrastructure (LEVI) fund required collaboration between local authorities. Collaboration across local authority areas and London boroughs drew in high levels of private investment while enhancing the opportunity for cross-subsidisation between commercially viable charge point locations, and those which are less commercial but have social importance.

1.3 Provide Funding and Support

To deliver a network that encourages and can support growing EV uptake, funding may be needed where the private market fails to step in. Key commonalities across funding schemes in other European countries include co-financing conditions, differentiated funding amounts by charger types and public accessibility requirements, and support for capital costs (for example, installation) as opposed to long-term operational costs. In the UK, the LEVI fund has been used to support staff and resources to help local authorities with developing their EV charging strategies and plans. As EV adoption grows and providing a public charging network becomes a profitable undertaking, there will be less need for public funding for infrastructure rollout, however, guidance and oversight on the charging network will still be required as well as research funding to further innovation.

1.4 Encourage Private Investment

Lessons from more mature EV markets show that, with the right set of incentives, private investors are willing to share the costs of charging infrastructure development. For example, Germany, which is a leading country in charging infrastructure, has implemented various measures to encourage private investment in EV charging infrastructure, such as simplified permitting procedures and access to public funding. In the Netherlands, for example, national funding was provided to local and regional authorities for the installation of chargers on the condition that they matched that contribution by another channel such as invitations to tender for a concession arrangement. In Oxford, United Kingdom, a superhub at a park and ride location with a mix of ultra-fast and slow AC chargers has been installed to cater to a variety of user needs while simultaneously improving the financial viability of operating the superhub.



Governments should guarantee and encourage standardisation to improve user experience and ensure efficient deployment of infrastructure, in addition to other areas affecting user experience.

1.5 Standardisation and User Experience

Governments should guarantee and encourage standardisation to improve user experience and ensure efficient deployment of infrastructure, in addition to other areas affecting user experience. While some of these areas will be regulated through the upcoming AFIR requirements, governments will need to ensure that there are no gaps and that there is coherence at a national level to ensure confidence and enhance the overall customer experience. A large part of the Netherlands' success in driving EV adoption is attributable to introducing national interoperability standards and roaming protocols early on. These standards were enacted over a decade ago which contributed to improved accessibility for EV drivers.

Additionally, beyond the usability of the charging equipment itself, considerations around charge point use should encompass the full user experience including the activities and needs that can be accommodated during the charging session. In recent funding tenders in Sweden, bidders were incentivised to go beyond the standard requirements through offering "Merit" criteria, which included providing access to toilets and convenience services within 300 metres of the charging station.

1.6 Plan for a Resilient and Future-Proofed Network

Future proofing charging infrastructure means thinking about how chargers can remain valuable and useful in a fast-changing landscape. Hardware and software should be built to standards to allow changes and adaptations down the line. For example, the Open Charge Point Protocol (OCPP) is an initiative of the ELaadNL foundation in the Netherlands and provides a method by which charging management systems can communicate with charging stations regardless of the operator. This also means that, in the case that the supplier of an individual charge point system ceases to exist, the charge point is safe-guarded and can switch to another provider.

1.7 Continuous Monitoring and Evaluation

A clear set of indicators, aligned to targets, should be defined to guide the data requirements for monitoring and evaluating progress in rolling out a charging network to meet future needs, the ability of the current network to satisfy EV users, and any impact of the network on external resources such as

energy demands. There are various methods for monitoring and evaluation work, such as consulting the broader public for their feedback or embedding minimum standards and targets within contracts with third parties to ensure a high quality of service to encourage continued EV adoption. The Swedish government, for example, has commissioned regular surveys to assess the satisfaction of EV drivers with the country's charging infrastructure. In the UK, under new laws planned by the Government, charging networks for EVs will need to have a 99% reliability rate. To reinforce the value of monitoring and evaluation, AFIR requires each EU Member State have a National Policy Framework for the rollout of the AFIR requirements and the progress made in implementing these should be reported every two years to iterate on the deployment approach.

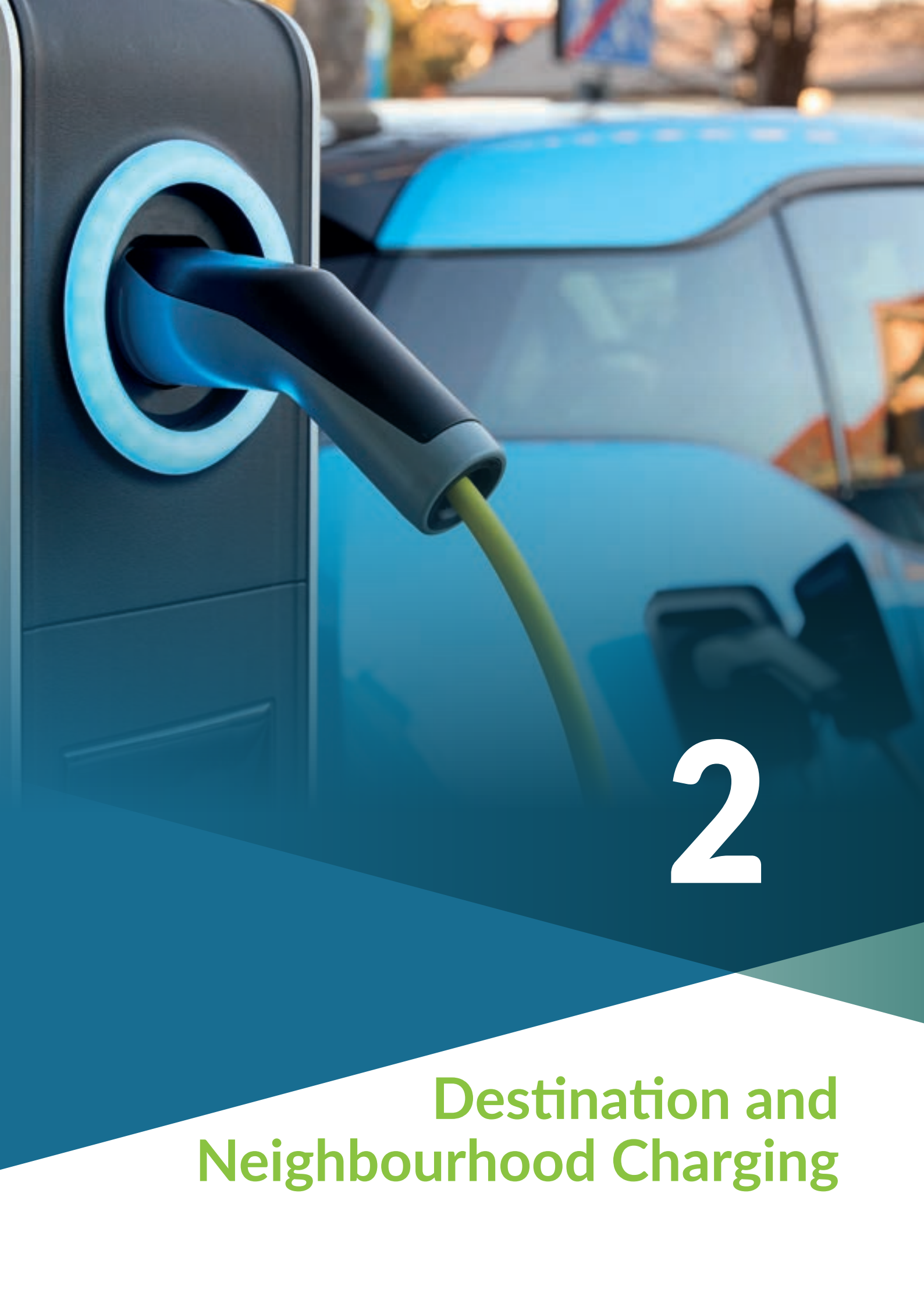
1.8 Enhance Equitable Access

While early EV adopters have largely had access to private home charge points installed in private garages and driveways, the move to mass EV adoption will mean that users are less likely to have access to off-street charging opportunities. Home charging is a preferred charging method because home chargers offer convenient overnight charging possibilities, and also because EV owners, by charging at night, can avail of the lower off-peak electricity rates.

Mimicking the potential for home charging behaviours for those without access to off-street parking, by providing access to neighbourhood chargers that offer slower charging speeds in return for a more cost-effective charging session is critical to enabling access to low-cost charging solutions particularly for lower income users. To support the shift to zero emissions vehicles in Hackney, London, where only a third of residents own a vehicle, the borough has been installing a mix of slow and fast neighbourhood charging. The intention is that these chargers will help facilitate EV adoption in an area that heavily relies on on-street parking, both to motivate private vehicle owners to switch to EVs and also to encourage a shift to EV car clubs over private vehicle use.

1.9 Learnings

To plan, and ultimately deliver, a public EV charging network that meets user needs, this plan builds on international experience to guide the process from strategy development to delivery and operation. In Ireland, the public charging network has largely been driven by market-driven private initiatives responding to demand resulting in infrastructure mainly being deployed in high-traffic and economically viable areas. This has created an imbalance in the network potentially leaving out underserved communities and remote regions. This approach also does not adequately provide infrastructure in areas where EV adoption is still low, but adoption might increase with the provision of public charging infrastructure. Strategically planning the public charging infrastructure network, particularly in neighbourhoods to support residential charging and at destinations to support local charging, ensures that charging infrastructure aligns with the evolving demands of EV users, encourages greater adoption and supports a more inclusive transportation system.



2

Destination and Neighbourhood Charging

The following chapter provides an overview of key characteristics of destination and neighbourhood charging locations, the various needs users may have when accessing these locations and how these can be supported through targeted charging infrastructure design. It also provides an overview of the key stakeholders involved in driving and supporting the expansion of a local charging infrastructure network and case studies to demonstrate the various approaches to meeting user needs.

2.1 Overview of Destination and Neighbourhood Charging Locations

EV charging can be designed to be located at various location types to complement different concurrent activities; however, the three main forms of public charging are at en-route, destination, and neighbourhood locations. While this plan focusses on the types of charging relevant to destination and neighbourhood locations, a brief overview of various types of charging locations is provided in Table 1.






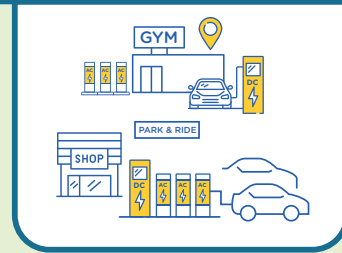
Types of Charging Relevant to this Plan					
Type of Charging	 Home (off-street)	 Workplace	 Destination	 Neighbourhood	 En-route
Access	Private	Semi-private	Semi-public / Public	Public	Public
Typical Locations	Private driveways	Private parking spaces/lots reserved for employees	Privately owned parking lots at establishments like hotels, restaurants, and medical centres and publicly owned car parks either on-street or at attractions like libraries, parks, and recreational facilities	On-street in residential neighbourhoods or other suitable areas with residences without access to off-street parking	At service stations or car parks along national roads and motorways
Typical Use Case	Overnight charging	Daytime charging, week-days	Daytime charging while running errands / undertaking activities or long stay car parks, i.e. park and ride	Overnight charging	Recharging during a longer journey
Power Output	Category 1 (AC) <ul style="list-style-type: none"> Slow AC charging point, single-phase 	Category 1 (AC) <ul style="list-style-type: none"> Medium-speed AC charging point, triple-phase 	Category 2 (DC) <ul style="list-style-type: none"> Slow DC charging point Fast DC charging point Level 1 - Ultra-fast DC charging point Category 1 (AC) for long stay	Category 1 (AC) <ul style="list-style-type: none"> Slow AC charging point, single-phase Medium-speed AC charging point, triple-phase 	Category 2 (DC) <ul style="list-style-type: none"> Level 1 - Ultra-fast DC charging point Level 2 - Ultra-fast DC charging point
Parking Area Owner	Private resident	Employer	Private Business, Public Body, Local Authority	Private Business, Public Body, Local Authority	Private Business, Public Body, Local Authority

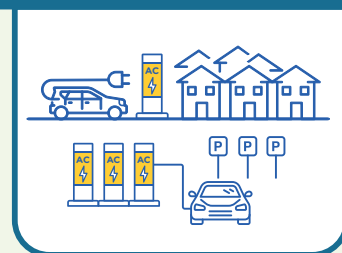
Table 1 - Common charging location types

Destination charging should be considered at trip destinations locations where people can top up their EV charge while their car is parked and they are undertaking business or leisure activities, or at transport interchanges, like park and ride facilities. The placement, number and power level of charging infrastructure should take into consideration average dwell times.



Destination charging can be provided in the form of a combination of or either DC and AC charging pedestals: for each location the charger type provided should fit the use case. DC fast charging stations are strategically positioned at destinations such as public and private car parks, hotels, restaurants, shopping centres, tourist attractions, and recreational facilities. The comparatively slower AC charging stations are primarily located at destinations associated with longer visit durations, for example, park and ride facilities. In other locations, a mix of charging types may be appropriate where there are stronger variations in user needs and expected dwell times due to the mix of activities accessible at that location.

Neighbourhood charging caters to residents to provide charging stations in residential areas without access to off-street parking and home charging. These chargers tend to be located at locations to provide access to on-street parking, however they can also be grouped as a hub in a neighbourhood where on-street parking is limited.



Slower, AC charging pedestals are preferred for neighbourhood charging in residential areas. Slow charging has the advantage of being more cost-effective to the end user than high-powered charging, making residential areas where overnight charging is more commonplace the ideal locations to provide these chargers. AC chargers often face barriers to installation such as limited on-street parking. They are less costly to install than DC however the business case is not as strong due to slower delivery of charging and turnover of users. Neighbourhood charging encourages off-peak charging, helping reduce peak electricity demand and minimising stress on the power grid.

2.2 Addressing Multiple User Needs in Destination and Neighbourhood Charging Network Planning

The Electric Vehicle Charging Infrastructure Strategy 2022-2025 developed personas to inform the development of EV charging infrastructure plans by better understanding the user experience. To deliver destination and neighbourhood charging that meets user needs, personas were developed (Table 2) to capture the range of challenges different user types may face and how these should be addressed and integrated into future network planning.

These various user types should be considered when selecting sites for the deployment of charging infrastructure. Certain sites attract multiple user types who are undertaking different activity types at that location at different times of the day. For example, a site might be in a mixed-use neighbourhood, attracting day visitors to the local shops and services, while at night residents park in the area. These sites are particularly valuable as potential EV charging locations due to the frequent activity in the vicinity. Equipping sites such as these with bundled chargers, such as fast DC and slow AC charge points caters to multiple users' needs and can ensure that the charging infrastructure is not underutilised.

Personas	Description	Main Concerns	Supports
 <p>Carsharing users</p>	<p>They routinely rely on public transport or active modes to access their day-to-day activities, so they do not own their own car. When they do require a private vehicle to complete trips, such as for weekend trips away or to go on a larger shopping trip, they use a car sharing club vehicle.</p>	<ul style="list-style-type: none"> • Not having a full charge when first picking up the car • Availability of conveniently accessible charging at final destinations to top-up the vehicle to avoid idle time waiting to charge the vehicle • Having widespread access to charge points, despite different operators • Getting penalised for returning the car with not enough charge • Speed of charge to reduce the impact of time waiting on the rental period 	<ul style="list-style-type: none"> • Information when booking a car about where to charge and real-time information on if the charger is available • Ease of payment – do not need multiple cards or apps for using the chargers • Clear information at the charge points on the charging speeds and how to charge the vehicle • Availability of fast charging to reduce time
 <p>Long Distance Commuter</p>	<p>They rely on their car for most of their journeys due to the lack of sustainable and convenient alternatives. They do not have access to private, off-street charging and rely heavily on on-street public charging to charge conveniently and safely overnight near their home. Due to their substantial daily driving distances and the additional errands they have to run, they might need to recharge during the day.</p>	<ul style="list-style-type: none"> • Range anxiety • Transparent pricing to identify the most affordable rates • Conveniently accessible charging at locations where they are running errands • Queueing for a charger 	<ul style="list-style-type: none"> • Information about location and pricing of charge points • Clear signals and sign-posting for charging facilities • Services at charging stations • Charging stations concentrated by activity hubs • Reliable AC charging in convenient and well-lit neighbourhood locations
 <p>Tourists</p>	<p>Tourists may use their own vehicles or rent an EV to travel around the country - both to cities and more rural destinations. Ideally, they will charge at destinations overnight.</p>	<ul style="list-style-type: none"> • Range anxiety • Fear that charging is not available, particularly in more remote areas, such as the national parks • Lack of access to the internet to locate chargers on a mobile app • Charger usage constrained to subscribers • Limited payment options available 	<ul style="list-style-type: none"> • Clear signals and signposting for charging facilities • Charging infrastructure located close to amenities • Charging interoperability • Ease of payment – do not need multiple apps for infrequent use
 <p>Van drivers</p>	<p>They drive frequently for work and ideally charge up at their private home charger to avail of the cheapest rate. They tend to transport heavier loads and make regular stops throughout the day to conduct a service at a point. Occasionally, when inter-urban trips are needed, they will need to relay on high-power charging.</p>	<ul style="list-style-type: none"> • Not having enough charge to complete all of the day's trips • Access to charge points to intermittently recharge while conducting parallel activities • Mix of charging speeds available at charging stations to avail of different pricing options • Access to different charge points without needing to subscribe to all providers 	<ul style="list-style-type: none"> • Facilities in the vicinity of charging stations • Mix of charging speeds available at charging stations • Charging interoperability


Personas	Description	Main Concerns	Supports
 <p>Taxi Driver</p>	<p>They use their vehicle to provide taxi services for a living. They spend most of their time doing short, local trips but never start their shift with a full charge, since they do not have access to private/off-street parking facilities where they can charge overnight. Any time they spend charging is time potentially lost actively providing a taxi service to a customer. They also carry cash on them, and so safety and security are daily concerns for them.</p>	<ul style="list-style-type: none"> • Not enough charge to complete a customer's trip or to compensate for the time sitting in traffic • Readily available chargers to quickly top-up in between shifts while taking a bathroom or meal break • Time needed to charge a vehicle reduces their availability to drive a customer • Access to low-cost charging options to fully recharge their vehicle during longer breaks on their shift 	<ul style="list-style-type: none"> • On-street EV parking solutions in neighbourhood areas • Mix of fast and slower charge points • Access to facilities near charge points • Clear signals and signposting for charging facilities • Adequate lighting around charging stations • Additional security features, like CCTV, on-site
 <p>Apartment dweller</p>	<p>They have shared EV chargers in the apartment block, but these chargers may not always be available. They prefer using the apartment charging option because it lets them charge while they are at home for a lower cost as compared to the faster chargers available to the public. Occasionally, they may rely on local public charge points at the supermarket when they need a high-speed charger.</p>	<ul style="list-style-type: none"> • Charge anxiety • Adequate pricing • Charging speed and availability 	<ul style="list-style-type: none"> • Information about location and pricing of charge points • On-street EV parking solutions near their residence • Clear signals and signposting for charging facilities
 <p>People with disabilities</p>	<p>For them, being independent is key. While they have access to private, off-street charging, when they need to recharge using a public charge point, they need to be confident that the infrastructure is easy to find, usable and accessible.</p>	<ul style="list-style-type: none"> • Not able to locate accessible chargers • Physical obstructions • Remote charging locations • Complex interface 	<ul style="list-style-type: none"> • Information about location and availability of accessible chargers • Clear signals and signposting for charging facilities • Security measures in place – passive surveillance, public lighting • Easy to use the screen interface to start and pay for a charging session • Interface is accessible at their height and not obstructed by bollards • Accessible services at charging stations

Table 2 – Personas illustrating user charging needs

2.3 Existing Local EV Strategies and Plans

Currently, the large cities in Ireland have commenced drafting their EV charging network strategies, with Dublin's local authorities having already published their strategy in 2022 and Limerick, Cork, and Galway all in the drafting stages. In addition to their strategy development, Limerick have begun piloting charging infrastructure at destination locations, which is detailed in the next section.

The Dublin EV Charging Strategy covers the areas of all four local authority areas and was led by Fingal County Council. The strategy identified charging needs at destination, neighbourhood and en-route locations. The plan estimated the reliance on publicly available charging infrastructure at different location types and the current charging network's ability to meet current and anticipated charging needs. The plan also looked at how charging needs might conflict with or augment existing and proposed sustainable mobility projects, and how mobility hubs might be used to support multi-modal travel. This kind of planning approach to network expansion, where diverse people's needs are the basis of estimating charging quantity and pinpointing locations, ensures an equitable charging network. To support the implementation of this regionalised strategy, Fingal County Council has gone out to tender to set up a framework of charge point operators to supply, install and operate a network of destination charge points. The tender encourages private sector investment in the future operations and maintenance of the charge points by entering into concession arrangements with the suppliers.

2.4 Case Studies of Current Destination Projects

A one-size-fits-all approach does not sufficiently cater to the diverse needs and challenges faced by the different personas. Accessibility challenges necessitate the need for local authorities establish charging infrastructure that caters to a wide demographic.

Different charging solutions are imperative to accommodate the unique requirements of different groups. There have been several destination charging projects across Ireland which illustrate different approaches to providing convenient access to charging infrastructure while mitigating the challenges resource constraints can pose. From bustling urban centres to remote tourist destinations, projects like these play a pivotal role in accelerating the transition to an electric mobility landscape.





FASTER Project

The FASTER Project is a joint initiative by partners in the border region of Ireland, Scotland and Northern Ireland to support the overarching ambition to transition to low carbon transport systems through a collaborative, regional approach to infrastructure rollout and the sharing of lessons learnt. The project was awarded €6.4 million from the European Union's INTERREG VA Programme, managed by the Special EU Programmes Body. The project funding was matched by the Department for Infrastructure (Northern Ireland) and the Department for Transport (Ireland) and Transport Scotland. The project partnership delivered 73 rapid charging stations, with a minimum 50kW DC capacity, in the programme area across the three regions before 31 December 2023. Louth County led the Ireland element of this project and oversaw the installation of 27 high-powered EV charge points at 14 locations across the counties of Louth, Meath, Monaghan, Cavan, Leitrim, Sligo and Donegal. To date, 1800 kW of charging capacity has been delivered across the region.



This project demonstrated how a project team with a regional focus, but with a lead local authority, can deliver a comprehensive network of chargers in high and low demand areas.





Offaly County Council

Offaly County Council applied for funding to install DC high power charging at two of their sites. The first site would be used by the public and staff and the second site at a machinery yard would be used for fleet and by the general public. Both sites were originally designed without restricted access in mind, but then later opened to public use. The site housing the fleet was made available to the public by redesigning the gate system - to access the EV charger, the public can go through the first gate while the second gate is used for secure parking for the fleet. The first gate can be closed off to the public, when needed, for safely charging the fleet vehicles.



This pilot demonstrates how a charging location can be used more optimally by making formerly private charge points available to the wider public to leverage underutilised infrastructure and improve revenue generation and the business case of the charge point.



Limerick City and County Council – Pilot Scheme

Limerick City and County Council received funding for the civil and infrastructure works associated with the installation of 30 EV chargers at 15 neighbourhood and destination locations across Limerick City and County. Of the chargers, 27 are high-powered chargers (50kW DC to 150kW DC) and three are high-powered AC chargers (22kW AC).

The pilot will trial innovative approaches and technologies. To increase capacity to meet demand within the existing sites and respond to diverse user needs, Limerick is considering options such as a mobility hub at one location that would include a charge point for car sharing access. At two locations slated for 100kW connections, extensive upgrades to the electrical network were required. To overcome this hurdle, Limerick is considering battery backup chargers to supplement the 22kW connection at the site and deliver up to 100kW.



Based on the trials, this pilot will demonstrate how different approaches and technologies can be used to mitigate challenges to EV charging deployment and respond to diverse user needs.



Finglas Community Mobility Charging Hub

The Finglas Community Mobility Charging Hub was pioneered by Dublin City Council (DCC) as a demonstrator pilot to showcase the modular concept of mobility hubs to address multiple user types' mobility needs. The hub is centrally located, in a Council-owned public car park, with connections to major motorways (i.e., the N2 and M50), public transport services, and is adjacent to public services such as the garda station, INTREO offices, a leisure centre, council services, and the Finglas village centre.



The hub comprises of four public charging spaces for vehicles with one 22 kW AC charger (2 tethers) and one 75 kW DC charger (CCS and CHAdeMO tethers), in addition to a charging station for rental e-bikes. The power supply also allows for charging provision in a backyard behind the area offices for charging DCC EVs that are available to staff whilst delivering council services to the public.

One of the AC parking bays is reserved for a shared EV, providing car access for those who either choose not to own, or cannot afford to own, a private car. The combination of slower AC and faster DC charging options was chosen to reflect location-based demand. The slower and cheaper AC option is intended to cater to local residents, whereas the faster DC charging targets the needs of time-constrained taxi drivers from the stand in Finglas village.

The capital cost for the project was relatively low at less than €40,000, due to spare power supply available at the neighbouring leisure centre. The 100kVA supply on site was sourced from the existing supply at the leisure centre. A combined heat and power unit (CHP) installed in the leisure centre generates power for the area office on site, thus freeing up the original supply and meter for the mobility hub. A long cable run of about 120 metres and a purposeful design of the cabinet allowed sufficient space for the provision of power to serve not only the EVs and the e-bikes, but also to serve the charging needs of council vehicles in the private parking area behind the area offices.

To mitigate long-term risk to the Council, a licence model was used, with the Council providing the power supply out to the connection points for the chargers/bike stands and private operators providing chargers and all public services.



The mobility charging hub demonstrates how multiple user needs can be catered to at one location and how a site can draw on spare electrical capacity to minimise costs.



3

Charging Requirements at Destination and Neighbourhood Locations

Building on the early progress made to address users' local charging needs, national targets to support the widescale implementation of an EV charging network are needed to facilitate EV adoption across the country. Minimum requirements for EV charging are outlined at the European Union level which form the basis of Ireland's national targets. This chapter presents the national and county-level targets for destination and neighbourhood charging that will need to be met by 2025 and 2030. In the formation of their strategies, local authorities will conduct bottom-up modelling to understand the nuanced charging needs across different areas within their jurisdictions, using the county-level targets as a minimum requirement.

3.1 Determining Minimum Charging Infrastructure Targets Based on EU Requirements

Ireland is required to deliver publicly accessible charging infrastructure to meet EU requirements, with target dates of 2025 and 2030. The minimum national charging infrastructure requirements are calculated on this basis. While some of the charging requirements will be fulfilled through the expansion of an en-route charging network along motorways and national roads, neighbourhoods and destinations are critical locations to fulfilling the daily charging needs of users. The remaining infrastructure target is allocated to the Irish counties based on the total fleet registered in each local authority area.

3.1.1 EU AFIR Charging Requirements

The Alternative Fuels Infrastructure Regulation (AFIR) lays down common technical specifications and requirements for EV infrastructure across all EU member states to ensure a seamless charging experience for all users.

National charging infrastructure requirements to achieve by 2025 and 2030 are set in the regulation. AFIR requires 1.3kW of public charging infrastructure for each full battery electric vehicle (BEV) and 0.8kW of public charging infrastructure for each plug-in hybrid electric vehicle (PHEV) to ensure that the level of charging available is ahead of demand. Providing widespread, ample capacity early on is a critical factor to responding to potential barriers to EV adoption such as charge and range anxiety. These national requirements will be distributed across en-route, destination and neighbourhood locations to support diverse user charging needs.

3.1.2 EV Uptake Scenarios

To determine what degree of charging infrastructure is required to meet the AFIR charging requirements, a forecast of the anticipated adoption of electric vehicles formed the basis. This forecast is based on the projected growth of battery electric and plug-in hybrid electric vehicles as a proportion of the total vehicles registered in Ireland. The forecast assumes that the CAP23 fleet targets are met:

- 175,000 passenger EVs and 20,000 LGVs by 2025
- 30% of the vehicle fleet must be electrified by 2030

Although the CAP target to transition 30% of internal combustion engine (ICE) vehicles to electric (both PHEVs and BEVs) by 2030 will remain unchanged, it is possible that the absolute number of EVs on the road by then may be adjusted according to projected total vehicle numbers in Ireland for 2030. The impact of the COVID-19 pandemic has resulted in decreased levels of new car sales and additional challenges in the supply chain have further prolonged this trend. Furthermore, progress towards CAP objectives to reduce the reliance on private vehicle travel and vehicle kilometres travelled overall may contribute to a lower number of passenger cars on the road.

Conversely, the charging requirements modelled in this section may also be impacted by a significant adoption of EVs. As stated in AFIR, when the percentage of BEVs surpasses the 15% threshold of total vehicles registered in the country, Ireland will be granted the authority to request derogation from the European Commission, enabling them to either reduce or completely suspend the obligations pertaining to fleet-based targets.² The modelling exercise reveals that this threshold is expected to be reached by 2030, when roughly 620,000 passenger vehicles and LDVs have transitioned to battery electric. Any additional charging infrastructure installed after this point that goes beyond the minimum AFIR requirements would be driven by market forces in response to market demand.



Presently and through to 2030, these AFIR minimum power requirements are anticipated to exceed the actual demand for public charging due to the relatively limited percentage of EVs within Ireland's fleet.

3.2 Top-Down Charging Needs Modelling Output

This section presents the modelling output that informs the national minimum charging requirements for destination and neighbourhood charging. These requirements are based on calculations drawing on the vehicle fleet composition, estimated kilometres driven per vehicle type, assumed energy efficiency of EVs, anticipated distribution of charging types, and the estimated capacity utilisation of charge points at different locations.

3.2.1 EVCI Requirements Based on AFIR

Based on the projected EV uptake in Ireland and AFIR requirements, a total power requirement for publicly accessible charging infrastructure of 214,453 kW and 712,395 kW is needed by 2025 and 2030 respectively. This total power requirement is spread across en-route, destination, and neighbourhood locations. To calculate what portion of power destination and neighbourhood charging locations need to contribute to under AFIR, the total en-route requirement as stipulated in AFIR was calculated and subtracted from the national total. However, it is important to note that there may be overlap in en-route and destination locations, particularly where a site is located along a national primary or secondary road.

To support this public charging network, it is anticipated that a total power requirement of 169,253 kW and 562,244 kW is needed by 2025 and 2030 respectively at destination and neighbourhood locations alone, assuming that the BEV share reaches 15% of the total expected fleet in Ireland by mid-2029.³

Presently and through to 2030, these AFIR minimum power requirements are anticipated to exceed the actual demand for public charging due to the relatively limited percentage of EVs within Ireland's fleet. Nonetheless, the expansion of charging provision is expected to encourage an accelerated shift to electric vehicles, and together with requirements that all new vehicles registered after 2035 be electric, the number of EVs on the road will generate a demand for charging by 2035 that will be greater than the AFIR-based power requirements.

These AFIR-based minimum power requirements are distributed across the local authority areas based on each area's proportionate vehicle fleet share. The projected local authority area fleet shares are based on the historic growth rates of fleets in each county. (Where relevant, the fleet estimated at a county level is allocated at a local authority level based on the relative population in each local authority area within the county.) Distributing the power requirements in this way ensures that the network is planned around current and anticipated demand. Table 3 represents the 2025 and 2030 EV charging capacity requirements at local authority level (not including the en-route network).

² This is for BEV only and does not include plug-in hybrid figures.

³ The 30% target rate for internal combustion engine (ICE) vehicles to electric (both PHEVs and BEVs) by 2030 is from ZEVI, while the 15% is from AFIR and only relates to BEVs.

County	 Target Power Output (kW)		County	 Target Power Output (kW)	
	2025	2030		2025	2030
Leitrim	1283	4166	Wicklow	5268	17680
Longford	1457	4736	Kerry	5691	18647
Carlow	2294	7526	Donegal	5724	18716
Monaghan	2299	7428	Wexford	6069	19929
Sligo	2412	8019	Tipperary	6311	20680
Roscommon	2449	7616	Galway County	6437	21465
Laois	2755	9048	Limerick	6780	22276
Offaly	2794	9094	Dun Laoghaire-Rathdown	7042	24014
Galway City	2797	9327	Meath	7306	24476
Cavan	2840	9239	Cork City	8083	26581
Westmeath	3378	11247	Kildare	8422	28268
Kilkenny	3552	11658	South Dublin	8704	29681
Louth	4203	13755	Fingal	9146	31186
Waterford	4360	14329	Cork County	12454	40955
Clare	4535	14888	Dublin City	17403	59345
Mayo	5006	16271			

Table 3 – Summary of EV charging capacity requirements by 2025 and 2030 across the local authority areas.

3.3 Visualising these Charging Requirements

The average power capacity required per county by 2025 is 5500 kW. Figure 5 provides an indicative example of how these kW requirements may translate into charge points at various locations to meet user needs. Individual local authority strategies and subsequent implementation plans will determine the charge point requirement and mix for each county. Users will have different reasons for visiting a location and therefore different times that they will be spending at that location. Reasons for charging at a location will also vary – some users might only look to top-up their battery while others might look to fully recharge their battery. In other cases, financial needs may dictate what charging speed users are comfortable with paying for. Therefore, broader areas will likely need a mix of charging output levels to cater to a range of needs.

Example of indicative charging infrastructure configurations at various location types to meet 2025 AFIR targets



* These locations would also host additional enroute charging infrastructure.

Key		
AC charge point	Destination charging	Neighbourhood charging need
DC charge point	Neighbourhood charging	Destination charging need
E-mobility hubs		En-route charging need

Figure 5 – Examples of charging solutions



4

Regional Approach and Project Lifecycle

Building on international experience and the successful delivery of early-mover national projects, such as the FASTER project, a regional approach will be adopted to support the delivery of destination and neighbourhood charging infrastructure across Ireland.

To effectively respond to gaps in the network and achieve national charging infrastructure targets in a timely manner, local authorities will develop regional and local area network plans. To deliver the infrastructure required at scale, a project life cycle (Figure 6) will be employed within each regional/local area. This process begins with strategy development at a local and regional level to guide the subsequent stages towards the delivery and on-going operations of charging infrastructure at destination and neighbourhood locations.

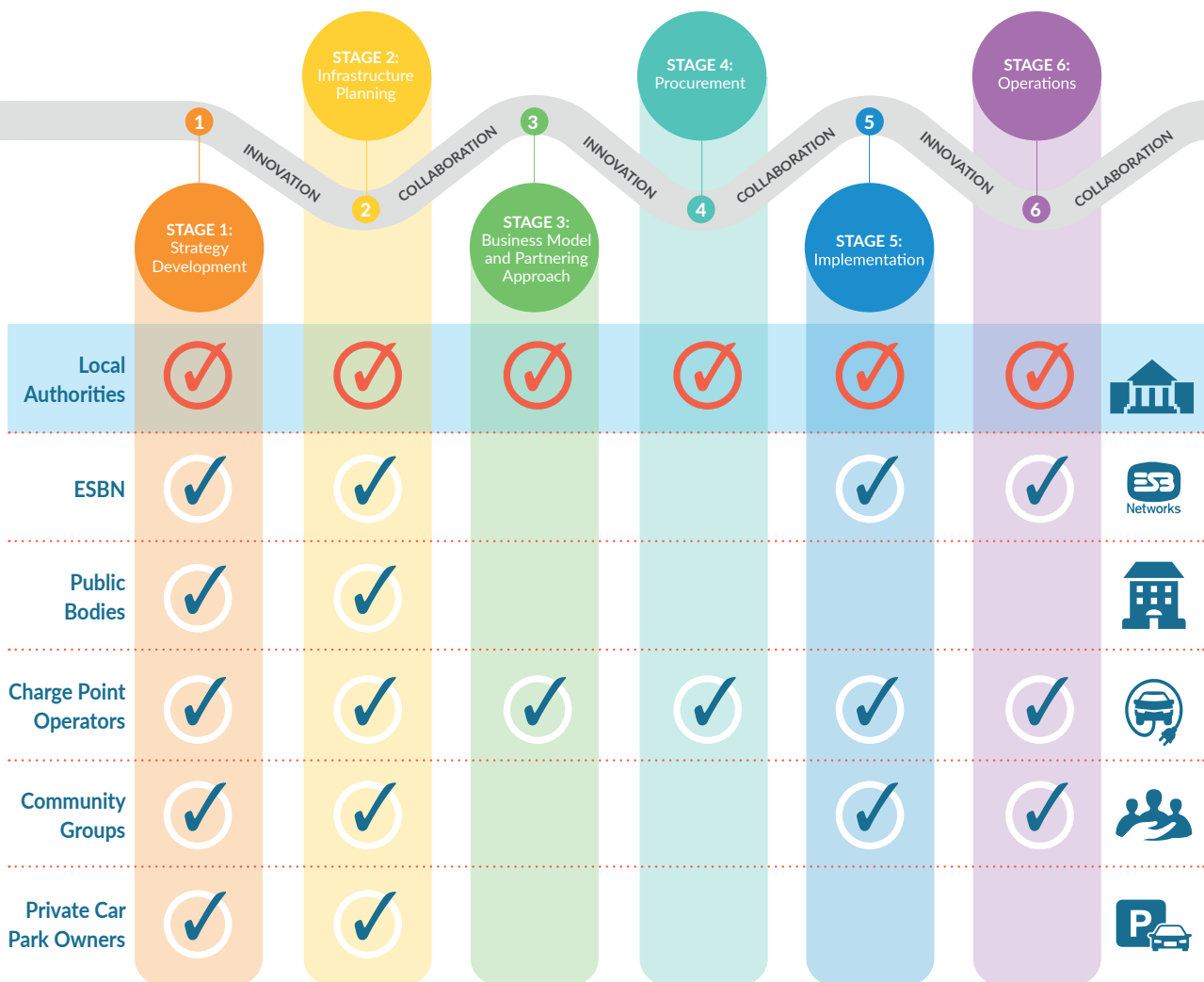


Figure 6 – Project life cycle

Further details can be found in the guidelines that are being developed to support local authorities in the development and implementation of their strategies. The guidelines outline principles to support in pinpointing the most suitable locations, assess the most appropriate business model to efficiently delivering large numbers of charge points across the regions, and how to design a procurement approach to leverage private resources and deliver a high-quality charging network.

4.1 Regional Approach to Delivering a Charging Network

To deliver a cohesive charging network that meets user needs, local authorities will take a regional approach to developing a strategy for the delivery of local charging networks, with the exception of local authorities in Dublin, Cork and Galway who are in advanced stages in the development of their strategies.⁴ The seven regions and three city areas (Figure 7) have been agreed in principle with local authorities.

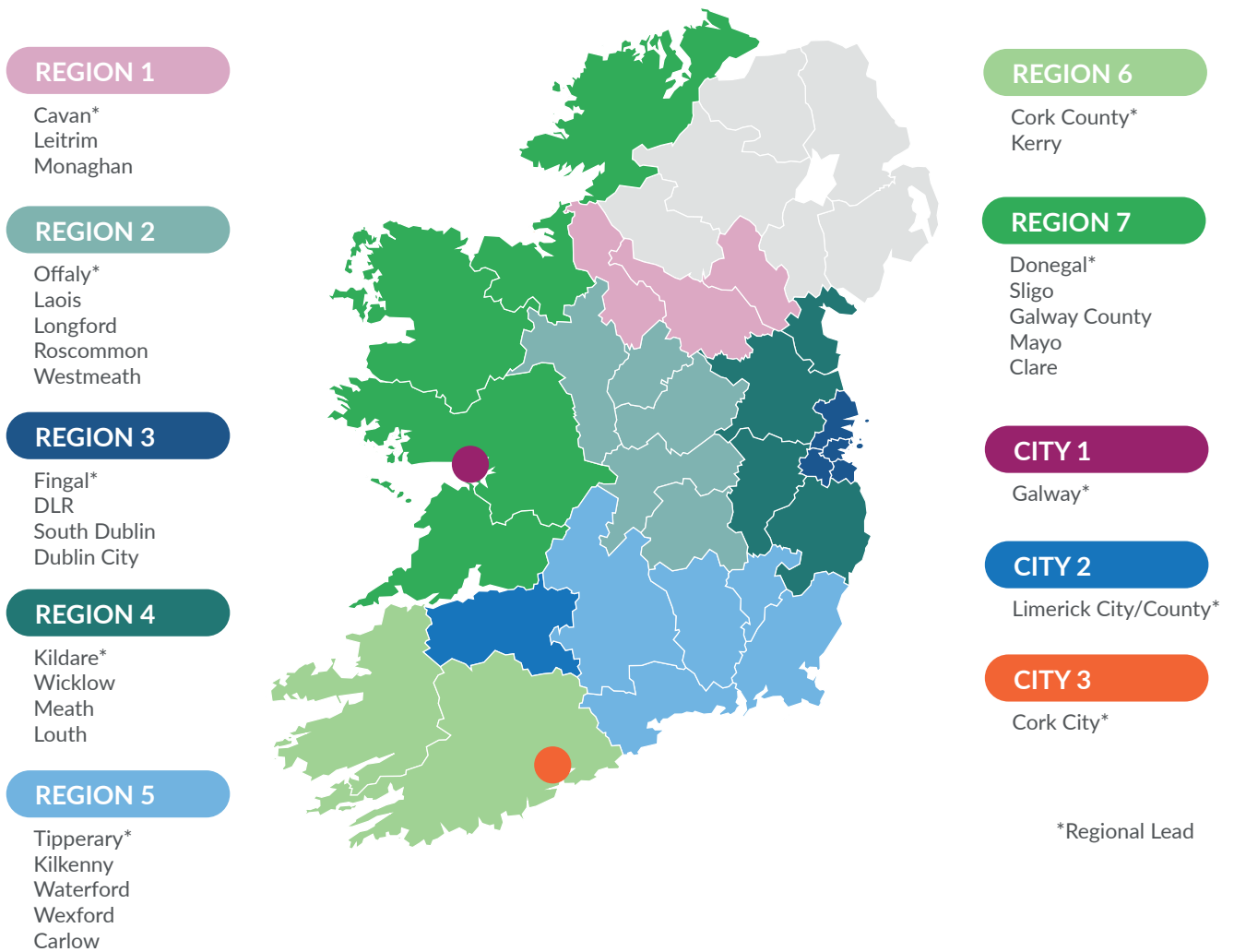


Figure 7 – Regional approach for strategy development

Given local authorities’ access to suitable sites and knowledge of their jurisdictions and residents’ needs, they are in a unique position to design targeted strategies to expand access to publicly accessible EV charging infrastructure at a local level. Local authorities can identify areas where gaps in the charging

⁴ These regional groupings are agreed in principle, and subject to funding and resources.

network pose a barrier to EV adoption and inequitably hinder individuals or groups from shifting from ICE to electric vehicles. Due to their knowledge of their local context and opportunities, ownership of suitable sites, and project delivery and stakeholder engagement experience, local authorities can make efficient use of available funding, accelerating the deployment of charging stations where they are needed the most.

By coordinating across jurisdiction borders (see Figure 7 and 8), local authorities can avoid the risks of insular, siloed planning and potential oversupply of infrastructure where demand does not warrant this while also ensuring there is sufficient infrastructure in rural and remote areas to meet future demand to ensure equitable access to charging infrastructure to promote widespread EV adoption.

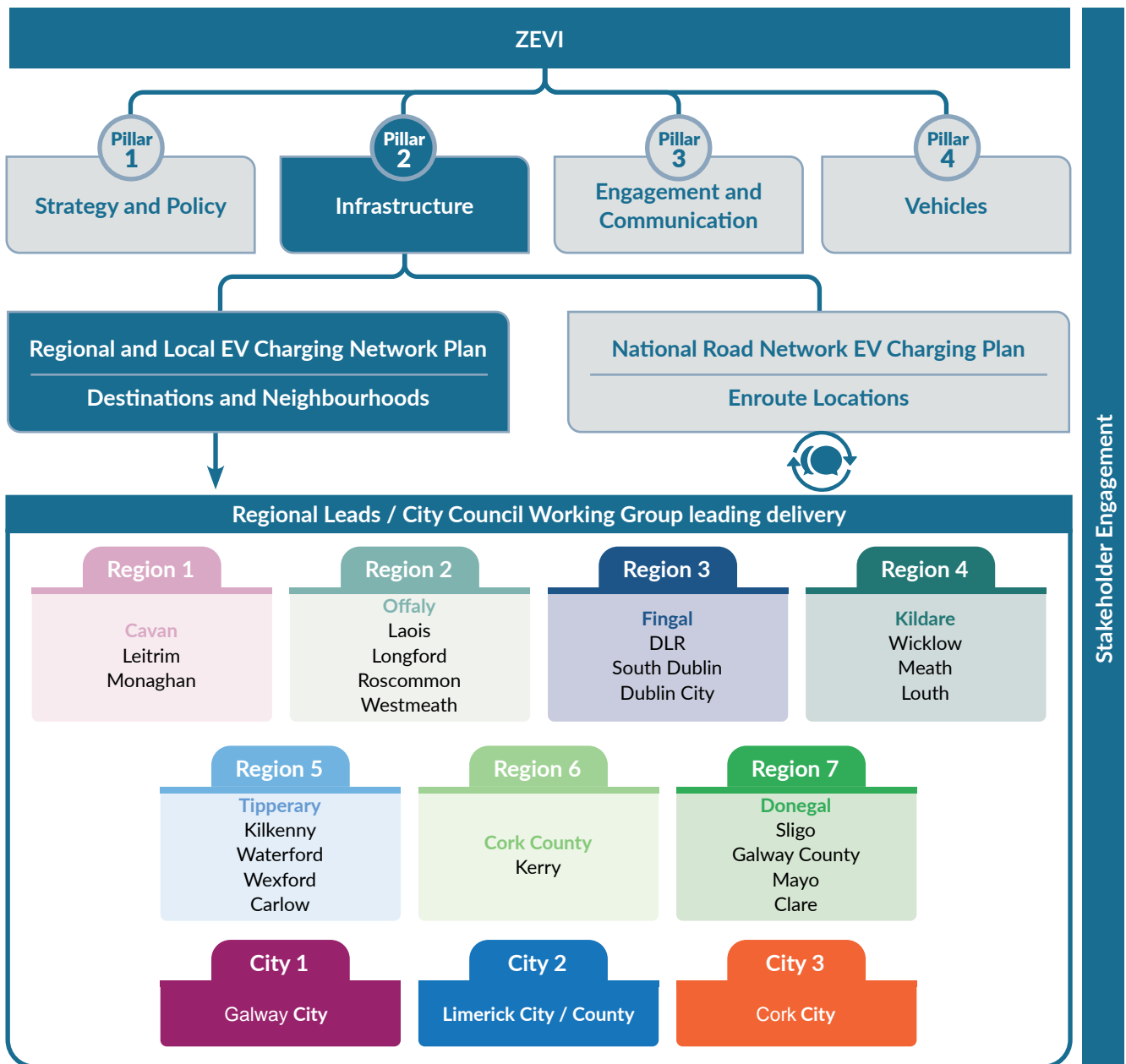


Figure 8 – Regional reporting and engagement structures

4.2 Delivering the Local Charging Infrastructure

4.2.1 Planning the Charging Network

Local authorities will take a bottom-up modelling approach (see Figure 9), starting at the local or regional level, to estimate the required infrastructure demand to provide a more accurate estimation of EV charging requirements. At a minimum, these should align with AFIR requirements, but in some cases, the modelling exercise might reveal a need for further charging infrastructure. Based on the priority areas and user groups identified in the local strategies, local authorities will need to identify the potential sites where the installation of an EV charging station supports strategic aims. These sites will be considered in terms of their strategic relevance and importance in addressing disparities in charging access, to ensure that charging options are distributed equitably across various communities.

Different communities, with varied demographic compositions, geographic layouts, and transportation habits come with different user needs. A flexible and adaptive strategy is paramount to meeting the diverse public needs and fostering widespread electric vehicle adoption across different communities.

While some sites will have minimal barriers to the installation of charging stations, others might have a substantial number of challenges that can significantly drive up the complexity and cost of installing a charge point. This can be problematic to expanding a publicly accessible charging network in these areas. A one-size-fits-all approach will not be effective – local authorities must tailor their charging infrastructure to meet the unique needs of different destinations and neighbourhoods and align with wider e-mobility policies. Technological advancements in charging solutions offer different approaches to responding to these challenges (Appendix A). Where new technologies have not been trialled with success in a similar context, pilot programmes can be run to evaluate their feasibility and effectiveness. Based on successful examples demonstrating demand and positive outcomes, the network can replicate these successes to expand the network.

When planning these networks, particularly when selecting specific sites for the installation of charging infrastructure, the locations' ability to contribute to future EV user needs should be considered. Not only does this foresight allow for scaling the site to provide more charging infrastructure in the future to contribute to 2030 targets, but also it enables for the efficient planning of resources through approaches such as incorporating opportunities for additionality. As was the case in Fingal and Offaly County Council, this planning approach to EV infrastructure avoids deploying charging infrastructure for one user type only and instead ensures that it can be used to cater to a larger number and variety of users (see Section 2.3 for a full description of the case studies).

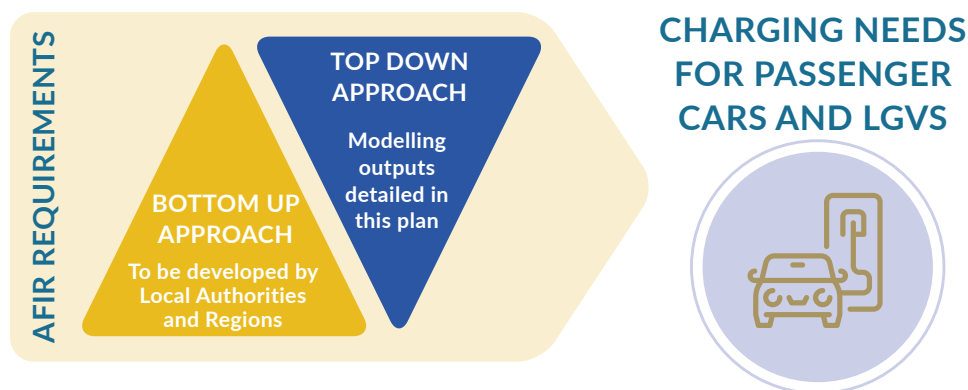


Figure 9 – Bottom-up and top-down modelling approaches



To ensure a high-quality user experience and access to as many users as possible, government-funded public charging infrastructure will adhere to EU and national regulations and design standards, including the recently drafted Universal Design Guidelines for Electric Vehicle Charging Infrastructure and the provision and accessibility of charge point information as required by AFIR.

4.2.1.1 MOBILITY HUBS

The National Sustainable Mobility Policy's 'North Star' is to connect people and places with sustainable mobility that is safe, green, accessible and efficient. A mobility hubs project is set out in the CAP as an actionable policy output that can deliver sustainable mobility accessibility outcomes.

In line with this, the Department is developing a mobility hubs pilot project. It is anticipated that the mobility hubs will include shared mobility solutions such as bicycles, e-bicycles, e-scooters, cargo bicycles and e-cars. The project aims to deliver between 140 and 220 mobility hubs to create a comprehensive network of hubs of sufficient density to ensure integration and alignment with existing public transport and to deliver the modal transition and behavioural change that is required to meet climate targets, including a reduction in total vehicle kilometres of 20%.

It is anticipated that three locations will initially be tested in this pilot: one in Dublin City, one in a Regional City and one in an urban location. Preliminary timelines indicate a procurement process in Q4 2024, and this will complement the EV infrastructure development in the areas chosen for the pilot.

Precise locations will be decided later in the project development lifecycle, using site selection criteria based on international best practice. Evaluation of the pilot project will be used to inform a future potential national roll-out of mobility hubs.

Additionally, as part of a €1.35 million pilot initiative, Project ROBUST, four shared electric mobility hubs are currently being rolled out in Dublin, Galway, Sligo, and Donegal with charging facilities for shared cars, bicycles and cargo bicycles. Over the next three years, user uptake of the hub will be assessed to inform how further such shared e-mobility hubs can play a role in different parts of the country to support the decarbonisation of transport.

As local authorities develop their infrastructure strategies, consideration will be needed in regard to how the provision of infrastructure might best align with mobility hubs to optimise resources and to coordinate with an authority's development plans and local area plans in respect of land use, mobility (active travel) and climate action.

4.2.2 Installing, Operating and Maintaining the Charging Network

Installing and operating EV charging infrastructure requires considerable upfront capital costs, technical expertise, and collaboration between different stakeholders. Partnerships between public and private groups can minimise the impact of these challenges in successfully expanding EV charging infrastructure and delivering projects based on the identified charge point locations.

Approaches for installing, operating, and maintaining EV charging infrastructure differ in terms of the role played by the local authority, which party is responsible for the different aspects of delivery, and the risk taken on by different parties. The three most common business models used to deliver EV charging infrastructure are listed below:

- 1. Own and Operate:** The local authority retains full ownership of the network and collects revenue, and thereby determines the charge point sites. The local authority plans, owns and operates the network and is responsible for maintenance. However, as this is resource intensive and requires technical expertise, the local authority may choose to appoint suppliers to deliver and manage the charge point infrastructure for a set period, in return for payment. Although revenue is retained by the local authority, this model does not allow for private sector funding / leveraging and it exposes the local authority to risks not seen in the other models.
- 2. Concession Framework:** This model is typically used to deploy relatively high charge point volumes, often based on a pre-agreed number of charge points. The local authority passes on some or all financial burden and risk to a supplier in return for reduced revenue share. The supplier typically takes on full responsibility for the operation and maintenance of the charge points. This model allows local authorities to leverage the expertise and resources of private companies, reducing the financial burden and risk while promoting rapid infrastructure expansion.
- 3. Lease Model:** In this arrangement, the local authority leases sites to a supplier on a long-term agreement. This supplier funds, operates, and maintains the charging infrastructure. The local authority receives revenue or rental fees. Generally lease options are only feasible on high-demand locations with low barriers to installation.



The Advantages and Disadvantages of the 3 Business Models and Contractual Arrangements

	Advantages	Disadvantages
Own and Operate	<ul style="list-style-type: none"> All revenue is retained by the local authority Locations are selected and designed by the local authority, so they retain control over project from concept to completion Full control over fees charge to users, including setting different rates for different user groups 	<ul style="list-style-type: none"> Funding would need to be identified to fully cover capital and the on-going and maintenance costs, where the chargers do not generate sufficient revenue Full responsibility for risks stay with the local authority Local authorities will be responsible for delivery of the charge points from strategy to delivery including design construction and operation. As they do not have the operational expertise they will need to procure service contractors. Local authorities will be responsible to ensure they comply with national standards, data reporting and compliance with AFIR
Concession	<ul style="list-style-type: none"> The local authority can decide where in the project life cycle they want to engage the contractor reducing the amount of direct resources and risk Opportunities to leverage private funding and resources Opportunity for some revenue gains through a profit-sharing or guaranteed rent agreement with the third party Local authority may retain ownership of the charge points or below ground electrical infrastructure Opportunities to bundle high demand with lower demand strategic locations to mitigate the risk of ongoing operational funding being required in remote locations Contract can be structured such that the CPO is responsible for any compliance with national standards and reporting requirements under AFIR 	<ul style="list-style-type: none"> Operators require confidence that revenue will be achieved and therefore locations would need to carefully analysed so that an opportunity for a profitable bundle of sites is offered to the market – the mix of lower demand, but strategically important, sites with high demand sites needs to be carefully considered before offering to the market through a competitive tender process (consider early market consultation as part of this process) Local authorities may receive a lower income than if they own and operated the charge points Local authorities are unfamiliar with these concession contracts and will need upskilling and advice when developing these contracts
Lease	<ul style="list-style-type: none"> Reduced risk and responsibility for capital and ongoing costs CPO is responsible for the design, construction and operation of the charge points The charge points can be futureproofed – the terms of contract renewal should specify that the third party is responsible for updating the hardware and software Local authority may be able to negotiate the ownership of below-ground infrastructure Sites are selected by local authorities 	<ul style="list-style-type: none"> Can be resource heavy for local authorities trying to resolve issues with some sites and third-party suppliers Suppliers will target financially attractive locations, leaving an infrastructure supply gap at unattractive locations Due to heavy up-front capital costs, CPOs may undersize the charge points to reduce operational costs impacting charging times and user experience Local authorities do not have as much influence on the standard of charger or service delivered

Case Studies

★ Case Study 1:

To deliver the Tees Valley regional network of fast and rapid charge points, the local authority undertook market testing to identify the most suitable business model approach for their needs. They found that an own and operate model allowed a more flexible approach. The maintenance and operation of the charge points is contracted out to a supplier. Though the local authority carries the risk of liabilities, they retain revenue collected.



★ Case Study 2:

Go Ultra Low Oxford used a concession agreement to rollout charge points in residential locations and supplemented this with central government funding support. A profit share arrangement is in place, such that when the charge points become profitable, a share of the revenue will go to the council. The project was designed in two phases. The first phase delivered 43 chargers through a mix of on-street charging technologies. Following the conceptualisation of the local charging strategy, the second phase will install a further 100 charging points.



★ Case Study 3:

In Nantes, France, the municipality tendered the service for the management of charge points in multi-storey public car parks to the private companies already running the car parks. These private companies managed the project and relationships with the suppliers for the installation of the charge points. By the end of 2019, 65 charge points in 15 public car parks in the city centre were available for public use. Additional charge points have since been installed such that 2% of the parking bays in each car park is equipped with a mix of 7kW and 22kW electric charging stations. As of 2021, Nantes had 215 public charging stations in public car parks in the city centre, the railway station, and at park and rides facilities. A car park with 500 bays was constructed near the city centre with charging stations to facilitate complementary plans to decrease on-street parking in the city centre while still enabling access to activities.



★ Case Study 4:

The Borough of Hackney in London plans to install over 2,600 public EV charge points by 2026 through a mix of mainly slow lamppost charging infrastructure and fast and rapid EV charge points, all drawing on 100% renewable energy sources. Bays equipped with fast and rapid charge points are reserved for active EV charging sessions only. Through a concession arrangement with two operators, private investments fully cover the cost of delivering and operating this charge point infrastructure, with a share of the revenue generated passed on to the Borough to support further sustainable transport initiatives. To support equitable access to the public chargers and support the adoption of EVs, Hackney residents not only benefit from discounted charging rates but also benefit from reduced parking permit fees due to the new tiered permit fee structure the Borough introduced that penalises more polluting vehicles and rewards zero emissions vehicles.



Local authorities have multiple contractual arrangements and business models they can use to deliver EV infrastructure, however, to leverage private expertise, resources and funding, the concession model has been most widely used across Europe. This contractual arrangement tends to be the preferred approach as it can accelerate the delivery of infrastructure to meet national targets, ensure an equitable distribution of charging points, leverage private funding and expertise to deliver the sustainable and reliable EV infrastructure needed to meet user needs.

4.3 Collaboration with Stakeholders

To navigate the diverse challenges faced and implement a successful charging network that meets the needs of users and makes efficient use of resources, local authority collaboration with several key stakeholders is critical in the planning, design, and implementation of the infrastructure.



1. **EV users** dictate the need for convenient, accessible, and reliable charging infrastructure, directly impacting the deployment decisions made by local authorities and private sector investors. Their experiences, preferences, and feedback are essential in shaping the design, placement, and user-friendliness of charging stations.
2. **ZEV** is the Office with the Department of Transport dedicated to supporting the switch to zero emission vehicles and will provide to support to local authorities to develop their strategies and implement their plans.
3. **ESBN** and **Eirgrid** play a crucial role in providing the necessary power supply and upgrading the grid infrastructure to accommodate the increased demand for EV charging.
4. **Charge point operators** are instrumental in installing, maintaining, and managing charging stations, ensuring the network’s reliability and usability for EV users. Engagement will be required to ensure there is not duplication of locations and resources with private charge point operators’ plans, unless needed.
5. **Public bodies (coordinating role)** such as Transport Infrastructure Ireland (TII) and the National Transport Authority (NTA) possess the authority, resources, and strategic vision necessary to drive the sustainable transition to electric mobility. Engagement with TII is key to identifying overlaps and potential gaps in user needs, in particular along national primary and secondary roads, may require both high-power, conveniently accessible en-route charge points as well as destination charge points. Given complementary e-mobility policy objectives to transition to zero emissions public transport services, the NTA will play a key role in bringing visibility to resulting infrastructure requirements to align investments in grid connections that support the needs of zero emissions public transport and passenger vehicles. Furthermore, TII Park and Share and NTA Park and Ride facilities will likely also be located in areas that can fulfil destination and enroute needs, and in some cases neighbourhood charging needs.
6. **Public bodies (landowners)** who might have charge points installed in their carparks such as the Office of Public Works (OPW), Failte Ireland, Waterways Ireland Health Service Executive (HSE) and Coillte, are key stakeholders in the planning processes. Where these public bodies have plans to install charge points at their premises, local authorities will consider how these plans align with and support their own efforts to expand publicly accessible charging points.
7. **Private car park owners** have sites that are potentially attractive locations for an EV owner to charge given the facilities they tend to be located in the vicinity of. Engaging with these owners to understand their plans for and interest in hosting publicly accessible EV charging networks can help expand the network to complement publicly owned charge points locations.



5

**Roadmap to
Implementation**

For the successful deployment of charging infrastructure to meet user needs, local authorities and regions must maintain a sharp focus and implement clear, well-defined plans in line with public spending codes and governance standards of the Department of Transport. Coordinated delivery of destination and neighbourhood charging is paramount to ensuring efficient use of public resources – planning should align with other plans such as the National Road Network EV Charging Plan and the plans of the private sector and other public sector bodies.

5.1 Roadmap and Timelines for Delivery

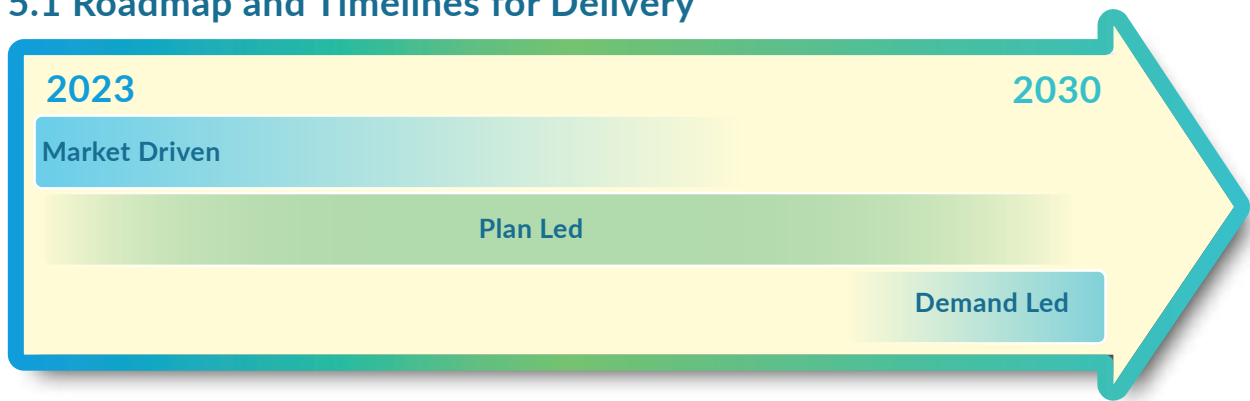


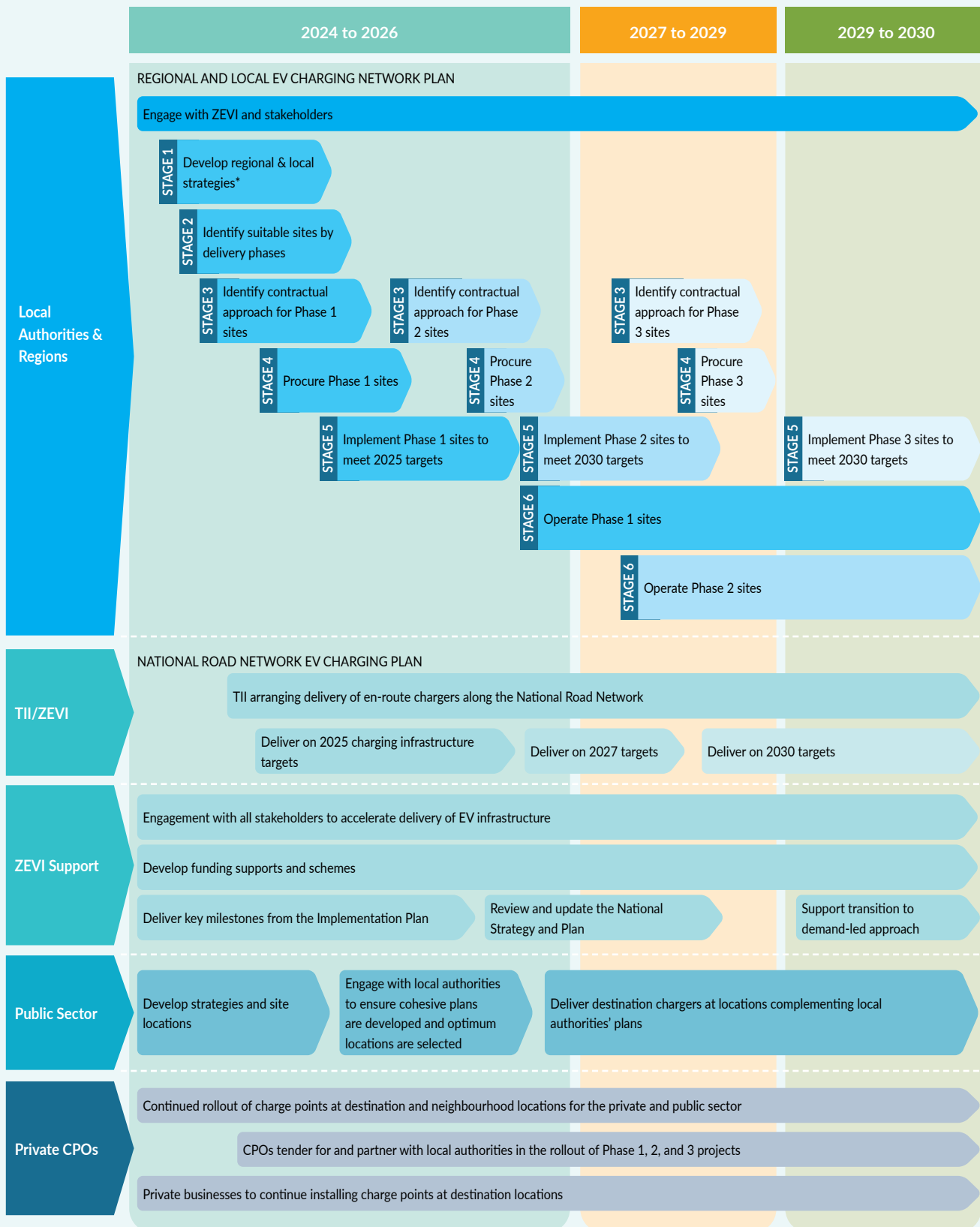
Figure 10 - Transition to plan led and ultimately demand led approach

The rollout of EV charging infrastructure in Ireland has predominately been led by private businesses in areas where market demand can support the financial viability installing, operating and maintaining charge points. Although local authorities will lead the accelerated delivery of infrastructure, facilitating the transition to a predominately planned- and ultimately demand led approach, the continued involvement of private operators is critical, as they continue to play a pivotal role in sustaining and expanding the EV charging infrastructure through 2030 and beyond. Private investment continues to be a key enabler to the rollout of this infrastructure and it is critical that this is leveraged while ensuring the infrastructure is accessible to all.

Having developed national strategies and plans to guide the delivery of a national EV charging network, ZEVI will turn to supporting measures to implement these strategies and plans. In tandem with local strategy development and subsequent local authority-led delivery at destination and neighbourhood locations, in 2023 ZEVI has launched two schemes⁵ that will install public fast 50 - 100 kW charging stations at sports clubs and community facilities by 2025. These schemes will ensure that EV charging is available in both urban and rural locations to meet community and visitor needs. ZEVI will support the public sector bodies in the rollout of EV infrastructure at locations such as tourist, education and health facilities. Funding like this, directed towards the expansion of publicly accessible infrastructure, lays the groundwork for enabling zero emissions mobility and a self-sustaining charging network.

As highlighted in Figure 11, 2024 and 2025 will see ZEVI take a proactive role in delivering the two schemes while TII will play a pivotal role in facilitating the deployment of en-route chargers, both contributing to the strategic expansion of the charging network. Simultaneously CPOs will continue their essential role, steadily rolling out EV infrastructure across the country.

⁵ The €15 million Shared Island Sports Club EV Charging Scheme was launched in January 2023 to support charging infrastructure deployment at local sports club facilities across Northern Ireland and Ireland. The €15 million Just Transition Fund Community Facilities Charging Scheme provides grants to expand EV charging at popular community facilities.



* Local Authorities with strategies in development / near completion include - Cork, Limerick, Dublin, Galway and Offaly

Figure 11 - Timelines related to the installation of EV charging infrastructure for light duty vehicles

Significant work has already been done on strategy development with some local authority and regional strategies completed, while others find themselves in the early stages of the process. Limerick, Galway, Dublin, and Cork have all either commenced or published their local EV charging strategies. ZEVl will accommodate the variations in pace and priorities over the coming months providing supports such as funding for strategy development, resources, EV infrastructure, research and development, as well as national guidelines and standards to facilitate a comprehensive charging network.

The remaining local authorities will develop out their strategies in the first half of 2024. Towards the latter half of 2024 into early 2025, local authorities will identify shortlists of charging locations, which will be delivered in three phases, to meet the 2025 and 2030 AFIR targets (refer to section 5.4 and Table 11 for more detail).

Local authorities will determine the most appropriate business model approach to optimising public resources to install, operate and maintain the charge points at the identified sites. Following procurement of charging equipment and services, charge point installation works will have commenced latest in 2025 across all the local authorities. A comprehensive review and progress check in 2028 will offer the opportunity to assess progress, refine strategies, and strategically plan for the requirements leading up to 2030 and beyond.

Critically, throughout the development and implementation of strategies, engagement between the local authorities, ZEVl and various stakeholders will be required throughout to mitigate anticipated barriers to charge point deployments in time to readily deploy infrastructure to meet key EU and national deadlines.

By adopting a holistic approach and bundling lucrative and less commercial sites together to form a profitable bundle, local authorities can address the needs of rural and urban communities. This approach not only can ensure equitable access to EV charging facilities for the public, but can create a balanced and appealing investment portfolio for private businesses.



5.2 National Support for Charging Infrastructure

To deliver on Ireland's CAP targets and drive reductions in GHG emissions within the transport sector, ZEVl will continue to engage with the private sector to ensure support is balanced with the needs of the users and Ireland's AFIR obligations. While the investment in destination and neighbourhood EV charging infrastructure is crucial to supporting widespread EV adoption, deployment can be hindered by barriers such as high upfront costs coupled with uncertain returns on investment, exacerbated by perceived and real levels of underutilisation of costly infrastructure. Lack of private investment in charging infrastructure, particularly when demand levels are low, may require additional government support until a critical point is reached and demand can support the private market.



Figure 12 - National supports

Prioritising funding for projects that involve installing scalable infrastructure is crucial. This foresightedness ensures that the charging sites are designed with expansion capabilities, accommodating the increased demand for electric charging expected by the year 2030. By fostering collaboration, local authorities can tap into the innovation and investment potential of private companies, ensuring the longevity and adaptability of the charging infrastructure.

To overcome barriers to deployment, ZEVl is and will continue exploring financing mechanisms, standardisation efforts, regulatory streamlining, grid capacity planning, coordination among stakeholders, public education campaigns, and targeted incentives to encourage private investment in destination and neighbourhood EV charging infrastructure. Three-year works funding programmes would allow for the flexibility needed to deliver these complex projects with private partners. Continued collaboration between government, industry, and community stakeholders is essential to create an enabling environment that addresses these barriers and promotes the development of a robust charging infrastructure network.

ZEVl will prioritise funding based on the fundamental principles outlined in the National Strategy. When considering avenues for public intervention, ZEVl will take the following principles into account:

1 Prioritise and enhance private sector participation: The important role of the existing private sector companies who are providing fuelling, charging and ancillary services is recognised as they have the technical expertise and resources required to successfully deliver charging infrastructure. In this regard, interventions will be designed to ensure the continued vitality of the private sector and promote a self-sustainable destination and neighbourhood EV charging market. Business models that facilitate the leveraging of private expertise and resources will be encouraged and prioritised for funding.

2 Alignment with wider policy and other network goals: The interventions will support: the State’s overall decarbonisation goals; the National Planning Framework (and associated National Strategic Outcomes including sustainable mobility, enhanced regional accessibility, transition to a low carbon and climate resilient society); and consider alignment with ESNB and EirGrid’s electricity network strategies.

3 Prioritise locations that suit user needs: Local authorities should make the best use of available infrastructure, to enhance convenience for users while significantly reducing the need for additional infrastructure, in turn, minimising risks and costs.

4 User experience and equity: Interventions will seek to provide a high-quality user experience to all users to ensure a positive perception of EV charging infrastructure provision and further facilitate the EV transition. This includes the standardisation of design and information, and coverage across Ireland to ensure equitable distribution ensuring connectivity across urban, rural and end of routes.

5 Enhance and facilitate innovation: New and innovative technologies that further accelerate the rollout of appropriate EV charging infrastructure will be encouraged, coupled with the use of data to inform decision making.

6 Resource efficiency: Interventions will seek to facilitate efficient use of private and public resources through approaches such as the regionalised bundling of high and low demand sites to improve the commercial viability overall of a package of sites.

7 Monitoring and evaluation: To ensure the charging network is operated and maintained to a high quality, with network gaps identified and addressed, key performance indicators will be established, embedded in contractual arrangements, and monitored. A consolidated map of charge points will support the monitoring and evaluation efforts, drawing on dynamic and static data as specified in the AFIR requirements.

5.3 Risks to Implementation

Delivery of the infrastructure called for in this plan will be extremely challenging. There are associated risks that will need to be managed and mitigated by local authorities, ZEVI and key stakeholders to enable the delivery of the plan. The first four risks outlined in the table below show the high-level risks identified in the Electric Vehicle Charging Infrastructure Strategy 2022-2025⁶, with updated dependency and mitigation measures as apply to this plan. The risk and dependency analysis carried out under this plan has identified the remaining risks outlined.

⁶ EV Charging Infrastructure Strategy 2022- 2025



Risk	Mitigation
Lack of available staff & delivery resources that underpin the plan	<ul style="list-style-type: none"> • Direct resourcing of staff for local authorities to deliver these strategies and plans. • Engage with stakeholder and public bodies and advice accordingly on best practice and contracts and sharing of expertise and knowledge.
Legal challenge to schemes launched	<ul style="list-style-type: none"> • Schemes will be designed in line with EU regulations, including State Aid rules. • Designed to ensure that any interventions are proportionate, transparent and represent value for money.
Adequate public & private funding in the years up to 2030	<ul style="list-style-type: none"> • ZEVI funding plan within Department of Transport planning process. • Leverage available private funding for investment.
Site availability and desirability for implementation of charge points	<ul style="list-style-type: none"> • Implementation of Project Lifecycle and site selection post strategy development to identify and deliver on suitable sites and identify and address constraints. • Early and ongoing stakeholder engagement. • Early market engagement with supports to improve the business case of installing charging infrastructure should ensure adequate site provision.
Lack of available grid capacity when needed to meet demand within the timelines	<ul style="list-style-type: none"> • Increased planning and recognition of timeline through ESNB Screening Process for delivery as outlined in the guidelines. • Early grid application as outlined in the local authority site selection guidelines. • Early notification to ESNB of grid upgrades to allow for scaling up of sites based on 2030 demands. • Apply innovative solutions such a battery back up to allow for high-capacity chargers with smaller grid connections especially in remote areas. • Market assessment to leverage CPOs who might already have grid connection offers to accelerate delivery plans. • Continued engagement with ESNB on the development of plans and through regular meetings with ESNB and CRU to manage this particular risk. • Leverage existing grid capacities and identify locations where there is spare capacity on the existing grid connections. Engage closely with ESNB to identify spare capacity. Engagement with other private and public sector bodies, such as NTA, to identify spare capacity at strategic locations such as park and ride locations, or at certain times of the day, like at office buildings for overnight neighbourhood charging.

Risk	Mitigation
<p>Risk of under/over specifying level of infrastructure called for in 2025 and 2030</p>	<ul style="list-style-type: none"> • The delivery of AFIR targets, which this aims to deliver, is designed to be ahead of demand. • Plan has built in review mid-2028 where 2030 targets may be revised based on usage data of existing charge points, resulting in increasing or reducing the target as appropriate. • Keep up to date with emerging innovations which may impact vehicle range and resulting public charging network requirements.
<p>Supply chain disruptions such as delays in obtaining charging infrastructure components</p>	<ul style="list-style-type: none"> • Engage with multiple CPOs to diversify the source of charging infrastructure components, reducing dependency on a single provider. • Develop service level agreements with CPOs to set expectations regarding delivery timelines and quality standards. • Work closely with CPOs to collaboratively plan and anticipate potential supply chain challenges. • The plan will allow for the development projects of varying value that are attractive to national and international CPOs and contractors.
<p>Difficulties in obtaining planning permission, leading to delays or potential restrictions on the locations where charging infrastructure can be installed</p>	<ul style="list-style-type: none"> • Identify locations and configurations that are exempt from planning permission for early project rollout and bundle projects requiring planning for later phases. • Engage with relevant planning division and stakeholders early in the planning process where planning is required. • Providing comprehensive required documentation to strengthen the case for planning approval.
<p>Challenges related to site-specific issues, particularly when dealing with private wires, leading to complexities in installation, maintenance, or potential conflicts with existing infrastructure</p>	<ul style="list-style-type: none"> • Conduct thorough site assessments before deployment, identifying potential challenges and collaborating closely with relevant stakeholders. • Engage in open communication with property owners, ESNB, and local communities to ensure a smoother integration of EV charge points into existing infrastructure. • Continued engagement with ZEVU to communicate any barriers encountered to infrastructure roll out.

5.4 What Will Be Delivered

To accelerate the transition to zero emissions vehicles and timeously deliver on transportation-related carbon emissions aims, this plan presents a planned, coordinated approach to accelerating the delivery of a resilient charging network, based on the fundamental principles underpinning the national Infrastructure Strategy. By setting clear national and local targets for destination and neighbourhood charging, this approach supports comprehensive networks that meet current and future demand while also ensuring remote areas and locations with less demand at present are addressed. This plan and the subsequent regional and local strategies are key to ensuring the equitable access to charging needed across Ireland to support widespread EV adoption.

Given their unique understanding of their local communities and environments, local authorities are ideally suited to facilitate phased charging infrastructure delivery at the local level. By bundling strategically important sites of high and low demand and leveraging private expertise, a comprehensive and resilient EV charging network can be delivered to meet user needs.

The phased approach (Table 4) to infrastructure delivery takes into consideration demand, funding availability, and the readiness of different sites. A phased approach allows for the immediate roll out of early mover projects, with minimal barriers, while allowing for adequate planning to be put in place to deliver more complex projects later on. Phasing allows local authorities to apply learnings and adapt their plans providing an opportunity to fine-tune the infrastructure rollout, consider innovative solutions, and optimise coverage to meet user needs.

The successful delivery of destination and neighbourhood charging infrastructure is contingent upon a dynamic and cooperative effort that involves active engagement and collaboration between both public and private sector entities and key stakeholders. Active engagement and forward-thinking are crucial in the development of regional and localised strategies as they serve as the bridge between national strategies and on-ground implementation, playing a pivotal role in ensuring that EV charging infrastructure meets user demands of their specific regions.








Delivery Phase	Phase 1	Phase 2	Phase 3
Delivery period	To Q4 2025*	2026 to mid-2028*	Mid-2028 to Q4 2030*
Description	Sites at destination and neighbourhood locations to meet 2025 AFIR targets with minimal or no barriers to delivery, that meet most user needs, and are of strategic importance (e.g., geographical and seasonal spread).	Sites with barriers to delivery (e.g. planning permissions, electrical grid upgrades), but of strategic importance, at destination and neighbourhood locations to meet 2030 AFIR targets. Scaling at existing Phase 1 site locations, where required.	Sites with high barriers to delivery, but of medium and high strategic importance. Transition to data-driven planning, based on user demand at existing locations. Scaling at existing Phase 1 and 2 site locations, where required.
Review	Ongoing strategy review, assessment of gaps in the public charging network and user needs in line with EV adoption		
Deliverables	169,253 kW	562,244 kW	


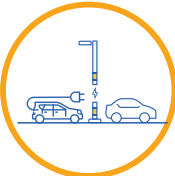



Table 4 - Phased approach to public charge point delivery in neighbourhood and destination locations

*These dates are indicative, and contingent on local authorities' strategy development and local circumstances.



A. EV Charging Solutions

		Description	Challenge Addressed			Case Studies
Current Solution in Ireland	 AC / DC Pedestal Charger	<p>The pedestal EV charger is commonly found in public charging stations across Ireland as it enables drivers to conveniently charge their EVs with flexibility in power options.</p> <p>Its versatility in providing AC and DC caters to a wide range of EVs and may be the most appropriate choice for local authorities.</p>	Lacking access to off-street parking space; lack of private access to charge points	✓	✓	Most common charging solution in Ireland
	 Residential Charging Hubs	<p>These centralised locations contain multiple charging stations for different user types, such as private vehicles, shared vehicles, and electric bicycles.</p>	Limited parking space; limited access to private charging options	✓	✓	Hubs at municipal parking facilities in New York City, NY, USA
	 Park and Ride Charging Hubs	<p>Slower charging solutions are combined with park and ride facilities to take advantage of long stays and provide affordable charging rates while encouraging integrating sustainable modes to complete last-mile travel. If close to national road or motorway, there may be a use case to install DC chargers.</p>	Limited opportunity to provide adequate charging facilities in neighbourhoods; access to affordable charging	✓	✓	Redbridge Park and Ride, Oxford, UK
Possible solution with constraints	 Shared Residential Charging	<p>Privately-owned chargers at private residents or establishments are shared with others, such as through a mobile app. Charge point owners can control the access and pricing.</p>	Limited access amongst residents to private charging infrastructure; limited resources to install additional charging infrastructure	✓		Co Charger in the UK; EVmatch in the USA ; the Department is looking to pilot this concept in a number of locations.
	 Kerbside - Bollard	<p>Charging stations are located alongside the road or kerbside and may be integrated into street furniture such as bollards. Currently in Ireland this solution is not installed in Ireland as it requires individual connections for each charge point resulting in a meter chamber required in close proximity to the bollard adding to street clutter.</p>	Limited access to off-street parking space; lack of private access to charge points	✓		Connected Kerb is installing thousands of kerbside bollard chargers as part of the UK's On-Street Residential Charging Scheme

Description	Challenge Addressed			Case Studies
<div data-bbox="172 456 347 631"></div> <p data-bbox="197 636 322 703">Kerbside - Lamppost</p> <p data-bbox="395 461 831 595">On-street charging is designed into existing street furniture to minimise the physical and visual impact on the streetscape.</p> <p data-bbox="395 631 863 766">Lamppost chargers are typically slow AC, providing the opportunity for lower cost charging solutions in areas with longer parking stays.</p> <p data-bbox="395 801 874 869">Currently in Ireland this is faced with the same issues as the kerbside bollard.</p>	<p data-bbox="895 461 1102 766">Lacking access to off-street parking space; lack of private access to charge points; street furniture reduction; access to affordable charging</p>	<p data-bbox="1147 461 1173 483">✓</p>		<p data-bbox="1284 461 1477 528">Liverpool, UK; Berlin, Germany</p>
<div data-bbox="172 902 347 1077"></div> <p data-bbox="197 1081 322 1189">Shared Workplace Charging</p> <p data-bbox="395 907 874 1317">Businesses designate specific charging spaces for guests, visitors and public. Workplace charging solutions may primarily focus on AC charging for longer-duration stays. However, by incorporating high-power DC fast charging infrastructure at the destination, users can benefit from rapid charging speeds during shorter stops. This solution can be opened up to the public after hours and can be a viable neighbourhood charging option.</p>	<p data-bbox="895 907 1075 1070">Underutilised charging infrastructure; public resource constraints</p>	<p data-bbox="1147 907 1173 929">✓</p>	<p data-bbox="1224 907 1249 929">✓</p>	<p data-bbox="1284 907 1477 1317">Austria provides grants to companies to install workplace charging, with a higher funding contribution where the chargers are made publicly available</p>
<div data-bbox="172 1326 347 1500"></div> <p data-bbox="197 1505 322 1572">Depot Charging</p> <p data-bbox="395 1352 858 1487">Depot charging solutions can be adapted for destination EV charging by opening up the charge points for the public to use.</p>	<p data-bbox="895 1352 1059 1554">Underutilised charging infrastructure during certain times of the day</p>	<p data-bbox="1147 1352 1173 1375">✓</p>	<p data-bbox="1224 1352 1249 1375">✓</p>	<p data-bbox="1284 1352 1477 1518">Long Beach, CA, USA (for trucks only); Revel in Bed-Stuy, Brooklyn, USA</p>
<div data-bbox="172 1588 347 1762"></div> <p data-bbox="197 1767 322 1834">Induction Charging</p> <p data-bbox="395 1592 874 1794">This wireless charging method relies on electromagnetic fields to transfer energy between the charging infrastructure and the EV. This charging method would require retrofitting vehicles to be compatible with this charging method.</p>	<p data-bbox="895 1592 1091 1827">Lack of space to add to street furniture; limited time to charge a vehicle; accessibility issues</p>	<p data-bbox="1147 1592 1173 1615">✓</p>	<p data-bbox="1224 1592 1249 1615">✓</p>	<p data-bbox="1284 1592 1458 1727">Research trials in Sweden ; Gumi, South Korea</p>

Possible solution with constraints

Future development / under development

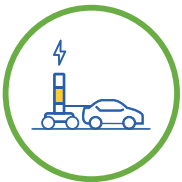
Future development / under development



Conductive Charging



Battery Backup



**Mobile Charging Stations:
Robotic Charging**



Gully Charging

Not feasible

Description	Challenge Addressed			Case Studies
This charging method is still under development and involves the transmission of electrical energy to the EV's battery through a physical connection between charging pads or plates installed on the ground and corresponding receivers integrated into the vehicle's undercarriage.	Lack of space to add to street furniture; limited time to charge a vehicle; accessibility issues	✓	✓	Pilot between Stockholm's Arlanda airport and a logistic logistics area in Rosersberg, Sweden
Beyond storing up electricity during off-peak times to supply power during peak times, in situations where the existing grid capacity or electrical connection is insufficient to meeting the power requirements demanded at a site, a battery backup system can be used to supplement the power supply of a charge point. This provides an interim solution to providing adequate charging infrastructure before a more permanent solution can be in place.	Grid reliability; peak demand management	✓	✓	
To respond to the challenge of vehicles parked in EV-designated parking bays after having completed their charge and the impact of these occupied spaces on the availability of chargers, mobile, robotic charging stations are being trialled as a way to move charge points around parking bays.	Underutilised charging bays		✓	Dallas Airport Pilot
Residences without off-street parking run an EV cable through a retainer channel to an on-street parking bay, mitigating the trip hazard to the public. This solution is used internationally but currently not a solution in Ireland as there are private wire regulations in place prohibiting private electricity supply to public area. This solution would also require permission from the local authority for a road opening licence and there may be issues around public liability insurance.	Lack of resources to install on-street public chargers in residential areas; lack of access to private home charger	✓		Oxford City Council trial

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