The State of Play in Electric Vehicle Charging Services:

Global Trends with Insight for Ireland

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Executive summary

Electrification of vehicle fleets, particularly in countries with increasing shares of renewable electricity supply, represents an important pathway toward low-carbon mobility. This report examines the role of electric vehicle (EV) charging infrastructure as a key enabler for EV uptake, and explores business models and policy approaches for promoting deployment. It then applies observed key principles to assess the Irish EV charging services market and identifies key recommendations for Irish policy.

Market & Policy Trends

The global market for charging services continues to mature, and companies employ a range of business models in order to provide charging products. Nonetheless, the economics of commercial public charging remain challenging due to the mismatched relationship between the importance of public charging access in dispelling range anxiety, and the clear preference of existing EV drivers for charging at home. Contemporary EV drivers tend to have high rates of home ownership and private parking access; a more mature EV market which includes drivers who have limited home charging will require a robust public refuelling network.

While home charging is most prevalent, workplace charging has shown to promote EV uptake, making drivers up to 20 times more likely to buy an electric car. Depending on fuel mix and hourly generation profiles, daytime charging at work can also promote consumption of renewable energy. Public charging, including fast charging, will be critical to enabling longer journeys, particularly when strategically aligned with drivers' behavioural patterns. Notably, concerns over the impact of fast-charging on battery life do not appear to be borne out by observed usage. Simulations and field studies demonstrate that drivers typically do not use fast-charging in a manner that impedes long-term battery performance.

Companies that provide public charging services and the business models they employ vary widely, from legacy oil or utility firms to dedicated charging network operators to auto manufacturers. This report identifies four key functions in the charging services value chain: manufacturing, development and installation, network operation, and sales and marketing. Policies that target only one function in this chain will be less effective if there are gaps in other areas of the value chain. For example, grants for individual charging stations target charging point owners, who want to offer charging on their property, but may not be

equipped to manage installation of equipment. On the other hand, large auctions or tenders may limit competition to a small number of established companies, though these companies may be best-suited to develop networks. Gaps in the charging value chain have also had damaging consequences for some charging companies and provide an instructive example of lessons learned, as in the case of equipment leasing or battery swapping stations. Holistic policy is needed to ensure such gaps are filled and do not become barriers to deployment of charging infrastructure.

Irrespective of business model, all market participants face high installation and grid connection fees which can make up a large share of the upfront cost of charging stations – 80-90% in some cases. Local electricity tariff structures constitute the main operating cost for EV charging stations. Tariff structures based on demand charges, for example, can comprise up to 50% of a typical commercial customer's electricity bill and more than 90% for EV charging. Streamlined planning and network connection processes, as well as innovative electricity rate design, can help to alleviate both initial and ongoing charging costs.

While there is scope to reduce costs, and utilisation is forecast to increase with higher EV deployment (and would therefore boost operating revenues), EV infrastructure is often at pre-commercial stages and requires public funding and regulation to facilitate the roll out of a comprehensive, competitive charging market. In particular, strategic infrastructure such as fast chargers may be underutilised under current market conditions, and therefore merit public investment. Public funding should generally be raised through general taxation rather than from electricity ratepayers, however when utilities can show that all ratepayers benefit, it may be advantageous for utility-led development to be funded by ratepayers.

Local, regional, and national authorities can use fiscal measures and incentives to disburse public funds at and support private sector investment in charging stations. Such measures should be carefully designed to ensure efficient uptake and a long-term transition to sustainable markets. Widescale EV deployment will need to be accompanied by network upgrades and investment will be required to accommodate increased demand. Planning spatial and temporal demand of installed infrastructure through demand response mechanisms and collaboration between EV charger installers, network planners, and policymakers helps minimise network investment.

EV Charging in Ireland

Ireland was an early leader in establishing a national EV charging network, and boasts

an impressive charger-to-EV ratio of one charger for every five electric vehicles. However, the future of Irish public charging is defined by two key, overlapping challenges: first, existing charging stations are aging and will become obsolete as technology improves. A previous regulatory determination regarding the ownership and operation of the infrastructure by semi-state energy group ESB and distribution system operator (DSO) ESB Networks had resulted in a lack of designated funding for network maintenance and expansion. Though the Irish regulator has recently approved an interim agreement for the ESB Group's continued operation of existing assets, future buildout could be undermined by the dearth of other established charging service providers. Second, the historical dominance of the legacy network operator in Irish charging station development and low EV market penetration means that the current market is underdeveloped, with few competitors active in Ireland. This is especially important given that public funding will likely move to a more competitive process, though some support measures are currently under review by government agencies.

The result of these compounding factors is that Ireland has not fostered a domestic market that is properly prepared or incented to supplement the legacy network. This outcome stands in stark contrast to the government's stated policy goals, and threatens to undermine Ireland's target of achieving 500,000 vehicles on the road by 2030. In order to promote address these issues and promote an effective, right-sized charging network that will enable future EV uptake, this paper outlines the following policy actions (more detail in Section 6: Policy Recommendations):

- DTTAS and DCCAE should leverage past investments in the national network by ensuring that Irish drivers are aware of the charging services available to them. This could involve standardized road signage or interface with GPS or mapping services to alert motorists to nearby charging stations. Such a campaign should reach beyond the community of drivers who already own an EV to raise awareness of charging availability among all drivers.

- Relevant bodies should conduct a detailed review of the cost drivers for EV deployment in Ireland, including both the upfront installation costs (i.e. planning and grid connection fees) and ongoing operating expenditures (i.e. retail electricity rates and rate design). Future prices for fast-charging should be carefully considered in terms of balancing the need for prices that are low enough to ensure continued incentives for EV driving with sufficiently high prices to cover maintenance of the

charger and discourage wasteful charging behaviour. Such a review should also identify specific policy and regulatory measures to mitigate these costs and promote charging development. Any lack of clarity around the responsibility of stakeholders such as local planning authorities and the network operator can lead to delays or cancelled projects, leading to costly uncertainty for market actors.

- Relevant departments/agencies should publicly communicate any planned incentives or support measures for future public charging development as soon as possible in order to attract new market entrants. Such schemes should be designed to take proper account of the underdeveloped Irish charging services market, and should be aligned with specific charging needs. These should include intercity fast-charging near motorways, standard on-street charging in dense neighbourhoods, and more home-charging access for multi-unit dwellings.

- Government, private actors, and the research community should collaborate to conduct more analysis around historical usage of the existing network, as well as evaluation of attitudes and behaviours for current and prospective EV drivers. This information can provide critical insight into planning for charging customers and siting future assets by eliciting drivers' needs and preferences for where and when they wish to charge. Robust analysis using driving profiles can ensure that public support for EV charging is spent efficiently and maximum impact.