ESB NETWORKS

NEW SOLUTIONS FOR DISTRIBUTION SYSTEM INTERFACES FOR PUBLIC ON-STREET EV CHARGING

Public Consultation – December 2020

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Introduction

The anticipated proliferation of electric vehicles (EVs) is already changing infrastructure and connections to the distribution network. ESB Networks was part of the Low Emission Vehicle Taskforce, Working Group 2, chaired by the Department for Communications, Climate Action and Environment (D/CCAE). This group defined four broad types of electric vehicle charging (Government of Ireland, 2018) which we use to inform our four stakeholder sectors for electrified transport:

1. *Domestic and Home* – This refers to residential customers whose electric vehicle charging is done at home. Usually 7kW single-phase alternating current (AC) or less.
2. *Commercial and Location* – This refers to stakeholders who are looking to provide electric vehicle charging at private commercial/communal premises with or without public access such as electric vehicle fleet operators. These chargers will typically have a capacity up to 22 kW three-phase AC or less per chargepoint. This may include high power rapid chargepoints suitable for electric vehicles, particularly larger vehicles, with higher charge rate capabilities.
3. *Public On-Street* – This refers to stakeholders who will be looking to provide electric vehicle charging in public areas with public access such as local authorities. These chargepoints will typically have a capacity up to 22 kW three-phase AC or less per chargepoint.
4. *Rapid* – This refers to stakeholders who wish to provide high power/fast charging with public access. It is envisaged that this will take place on private property with public access similar to a petrol forecourt. These chargepoints currently have a capacity up to 350 kW Direct Current (DC). This is expected to rise in the future as larger capacity batteries in electric vehicles become more common and as heavy goods vehicles and public transport (e.g. buses) also electrify.

The consultation will present an overview of new solutions for connection of public on-street EV charging infrastructure to the distribution system that is consistent with current legislation and presents possible new interface solutions to facilitate both high powered (22 kW) and low powered (7 kW) connection requirements.

We have considered scenarios which include EV chargepoint installation in an urban environment to include EV chargepoints in newer housing developments which do not feature driveways and off-street parking on their property and instead have dedicated parking spaces for homeowners as illustrated in **Figure 1** as well as EV chargepoint infrastructure located in urban and suburban areas controlled by local authorities.

The connection of on-street charging is complex due to existing legislation, ESB Networks requirements as Meter Registration System Operator (MRSO) and regulatory direction via the Metering Code, the requirements and objectives of other stakeholders including EV chargepoint OEMs and providers, EV users and local and national government.

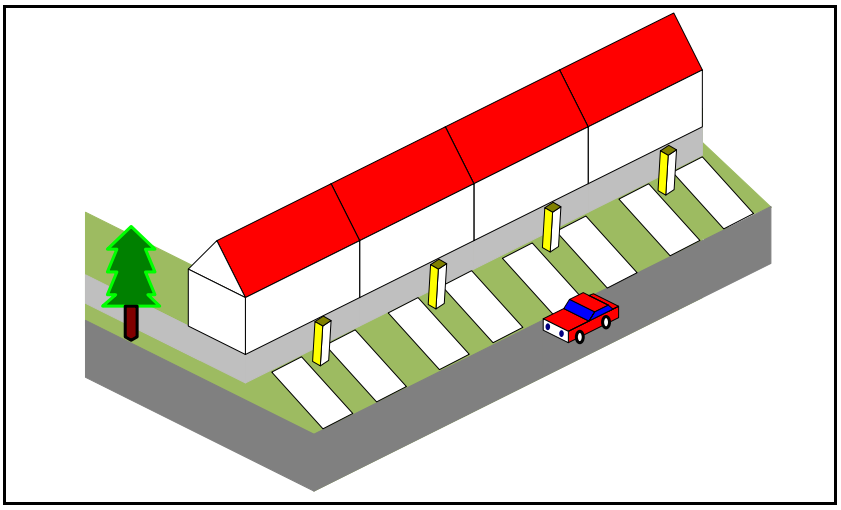

Figure 1 Parking and EV Chargepoints in housing estate layout without off-street parking

Solutions to facilitate the connection of public on-street EV chargepoints

ESB Networks believe that the two solutions proposed in this consultation are viable and will provide additional flexibility for Local Authorities to facilitate the connection of *Public On-Street* charging. The two solutions seek to address challenges around two base scenarios:

1. Public on-street charging in an urban area with capability to supply 2 X 22 kW AC to an EV. Small numbers of chargepoints in the area. Short-term paid for parking.
2. Public on-street charging in an urban/suburban residential area with capability to supply 7 kW AC to an EV. Larger numbers of chargepoints in an area. Overnight parking. Particularly appropriate to residential areas without access to off-street parking.

The two solutions are described in the following sections and described in the context of teed LV networks. The solutions proposed could equally be applied to LV networks with minipillars.

Solution A – ESB Networks Meter integrated in EV Chargepoint

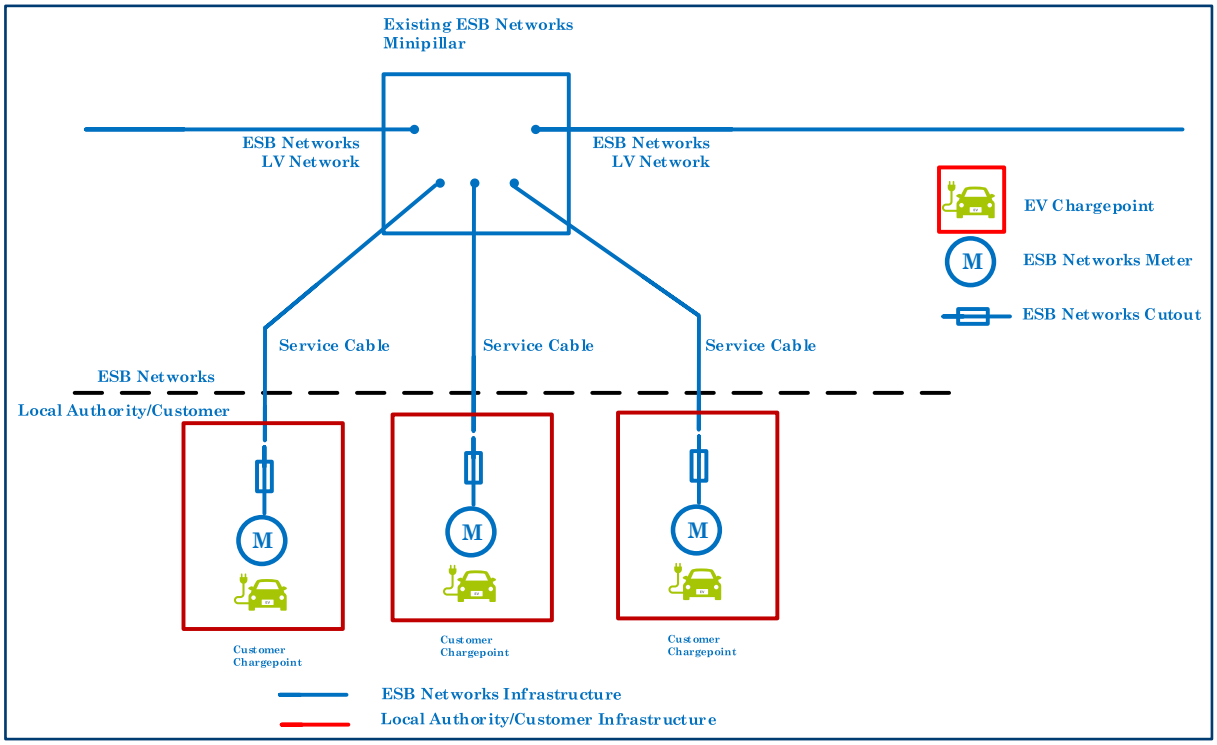

Figure 2 Solution A - ESB Networks Meter integrated in EV Chargepoint

In this solution the local authority's/customer's EV chargepoint contains the ESB Networks equipment (cut-out, isolator and ESB Networks meter) which are fed from the local LV network via a standard ESB Networks minpillar. In this solution, the EV chargepoint shall incorporate a dedicated and exclusive compartment for the ESB Networks' cutout, isolator and meter. The compartment in the EV chargepoint shall ensure that the ESB Networks meter can be mounted minimum 600mm above the ground. This is required for safe working.

In this case the following should be noted:

1. ESB Networks will be responsible and own the LV infrastructure that run through public spaces, particularly footpaths from the ESB Networks minipillar to the EV chargepoint cabinet.
2. An ESB Networks cut-out, isolator and meter to be installed in the EV chargepoint.
3. If an EV chargepoint is physically damaged and needs to be isolated ESB Networks will need to be on site to provide isolation.

Providing space for a standard meter in the body of an EV chargepoint is not without precedent in other European countries with this being common practice in the Netherlands for example. Moreover, ESB Networks have successfully developed a prototype EV chargepoint with an EV chargepoint manufacturer to understand the practical implications for such an approach.

To enable this solution, we will develop and issue a functional specification which will specify the requirements of the ESB Networks compartment within the EV chargepoint. If we receive positive feedback on this solution, we believe that this could be in place for the end of Q1 2021.

Stakeholder Q1: *What is your view of this new option for connecting EV chargepoints to the LV distribution network? In what scenarios would this approach be useful?*

Solution B – Centralised ESB Networks Meter and ESB Networks LV Network

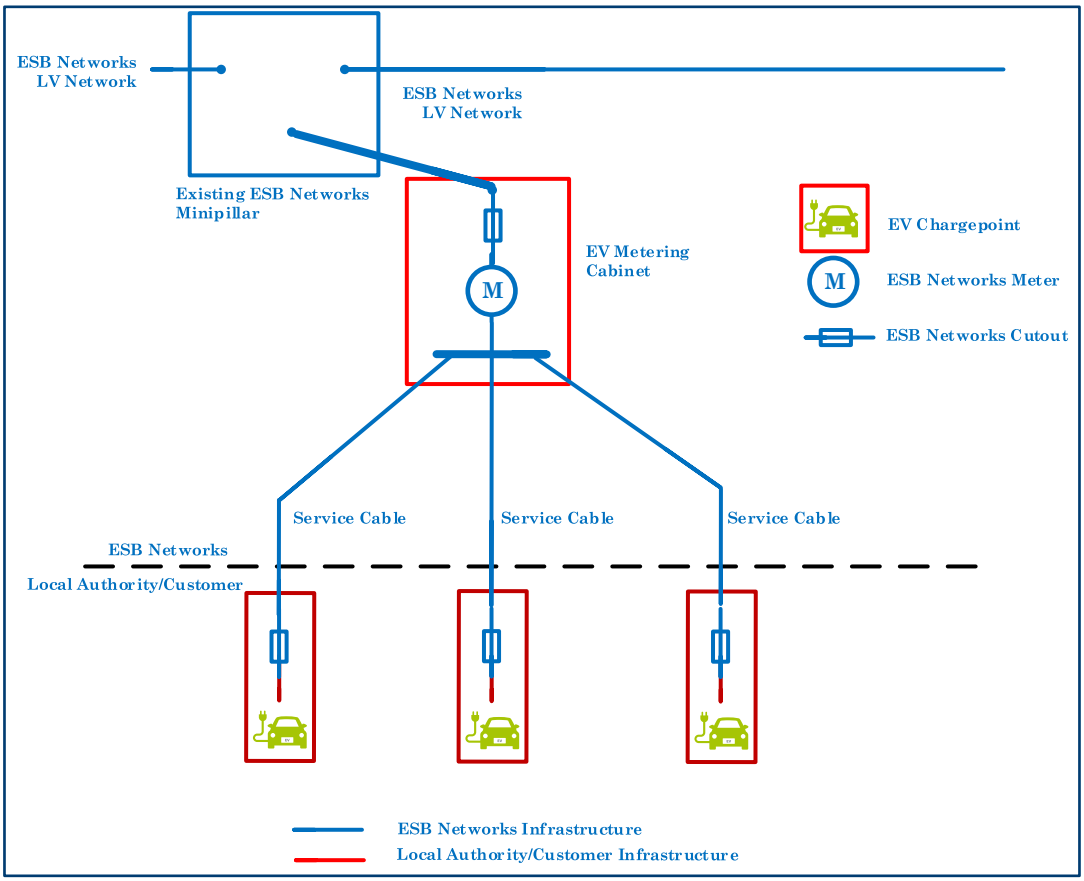

Figure 3 Solution B – Centralised ESB Networks Meter and ESB Networks LV Network

In this solution there is a centralised meter upstream of the EV chargepoints, however the customer interface point is the cut-out/isolator located within the EV chargepoint rather than the ESB Networks meter which generally is the interface point. This is a departure from ESB Networks current customer interface arrangements. With this solution LV instructure will continue to be planned and managed by ESB Networks but reduces metering requirements. Key points to consider for this option are:

- Reduced metering requirements;
- Connection point and metering are not the same – isolator interface point;
- Supports different customer models, e.g. concession from local authority, aggregator;
- ESB Networks meter not required in each EV chargepoint.
- If an EV chargepoint is physically damaged and needs to be isolated ESB Networks will need to be on site to provide isolation.

To enable this solution, we would pilot this approach to understand the practical implications for this approach. If we receive positive feedback on this solution, we believe that this could be in place for Q3 2021.

Stakeholder Q2: *What is your view of this new option for connecting EV chargepoints to the LV distribution network? In what scenarios would this approach be useful?*

Discussion

A summary of the solutions proposed in this paper are given in Table 1.

Public Charging Methods	Compliant with Legislation	Comments
Solution A – ESB Networks Meter integrated in EV Chargepoint	Yes	Compact solution for higher powered charging (fast, 2 x 22kW), allows for disaggregated customer billing. Successfully prototyped with results that can be an input into developing a vendor neutral functional specification. Potentially expensive in low power (<7kW) residential settings
Solution B – Centralised ESB Networks Meter	Yes	More cost-effective solution for standard charging (~7kW), Supports different customer models, e.g. concession from local authority, aggregator; Requires a pilot to verify and deal with issues such as earthing. Has potential applications in housing schemes and residential areas where large numbers of low power chargers are required.

Table 1 Solution Summary

In addition, to the solutions proposed here, there has been some discussion about the provision of LV infrastructure for public on-street EV chargepoint infrastructure in a similar way to the way public lighting infrastrcture is provided by Local Authorities which is supplied with an UnMetered Supply (UMS) by ESB Networks. In the case of EV chargepoints an Un Metered Supply is not appropriate due to the unpredictability and volume of energy that may be consumed at each EV chargepoint.

Furthermore, Local Authority owned LV installations are limited to public lighting only. In 2007, the Commission for Energy Regulation (CER)[1] published a paper developed by the ESB Networks "Public Lighting: Asset Ownership Proposals" (CER/07/014), in which the ESB Networks proposed asset boundary demarcation as:

> *LV installations used exclusively to support, control and supply public lighting or related lighting loads are the property of the Local Authority.*

In the CER's subsequent April 2008 paper, it agreed that the asset boundary demarcations proposed by the ESB Networks were practical and consistent with the Electricity Regulation Act, 1999. The CER therefore approved these proposals. Changes to this would require a number of changes to current policy and may also necessitate legislative changes. Therefore, we would expect that these changes would not be accomplished in the near term.

It should also be noted that the cabling used for public lighting circuits has been designed and built to cater for low power, unmetered applications. This infrastructure is likely to be inappropriate for the demands of EV chargepoints and future EVs. If there is a requirement to reduce street furniture, a

[1] Commission for Energy Regulation (CER) is the former name for the Commission for Regulation of Utilities (CRU) and is Ireland's energy and water economic utility regulator

more appropriate approach would be to develop and use an EV chargepoint with an integrated public light and use an appropriate supply from ESB Networks.

Stakeholder Q3: *Do the options proposed in this document facilitate most EV chargepoint scenarios? If not, what other scenarios be considered? What other options should be considered for connecting EV chargepoints to the LV distribution network? Are they currently compatible with existing legislation?*

Have your say?

We are already busy in many parts of the business looking to facilitate the electrification of heat and transport. To enable this, we will look to embed a company-wide programme cutting across boundaries and business functions to reshape the way we do business around our customers' needs. Electrified heat and transport impacts large swathes of our business, from our new connections team to the engineers who decide when and where we invest in our network, from the National Control Centre to the our Network Technicians and other key field staff who have always kept the lights on and who will now be a key enabler of the transition to low carbon heat and transport. This consultation will provide valuable feedback on how we approach facilitating public on-street EV chargepoints. We value all forms of feedback.

Please help shape our business offerings in this space by sending us your comments to innovationfeedback@esbnetworks.ie. We look forward to hearing from you.