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Lessons from the Dutch EV charging approach

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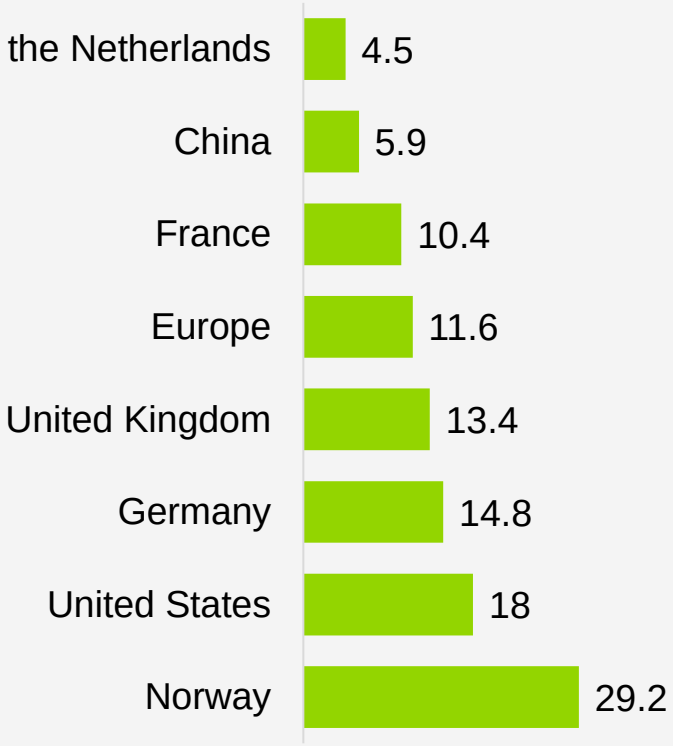
The Dutch are front-runners in EV charging infrastructure



EVs per public charge point
Status quo of charging infrastructure in 2020 [1].

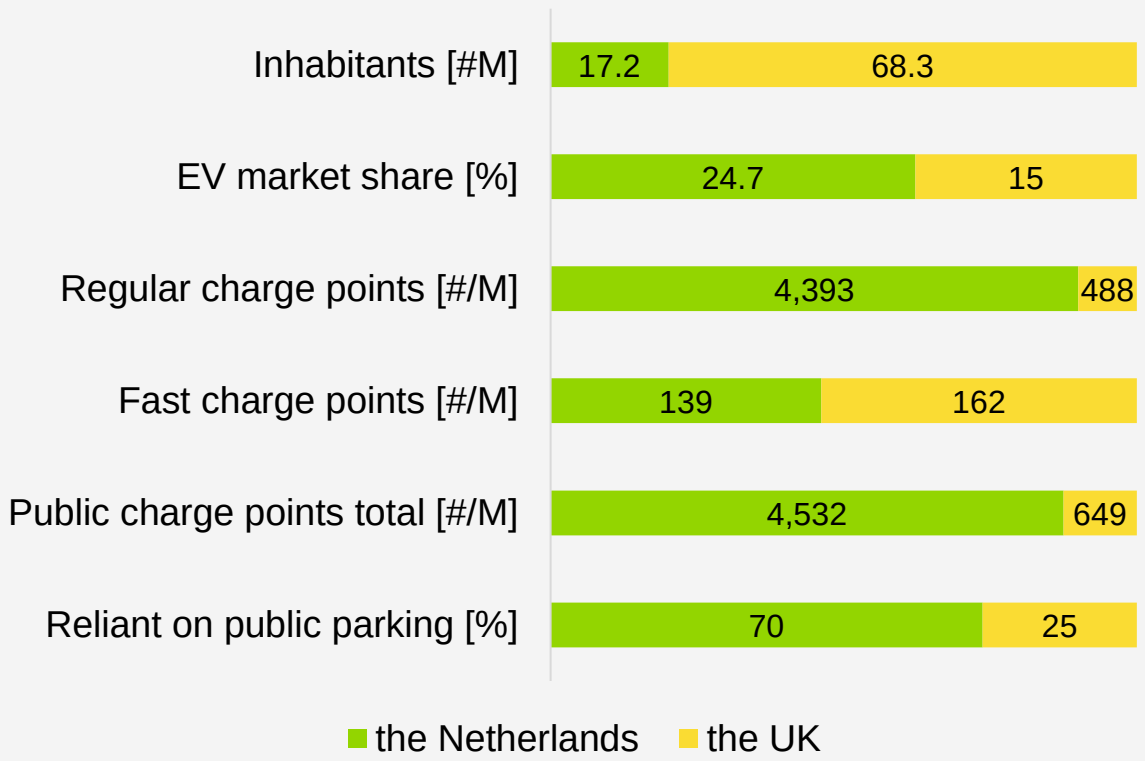
The Netherlands has one of the lowest number of EVs per public EV charge point in the world, while also having **the highest number of public chargers installed per capita and per square kilometer**. Furthermore, when it comes to the development of charging infrastructure it has **outpaced all others** [2].

This can be partly attributed to the **specific country characteristics** of the Netherlands: densely populated, small travel distances, highly reliant on public parking. But the **specific characteristics of the Dutch charging strategy** also explain this highly successful deployment.

Key characteristics of the Dutch EV charging infrastructure development strategy

- Collaboration between stakeholders of different levels
- Local mobility programs and area-wide tenders
- Demand-driven approach to reduce risks for operators
- Data-driven approach that provides transparency and operability

The UK is lagging compared to the Netherlands



Comparison of UK and NL figures

Even with more off-street parking, EV uptake in the Netherlands is higher than in the UK.

Access to public EV charging infrastructure is part of this story.

With a quarter of the UK population, the Netherlands has more installed chargers than the UK, with a total of **77,946** installed chargers compared to **44,304** in the UK [3,4].

The market share of EVs (both PHEV and BEV) is higher in the Netherlands than in the UK, with a market share of **24.7%** compared to **15.0%** in the UK [3,4].

Dutch households rely significantly more on public parking. Across the UK 25% of vehicle owners or **6.6 million households** rely on public parking, while in the Netherlands the comparative figure is 70% or **4.9 million** [5,6].

The Dutch are advancing through collaboration

The specifics of the market and the **willingness of different stakeholders** to accelerate EV charging infrastructure development has led to the creation of a very specific stakeholder ecosystem in which **collaboration is key**.

National government

National policy focusing on **stimulating e-mobility in general**. Putting most roles and responsibilities at specific regions or municipalities.

DSOs

Operating a collaborative **knowledge platform** that focusses on smart-charging, EV-charging behaviour and interoperability. Historically DSOs also developed and operated EV charging infra.

Provinces, regions and municipalities

Structuring their own mobility programs, which cover the **development of EV charging infrastructure**, but also occasionally financial support, etc.. Done in **area-wide tenders**.

Charging infrastructure is developed in area-wide tenders

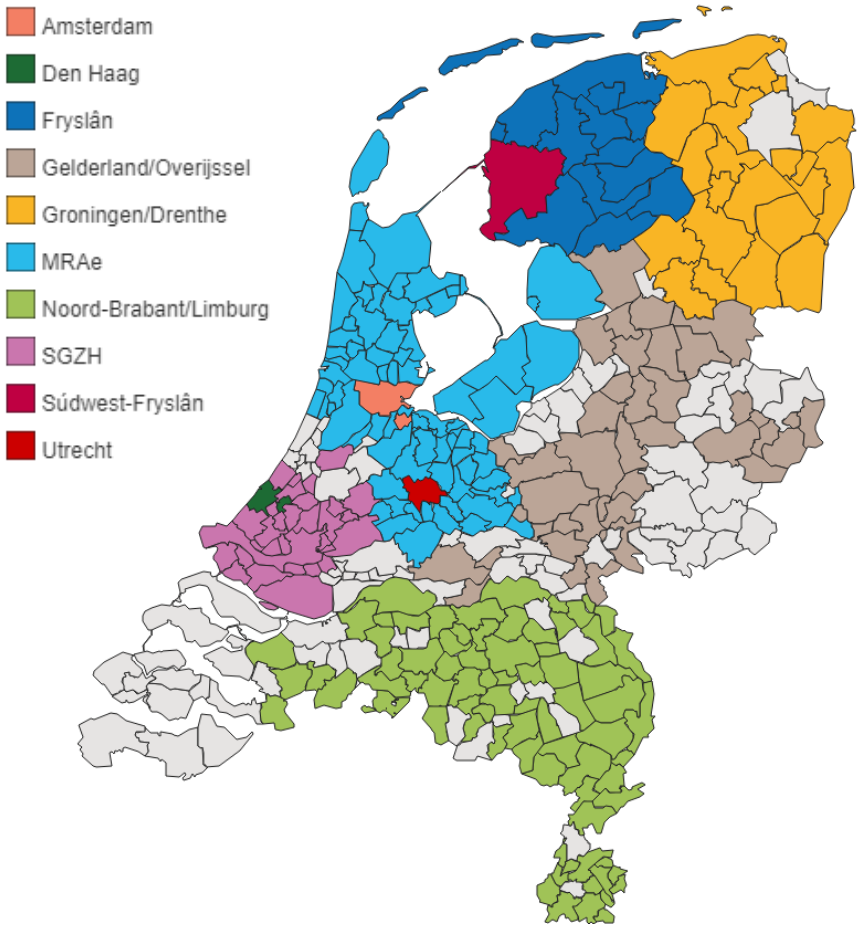
These tenders have allowed a significant number of EV charge points to be installed and with equitable coverage

Initially, almost all public EV chargers in the Netherlands were developed by **EVnetNL, an initiative of the Dutch DSOs**. Since 2016, several municipalities have been encouraged to take back ownership of the infrastructure and have ultimately relied on external partners to operate and continue development of this infrastructure. However, in some areas, Dutch DSOs still operate charging infrastructure through EVnetNL.

Currently in the Netherlands, **municipalities, provinces and regions are encouraged to develop their own mobility programs**. These mobility programs usually cover the development of EV charging infrastructure, but in some cases, subsidies for EV/infrastructure purchase and other incentives. They usually see the involvement of external partners, who focus on network expansion and operation. **To secure better conditions with charging operators**, municipalities can associate themselves and establish area-wide tenders. **An example is MRA-e which holds concessions in three different provinces**.

The resulting electric mobility programs systematically use **demand-driven approaches** built around the Dutch '**right-to-charge**' and involve **close collaboration** with other government bodies and DSOs, in part to ensure the relevant **EV charging data** flows to all parties . All these factors help in **removing the risks for charge point operators** and improving their business case. The concession of Amsterdam was the first of its kind and set the stage for other concessions to come.

All different concessions in the Netherlands



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Amsterdam concession: key characteristics

Key characteristics of the Amsterdam concession have been translated into **the majority of Dutch mobility programs**.

Placement based on demand from potential users

The charge points are installed considering user requests; the connection is made by the installer (with the DSO's agreement) and the construction activities are planned and structured to limit all impacts. Historically, user requests constituted the bulk of placed charge points, although recently forecasting future demand (based on user data) has also contributed to charge point installation.

Collaboration and sharing of usage and network data

Vattenfall, the municipality and Liander are studying usage data to determine if further infrastructure is needed and if network capacity allows extensions. Beyond reinforcing certain stations, new charge points are installed when required (based on existing and project use data). In some cases, up to 3 charging stations are installed at a site in order to forecast future demand.

Decreasing financial public support

Historically, the operators received both CAPEX and OPEX support (through subsidies). Currently there is only support for connection costs, depending on the nature of the connections. The support will be gradually abandoned as has been the case for the more recent concessions (e.g. Rotterdam).

In the Amsterdam concession the company that installs the charge points (Heijmans) and the DSO (Liander) struck an agreement specifying that Heijmans was **allowed to connect the charge points directly to the electricity grid**, without the need for further intervention from Liander. This agreement **significantly reduces the overall lead time** of placing and connecting a charge point.

Demand-driven approach to reduce risks for operators

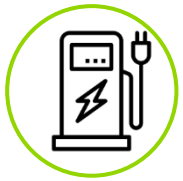
Requesting an EV charger in the Netherlands: how it works

The EV owner requests the installation of a charger on the platform of the charging operator or municipality.

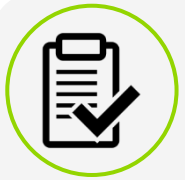
The operator validates the relevance of the request and considers installing a new charge point. It does so by looking at the existing charge points and their utilisation rates.

The operator chooses the location based on existing network infrastructure (including available capacity), accessibility, visibility and local impacts.

The location is validated by the DSO, who can also make changes to the exact location to avoid possible network reinforcements.



After the municipality gives the official approval for the installation of the new charging point, the prime contractor installs the charging point, prepares the site and in the case of Amsterdam even connects it to the electricity grid.



The results

High utilisation rates, since chargers are placed according to existing demand, thus improving attractiveness for the charge point operator.

Addresses concerns about charging availability, improving electric mobility attractiveness for consumers and ensuring equitable access: whole municipalities and provinces are covered .

Has proven **more effective than placing chargers at key strategic locations** such as shopping areas [7].

Amsterdam concession: the benefits

The Amsterdam concession resulted in **specific benefits for each involved stakeholder**.

Municipality

Guaranteeing usage means guaranteeing a positive business case for charge point operators. Ensuring charge point development as part of such concessions tends to limit or completely remove the need for subsidies from municipalities, which can further simplify deployment.

DSO

Sharing data both on infrastructure usage and on network capacity ensures that network expansions can be done when needed and that EV charging does not degrade security of supply.
Enabling the charge point installer to also cover the grid connection limits interventions and associated costs and accelerates deployments.

Charge point operator

Ensuring that the charge point network is expanded according to direct end-user demand guarantees usability and thus revenue for the charge point operator. The data insights also ensure that superfluous installations are avoided and usage stays high.

Charge point user

The on-demand functioning practically guarantees access to available charge points nearby, improving the attractiveness of switching from an internal-combustion vehicle to an electric vehicle. Equitable access encourages those without off-street parking to switch to EVs.

Learnings from Rotterdam: fully subsidy-free concessions

Concession characteristics

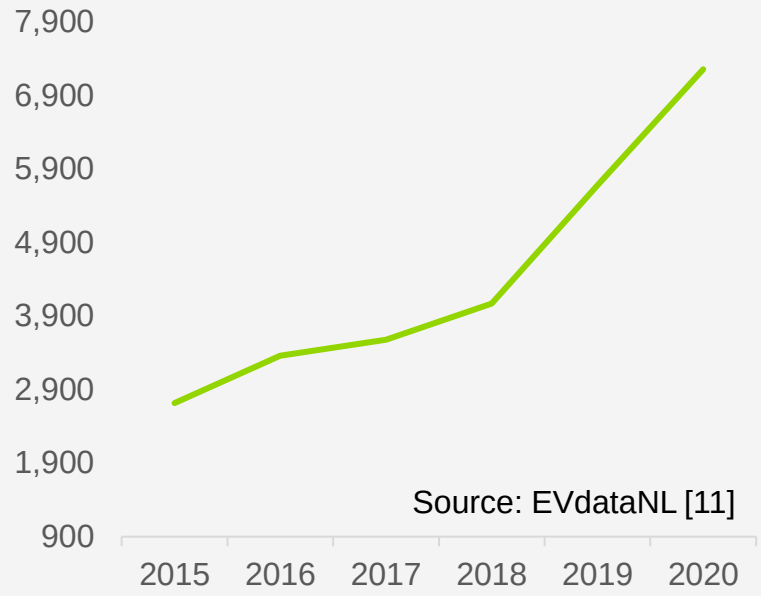
- Initially 16 municipalities, currently 30.
- Concession of 10 years
- 6.500+ Charging points
- Guaranty of usage
- Subsidy-free and fully renewable electricity

In 2016, **Engie Infra & Mobility** was awarded the permit to place EV charging points in **Rotterdam** and the surrounding municipalities. Since 2016 **over 2.850 charging points** have been placed and in the three years approximately **4.000 more will be installed** [8].

The operator **does not receive funding** from the municipality but pays the municipality €500 for each station installed, the generated money is reinvested in the development of smart charging pilots [9].

This is possible because of the **guarantee of usage** the concession ensure through the **demand-based model** and the **right-to-charge**. The operator also requires a **minimal charge use of 2.000 kWh per year** [10] and asks this of all end-users interested in getting access to a charge point. However, according to the data the actual average consumption per charge point is only growing.

Average kWh charged per charging point in Rotterdam



Source: EVdataNL [11]

Learnings that could be drawn from the Netherlands

Collaboration between stakeholders at different levels

The collaboration between the government, DSOs, municipalities and charging operators significantly **reduces the overall lead time** of installing a charge point as well as the total costs at whole system level (fewer site visits, etc.).

Demand-driven approach to reduce risks for operators

The **demand-driven approach**, where charge points are deployed based on demand from potential users **results in high utilisation** of the infrastructure, partially de-risking investment from the potential charge point operators and limiting public subsidisation.

Local mobility programs and area-wide tenders

Giving more **responsibilities to local governments** and **centralising at the city level** enables a coherent EV infrastructure development strategy. This incentivises local governments and municipalities to develop their own objectives for EV charging infrastructure development.

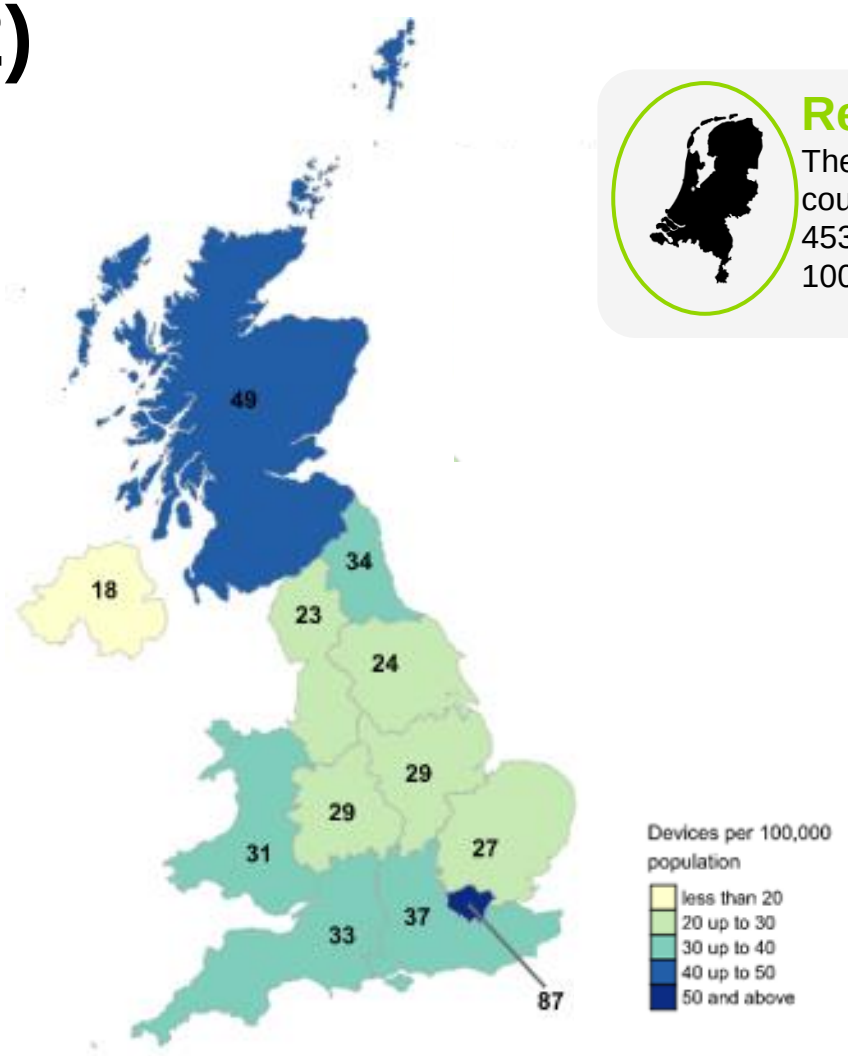
Data-driven approach that provides transparency and reduces costs

The data-driven approach accelerates deployments and **reduces costs for charging operators** while allowing them to better recoup their investments. Historical data is also used for **forecasting medium-term charging needs**, but also to define the long-term concession perimeter. This is supported by the NAL (“National Charge Infrastructure Agenda).

Public Charging in the UK (1/2)

Provision of public chargers varies significantly throughout the country, the majority of the UK's charging demand is fulfilled by home charging, with 85% of EVs in the UK having home charging available. Greater London and Scotland are the leading regions for the deployment of public chargers per head of population. Large urban areas outside of London such as the West Midlands, Greater Manchester and West Yorkshire have the greatest need for improved availability of public charging. These regions have the lowest supply of public charging infrastructure relative to their current and anticipated charging needs (ICCT). The roll out of rapid charging facilities in the UK has been faster than public charging as a whole in line with the government's target of 2,500 high power chargers (>150kW) by 2030.

The need for public EV charging will continue to increase, driven by the ban on the sale of ICE passenger vehicles in the UK from 2030 and the gradually reducing availability of ICE vehicles supplied by automakers. At the same time, automakers are increasing the supply of EVs to cover all key vehicle segments and price points while advancements in battery and EV technologies will contribute towards lower purchasing prices.



Public charging devices per 100,000 of population by UK region

Source: Zap-Map, Office for National Statistics [12]

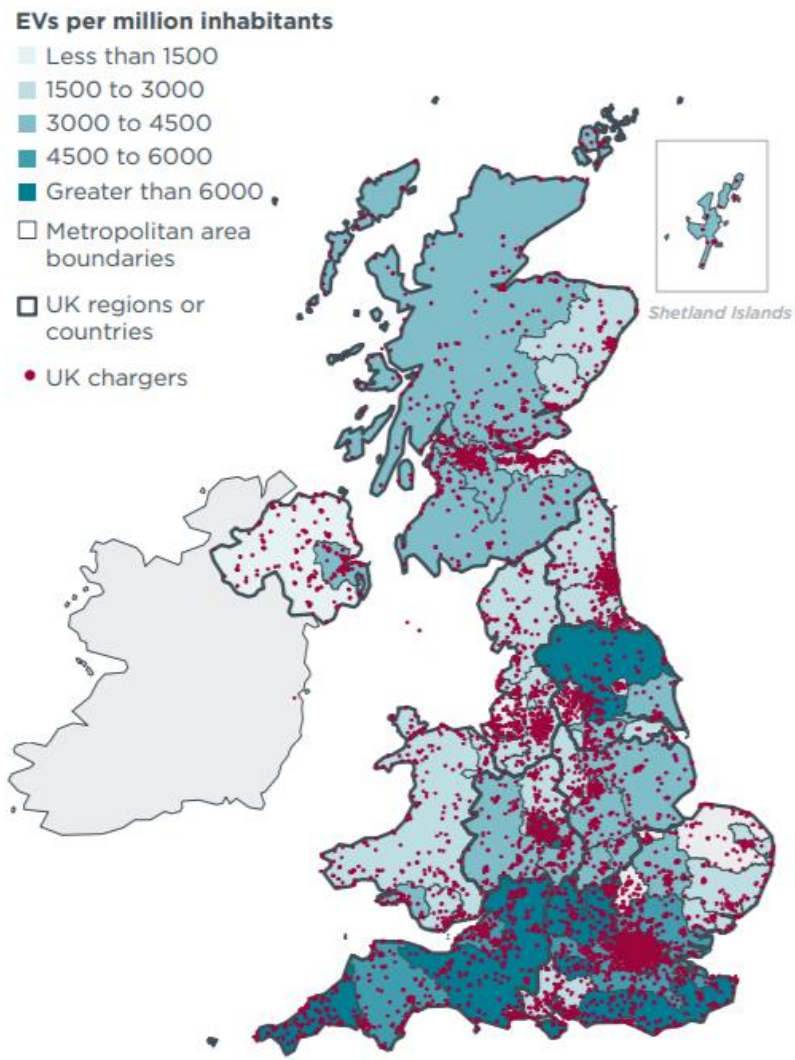
Reference

The Netherlands has a country-wide average of 453 charging points per 100,000 population

Public Charging in the UK (2/2)

The UK needs to rapidly increase the rate of installation of public charging infrastructure to meet the country's estimated 280,000 public charge point requirement for 2030 [13]. A recent study has found that 90% of UK households are more than 5 minutes away from the nearest public charge point [14] which is especially relevant in cities where their dense populations and low availability of home charging equipment results in a greater reliance on public charging.

Local authorities are key to the successful rollout of public EV charging infrastructure. The installation of public EV charging equipment has largely been funded by private sector investment, however a significant proportion of installations have benefitted from Government funding with grant schemes. Local authorities are responsible for identifying sites for charging equipment and for their installation. charge point operators are contracted by local authorities to install and operate EV charging equipment, but face challenges in recouping their investments due to the uncertainty of achieving high charge point utilisation.



Electric cars per million inhabitants overlaid with charging station locations

Source: ICCT [15]

Application to the UK EV Charging situation (1/2)

Proposed priorities for action.

Infrastructure mapping

Infrastructure mapping of EV charging needs by scenario and how these relate to city and regional authority areas would provide a clearer basis for charge point area concessions. This could include heat maps from Local Area Energy Mapping and Planning. Potential roll-outs need to progressively rely more on methodology built around “on-demand” deployment.

Collaboration

Collaboration between Government, Ofgem, DNOs, Charge point Operators and City/Regional Authorities would establish a new framework for regional accountability and action, underpinned by central technical standards, service level requirements and charge point inter-operability requirements.

Regulation

Regulation will need to reflect changes to the grid connection approach and resulting DNO costs while ensuring that consideration is given to grid constraints, the need to minimise investment over time and to embrace the benefits of flexibility from smart charging and ultimately from V2G.

Application to the UK EV Charging situation (2/2)

Proposed priorities for action.

Local mobility program funding support

Establishing local mobility programs requires funding for city and regional authorities to support the development of this and enable effective area-wide tendering in place of current entrepreneurial siting of public charge points.

Demand-driven approach

A demand-driven approach necessitates easy-to-access online systems for EV owners to request charge point access near them in a way that facilitates responsive investment decisions by all stakeholders.

Attract private investment

A demand-driven approach is likely to increase attractiveness for private investors, as the Rotterdam example which institutes a minimum usage guarantee has shown. Concessions and area-wide tenders should reduce cost of capital, improve interoperability and improve coverage.

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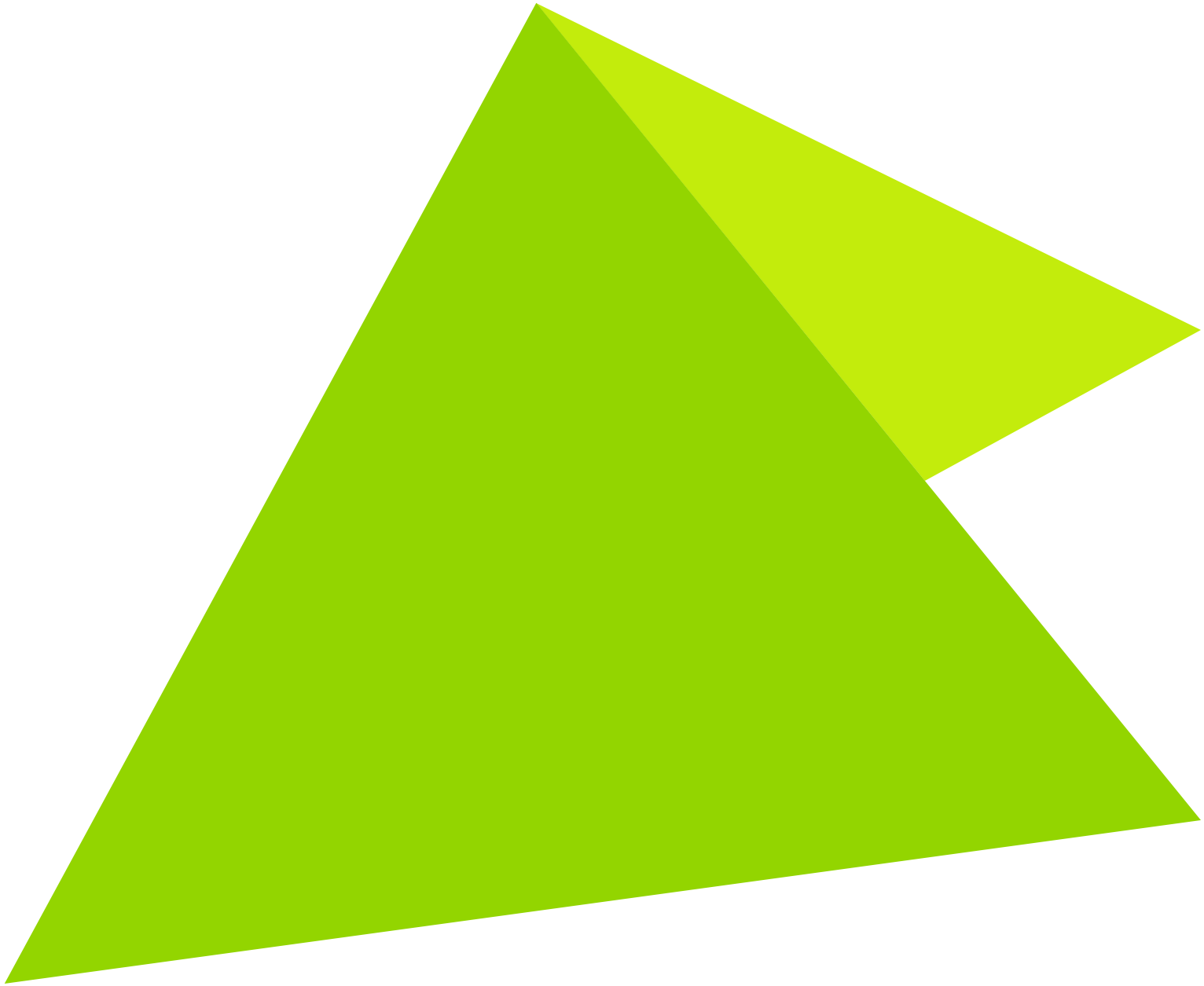

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