

Europe's charging infrastructure for electric HDVs

Targets for 2027 & 2030 pave the way forward, but obstacles remain



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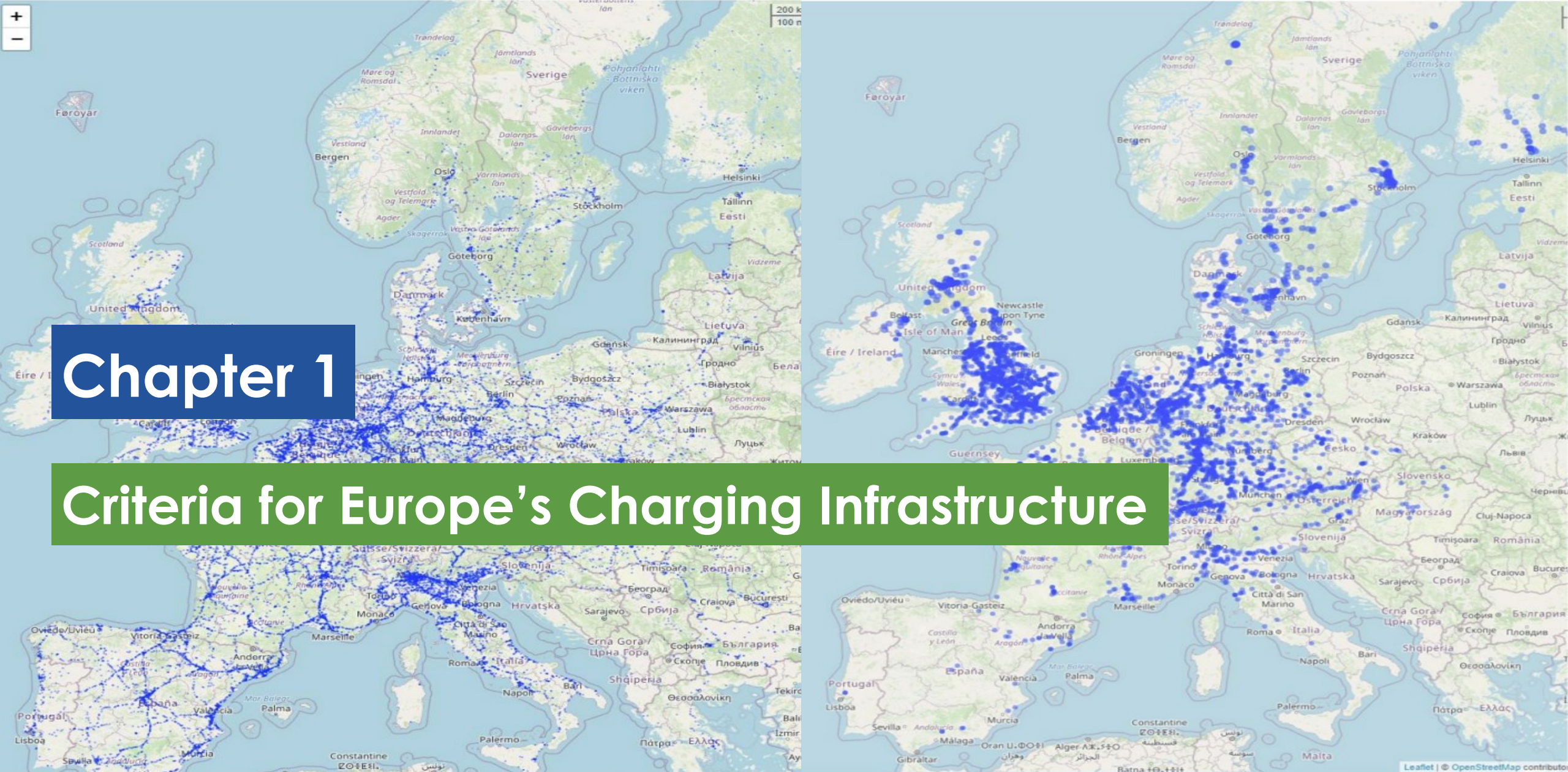
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Talking to the Industry

- Spotlight Interview: Anja van Niersen, CEO, Commercial Vehicle Charging Europe (CVCE)
- Spotlight Interview: Patrick Plötz, Scientific project lead, High performance charging for long haul trucking (HoLa)
- Scania
- BP
- Mercedes-Benz Trucks
- Galliker Transport





Chapter 1

Criteria for Europe's Charging Infrastructure

Focus for HGV Charging Facilities in Europe

- **10%** of locations in Europe account for **50%** of total stops made by trucks today.
- This 10% means over **3,000** locations in Europe account for **78,000** stops made by trucks per day
- Focus now on making sure these 3,000 locations are equipped to handle electric charging for HGV trucks by 2027
- ACEA calling on Member States prioritise top 10% truck stop locations within their countries to be equipped with suitable chargers by 2027
- Critics state existing service stations not large enough for ample truck parking, new greenfield sites needed

<https://www.acea.auto/press-release/electric-trucks-new-data-maps-out-priority-locations-for-charging-points/>



Only ~~4~~ ~~3~~ 2 public charging locations for heavy trucks in Europe—2022

- **Sweden:** Scania supplies 5 BETs and 1.6 MW charging equipment to Falkenklev Logistik for a 22 vehicle electric charging stations for trucks to open this year in Malmö.
 - Site will support en-route charging for long haul electric trucks
 - Charging station in Malmö supplied by Finnish manufacturer Kempower, delivered to Scania
- **Germany:** eTruck Charging Park in Wörth am Rhein opened 25 June 2022 by Mercedes-Benz Trucks together with Netze BW. Mercedes electric truck customers can use charging stations and technology from various suppliers, but this site is not open to public.
- **Germany:** bp's Aral brand has opened its first electric truck charging station at Schwegenheim in Rheinland-Pfalz on 27 July 2022. Site has two 300kW chargers for electric trucks.
- **Norway:** CharIN-Charging Interface Initiative e.V—officially launches the Megawatt Charging System (MCS) in June 2022 in Oslo. But this was only for the event EVS35.



No adequate charging infrastructure for trucks today

Brussels, 3 April 2020 – The European Automobile Manufacturers' Association (ACEA) has released new data on the number of charging points and re-fuelling stations required for zero- and low- emission trucks to meet the 2025 and 2030 CO2 targets. In terms of charging points for electric trucks, this means going from close to zero today to some 90,000 public points over the next decade in order to enable the transition to carbon-neutral road transport.

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“No public charging infrastructure for trucks yet in Europe, clients with electric trucks use depot charging and limited to regional routes,” OEM eTruck manufacturer, August 2022.

Europe—focusing on HDV truck stops most used:

- 75,000 km of highway in Europe implies several thousand rest areas, on average 350 km apart.
- Stops are either short stops of less than 3 hours or longer stops of more than 8 hours.
- **Group 1:** On average 60% of stops are shorter than 3 hours
- **Group 2:** On average 33.3% of stops are longer than 8 hours
- Group 1 + Group 2 cover majority of stops
- Therefore stops of between 3 to 8 hours hardly ever take place, so the two Groups 1 & 2 are used as a basis to forecast the main stops needed for charging infrastructure locations across Europe.
- Long haul trucks use long stop (Group 2) durations more than regional trucks

	Group 1			Group 2		
	½ hour - 1 hour	1 hour - 3 hours	3 hours - 8 hours	8 hours - 23 hours	23 hours - 44 hours	> 44 hours
Long-haul truck	35%	24%	6%	31%	2%	2%
Regional truck	44%	23%	6%	24%	1%	3%

Raw data on 750,000 truck stops from 7 OEMs was used for this study.

Source: Fraunhofer ISI



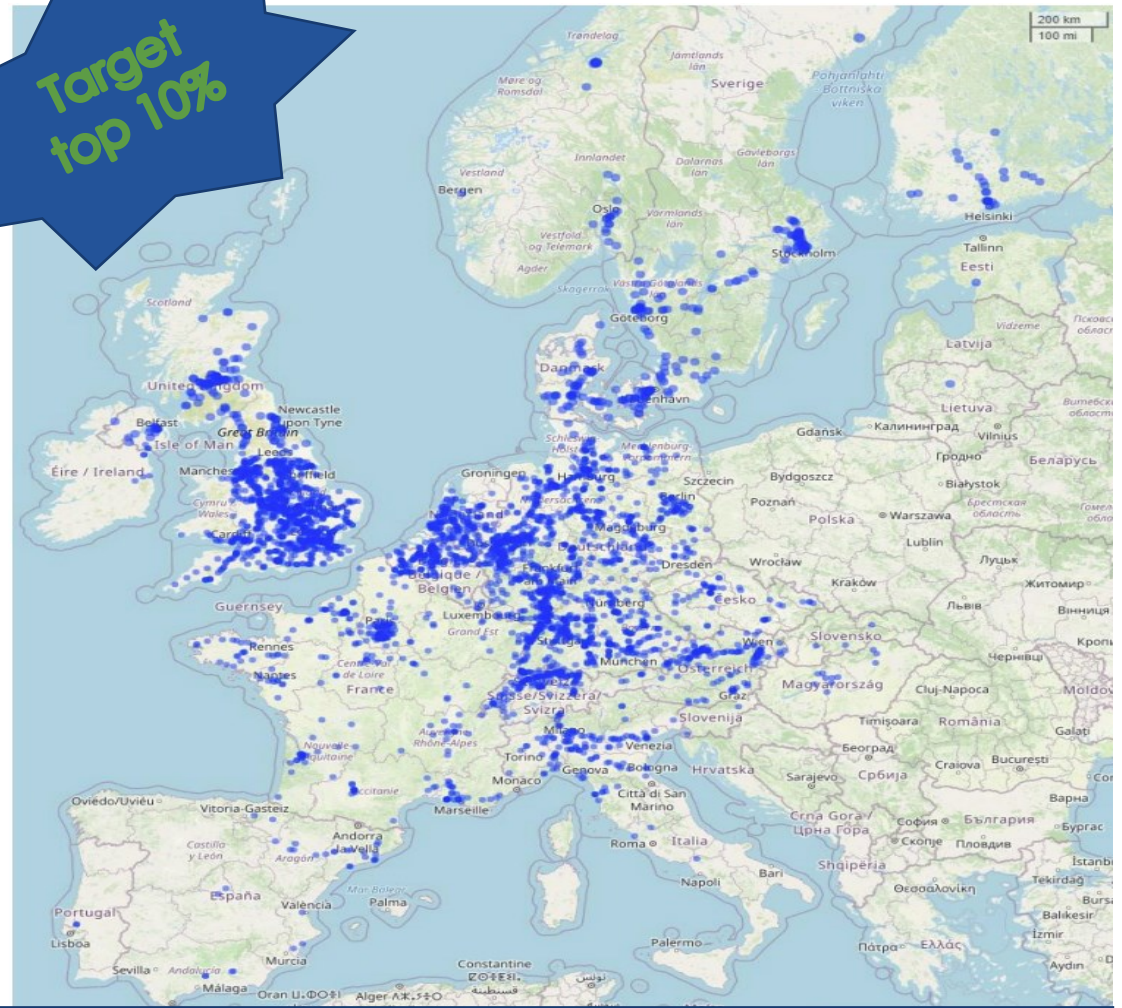
Long Haul Truck Stops – 31,145 long haul stops across 35 countries

Target top 10%



Regional Truck Stop Locations—4,023 regional stop locations

Target top 10%



Target to build charging infrastructure for Top 10% of most used commercial vehicle truck stop locations by 2027



The way forward (from 2027):

Step 1: 2027

Top 10% of most visited in Long Haul Data

- Step 1:
 - Top 10% of most visited in Long Haul Data as locations for first public charging stations
 - Target: 2027

Step 2 : 2030

Extend to all stops in the Long Haul Data

- Step 2:
 - Extend to all stops in the Long Haul Data set for a dense and efficient public charging network
 - Target: 2030

Dense and efficient public charging network across Europe for heavy trucks 2030-2040

Note: 90% of Regional Truck stop locations are identical to Long Haul stop locations

What about today?

Public Electric charging infrastructure for heavy vehicles today almost non-existent? (2022)



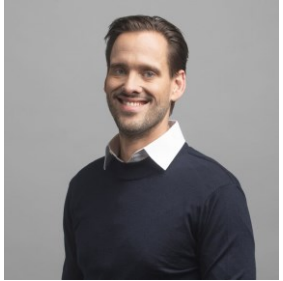
Lack electric truck charging infrastructure, today



Martin Lundstedt, Chairperson ACEA Commercial Vehicle Board, CEO Volvo Group

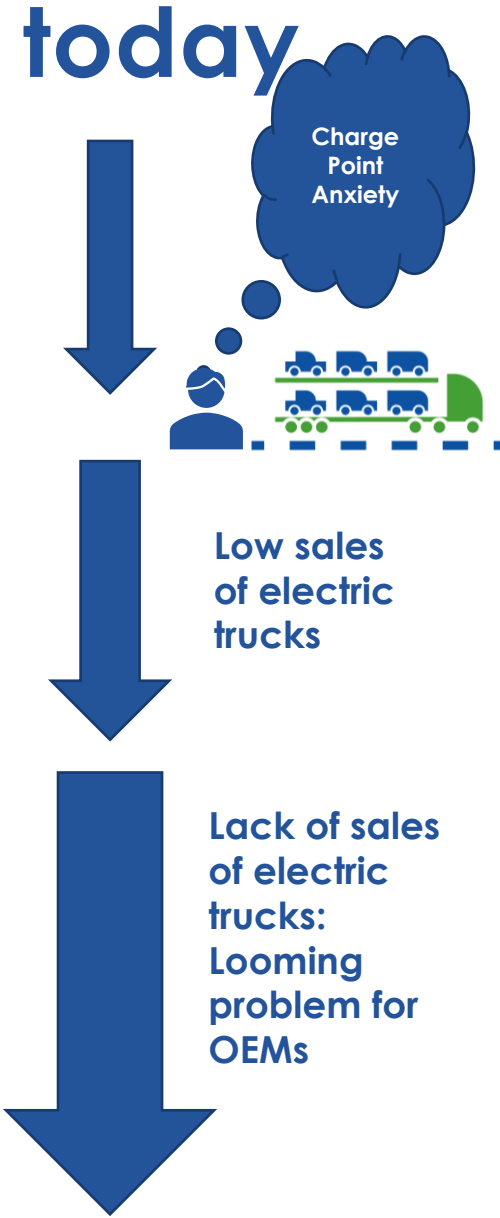
“Battery electric trucks will play a major role in decarbonising road freight transport. If enough charging stations are rapidly installed across the EU, their market uptake will increase exponentially over the coming years,” stated Martin Lundstedt, Chairperson of ACEA’s Commercial Vehicle Board and CEO of Volvo Group.

“Given that charging stations that are suited to the specific needs of trucks are almost completely missing today, the challenge ahead is huge. That is why we want to help governments and industry stakeholders to direct their investments to where they are most needed,” explained Lundstedt.



Roel Vissers, Director Strategic Partnerships & Public Affairs, CVCE

The biggest challenge will be time. Technology is ready to electrify trucks on relatively short notice, but this will not happen without the required public charging infrastructure. We need to build a network, which involves obtaining building permits and getting grid connections within months. Normally, this tends to take years. But we – as Europe – cannot accept years of delay, so we must find a way.



Heavy Duty Trucks cannot use PV charging infrastructure

Heavy-duty vehicles simply cannot use passenger car infrastructure because of their much higher power and energy demand, as well as specific space, parking and access requirements. If Europe is to achieve these minimum levels of deployment, binding truck infrastructure targets for ~~member~~ states must be set now by the Alternative Fuels Infrastructure Directive, ACEA urges.

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The statement from ACEA is partly the case, in general at most charging locations it's almost impossible for trucks to charge, as these concern charging at a parking spot for cars. At our stations the high power and energy demand is not the issue, but the weight of the truck and especially the turning radius are limiting factors for charging at a station.

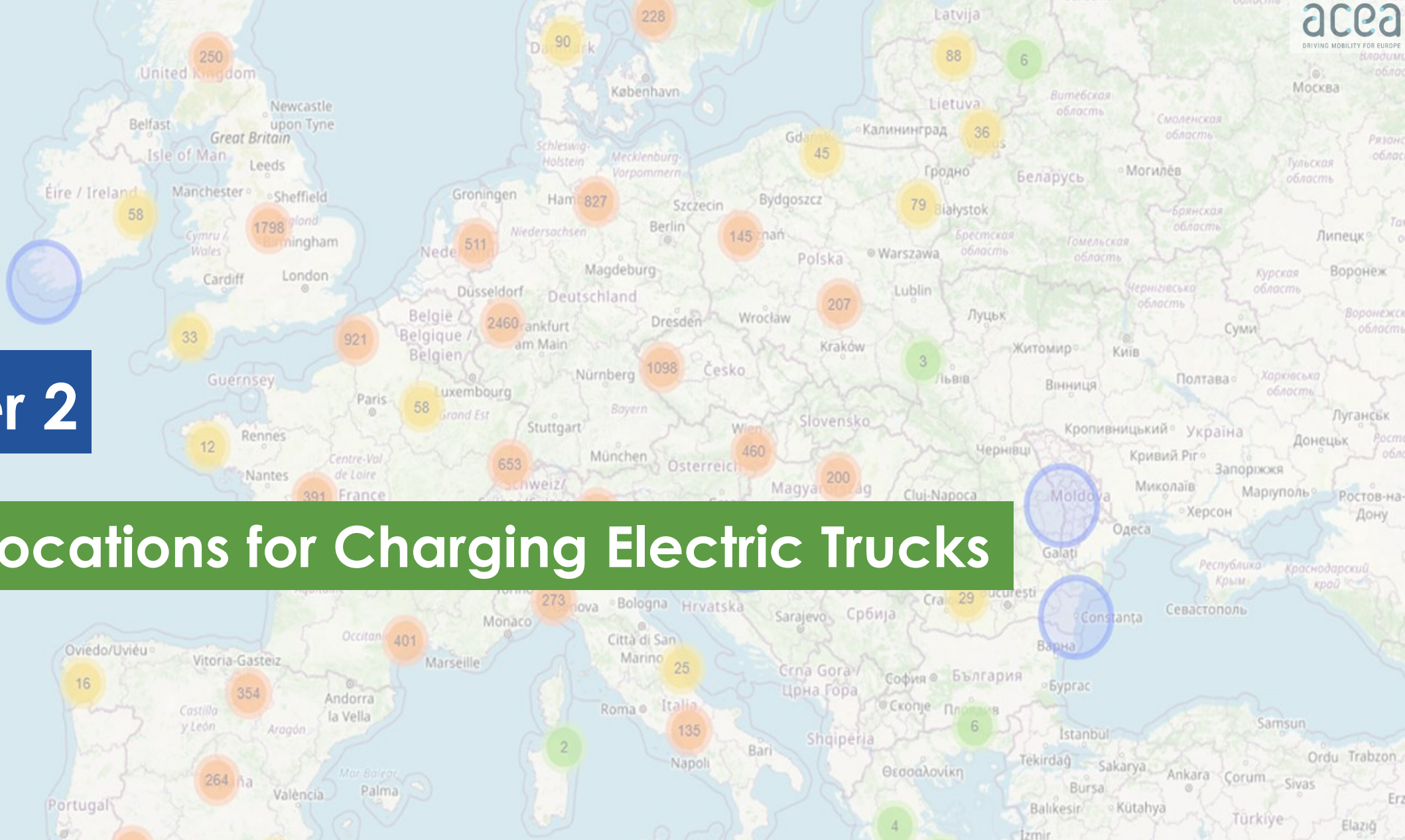
Thanks to the drive-through lay-out and high roofs, most of our stations are already open for trucks up to 7.5 tonnes. Except for the arc stations, with a height limitation of 2.75m. At the moment we are assessing our current stations to determine what we can offer there.

About the ~~X~~ 2 existing sites made specifically for heavy trucks in Europe, there is probably nothing else there, except for our stations where trucks up to 7.5 tonnes can charge.

FASTNED 

Chapter 2

Priority Locations for Charging Electric Trucks



		Total truck stop locations	Locations requiring chargers by 2027			Total truck stop locations	Locations requiring chargers by 2027
1	Germany	7,452	746	16	Denmark	269	27
2	France	5,833	584	17	Norway	217	22
3	Italy	3,367	337	18	Portugal	186	19
4	UK	2,989	299	19	Bulgaria	138	14
5	Spain	2,818	282	20	Finland	132	14
6	Poland	1,445	145	21	Lithuania	114	12
7	Netherlands	1,014	102	22	Slovenia	102	11
8	Belgium	899	90	23	Croatia	67	7
9	Austria	877	88	24	Luxembourg	60	6
10	Czech Rep.	811	82	25	Greece	58	6
11	Sweden	672	68	26	Ireland	45	5
12	Hungary	587	59	27	Latvia	44	5
13	Switzerland	301	31	28	Serbia	41	5
14	Slovakia	276	28	29	Estonia	33	4
15	Romania	274	28		Total	31,121	3,126

Targeting top 10%

- 2027: **3,126 EXISTING** Locations across Europe require chargers



77,853 stops per day by trucks for charging at locations in Europe expected by 2027

- 2030: **All existing** locations across Europe **WOULD** require chargers, so 31,121 locations



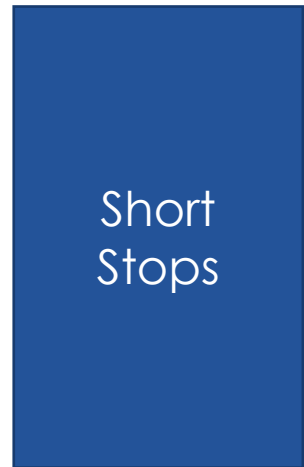
143,083 stops to be made per day by trucks for charging across Europe

But this analysis does not take into account increase in number of total trucks in service by 2030.

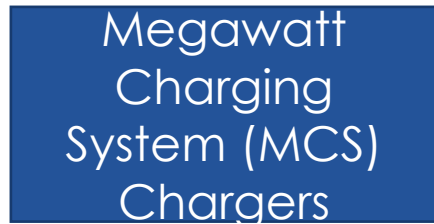
Types of Stops determine charging needs

Precise locations of truck stops in 29 European countries are distinguished by stopping times of the trucks - SHORT STOPS (under one hour) and LONG STOPS (overnight parking). These are important as the duration of the stop determines the type of charging system required based on the amount of time for a full recharge. This also then allows for power supply to be allocated accordingly for the stop.

- Short Stop



Required from 2027



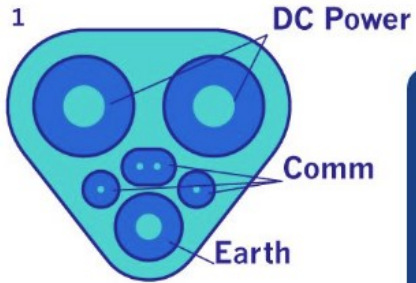
- Long Stop



Short truck stops (MCS chargers)

MEGAWATT CHARGING

Gamechanger for eTrucks

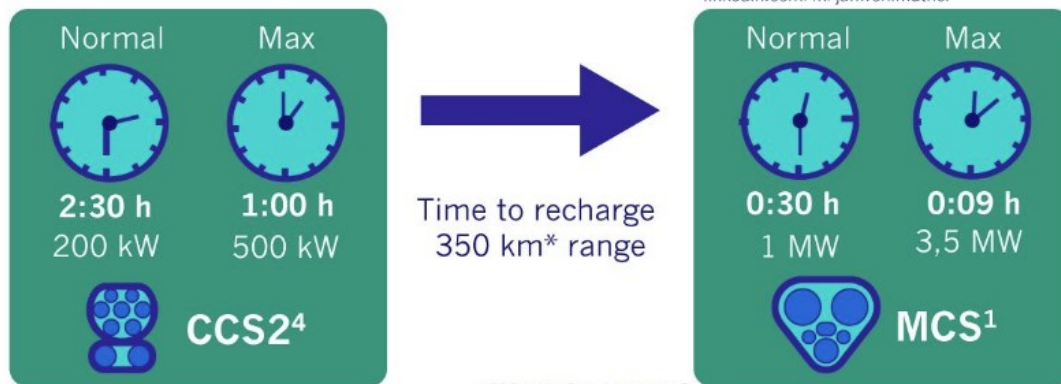


FACTS^{2,3}

- up to 1,250 V & 3,000 A
- plug and inlet designed for trucking
- not backwards compatible to CCS
- vehicle2grid-ready (bi-directional charging)
- inlet always left side behind cab
- plug design proposal presented at EVS35
- commercial release 2024

WHY?

The Megawatt Charging System can significantly reduce time to recharge battery electric trucks for maximized utilization e.g. during a regular driving break after 4.5h



Quick Facts:

- MCS designed for maximum current of 3,000 ampere (DC) and up to 1,250 Volt
- Potential of Peak Power is 3,750 kW or 3.75 MW
- MCS is more than the max 350-500 kW of the existing Combined Charging System (CCS) used as a base for development
- MCS standard to be released 2024
- From 2027, all Short Stops will require MCS* in Europe (ACEA)

MCS, the Megawatt Charging System, represents a global solution for Heavy Duty transportation, and is based on globally aligned requirements and a technical specification to develop the requirements for a worldwide standard with final publication of the standard expected in 2024.





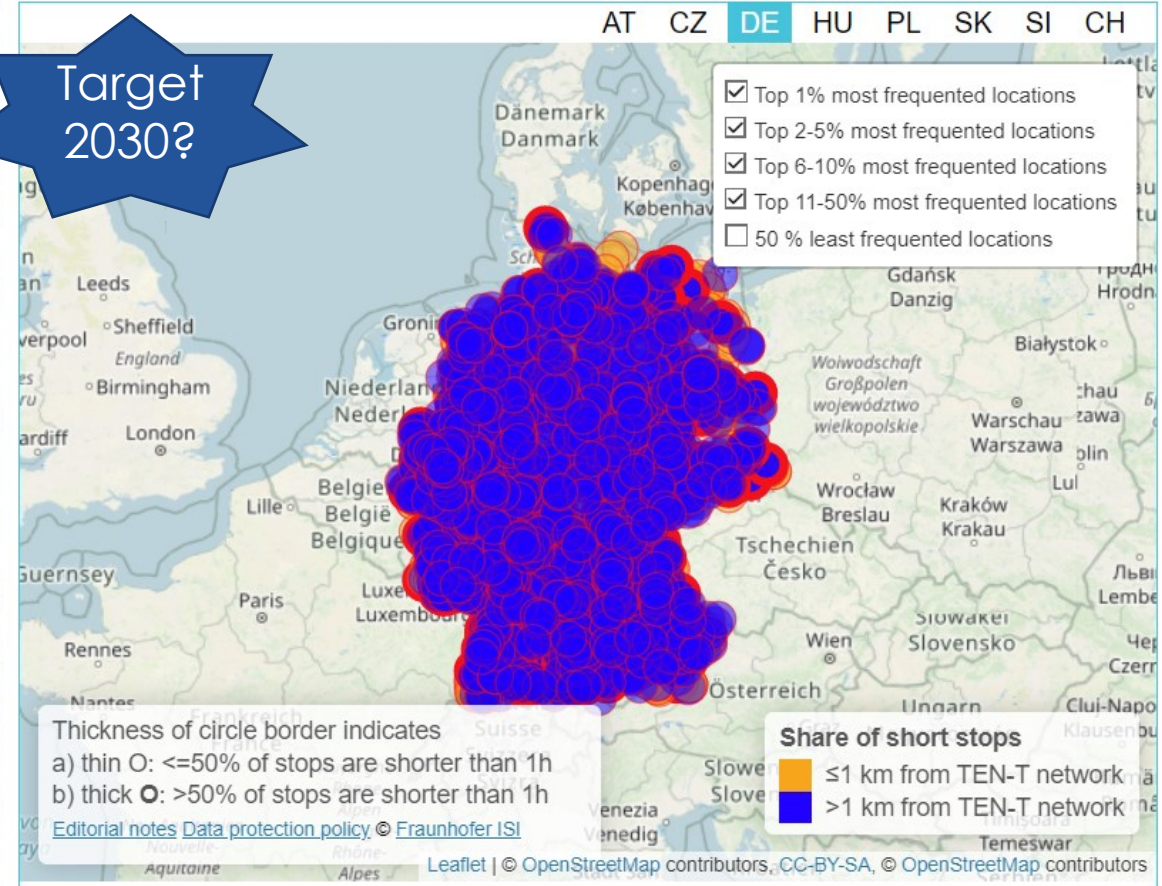
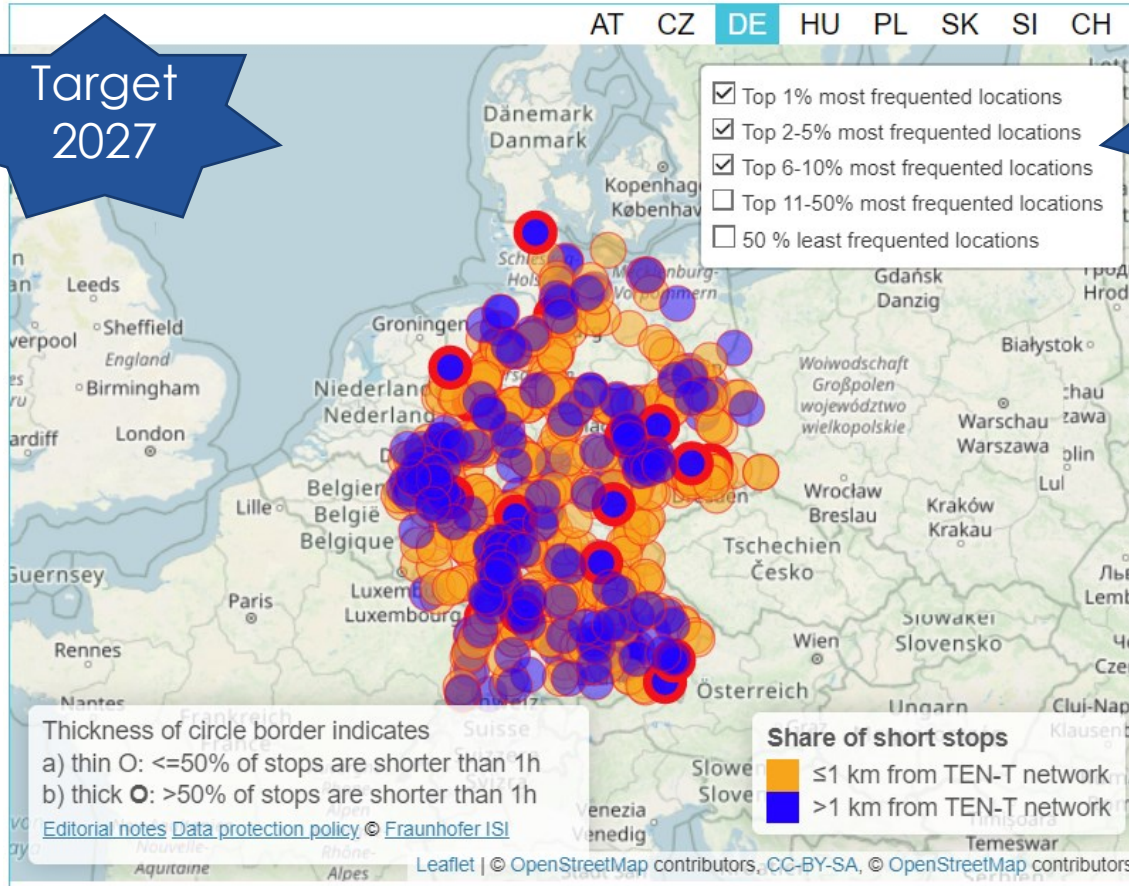
Short Truck Stops (MCS)

Top 10% of most utilised short truck stops

Top 50% of most utilised short truck stops

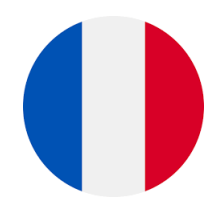
Target 2027

Target 2030?



The top 10% most utilised locations should be fully equipped with suitable chargers no later than 2027. A minimum network of charging stations must be fully operational by 2030 at the latest.



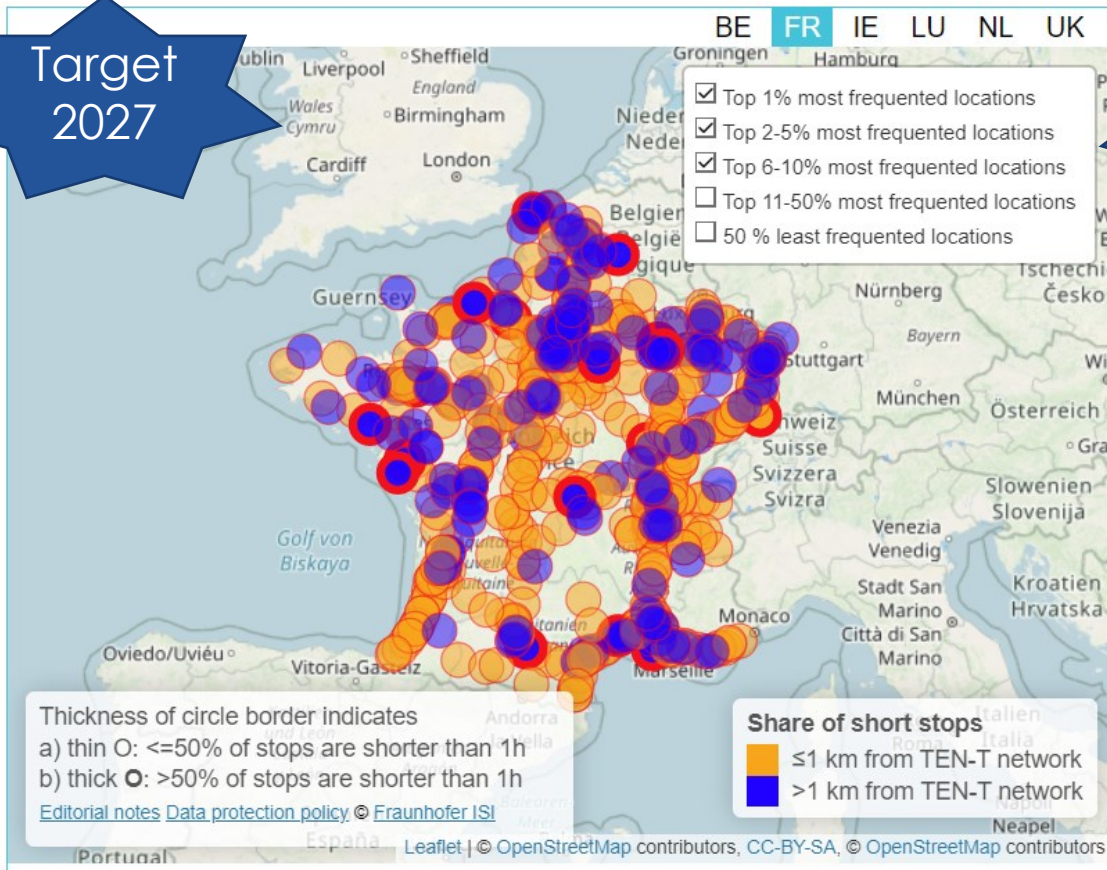


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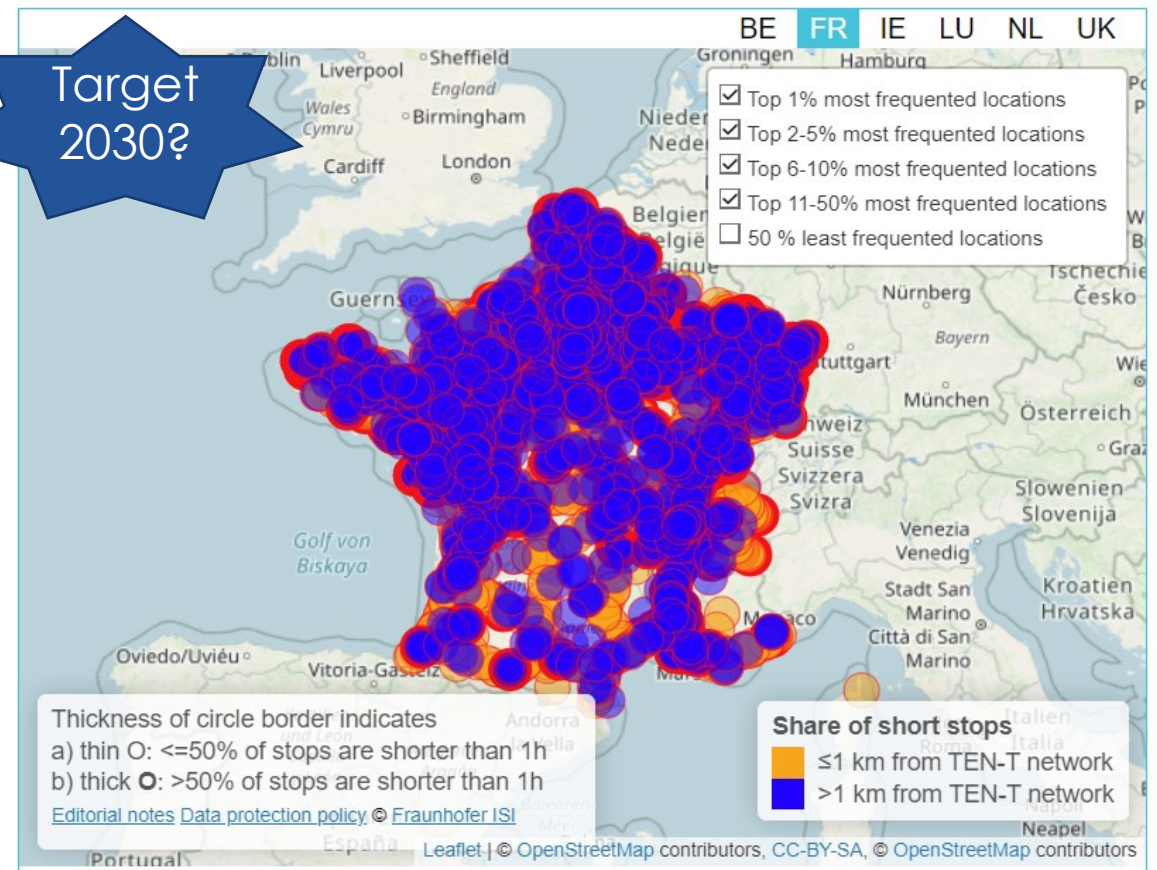
Top 10% of most utilised short truck stops

Top 50% of most utilised short truck stops

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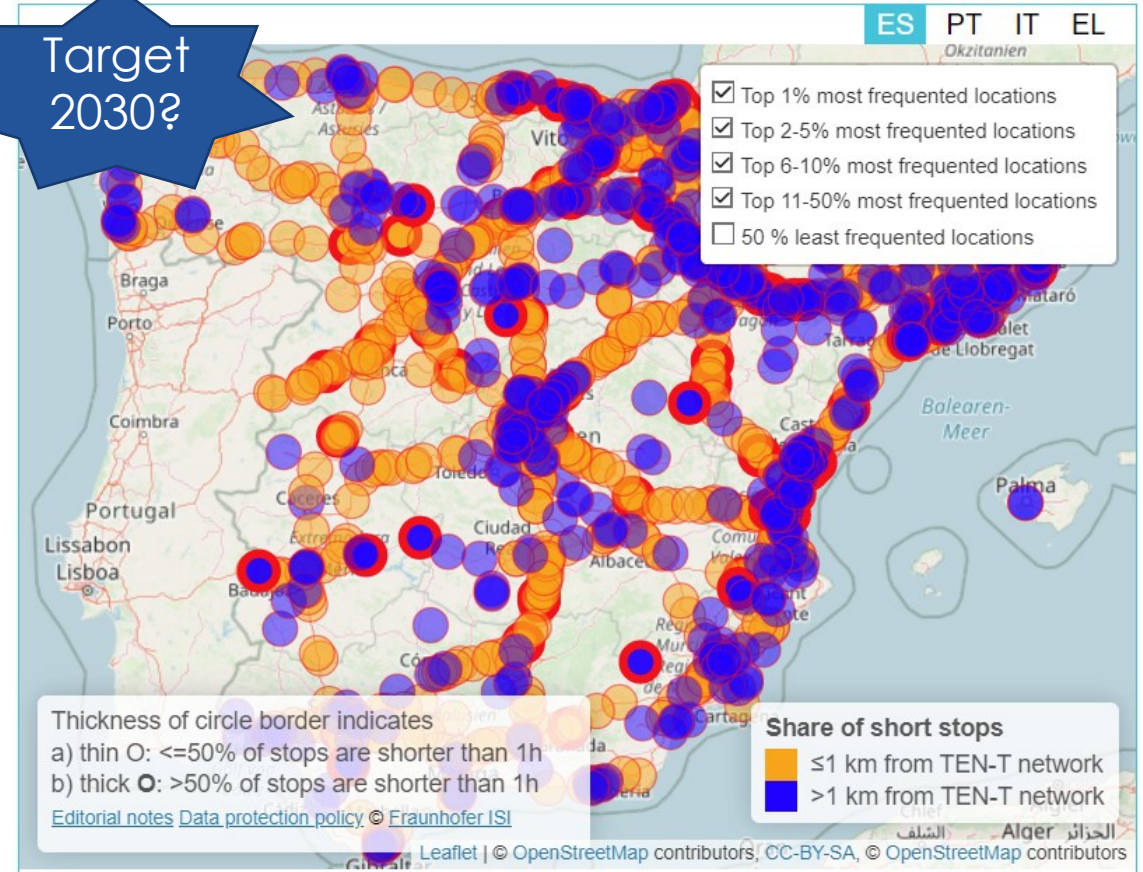
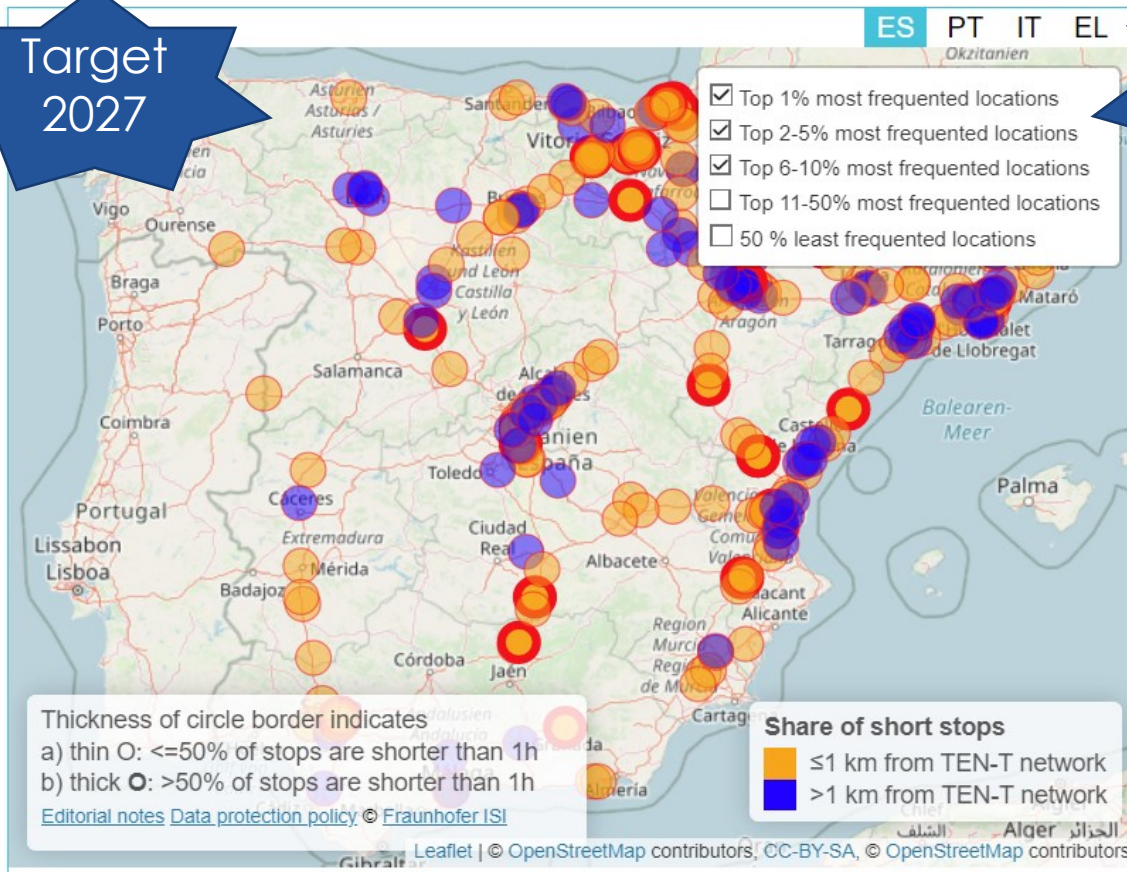
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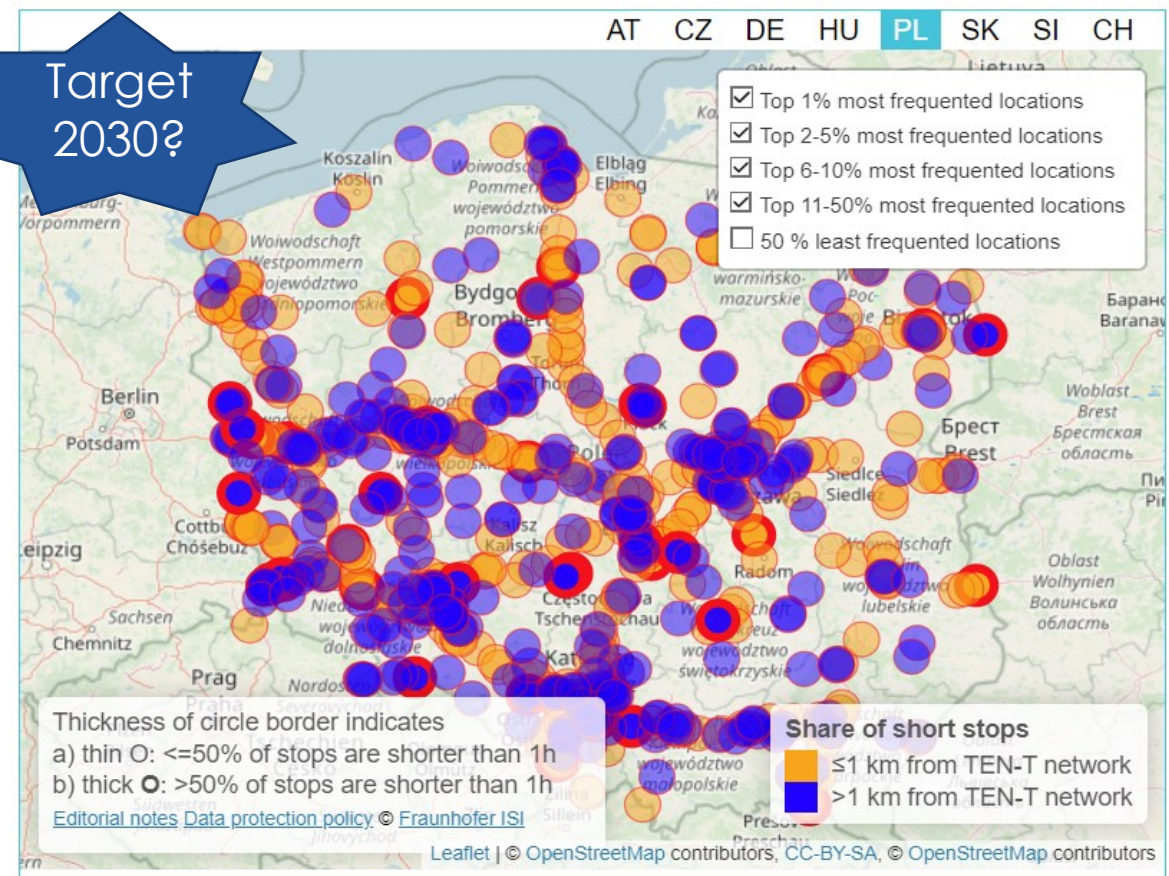
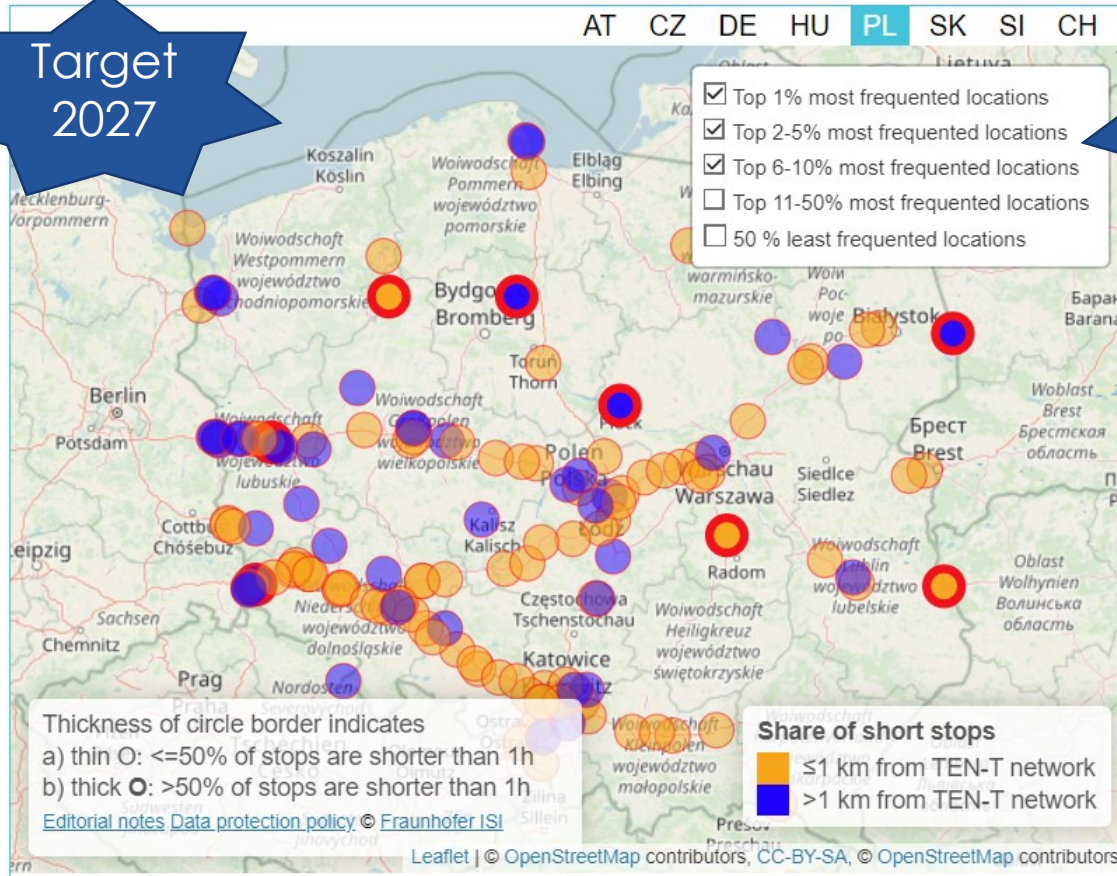
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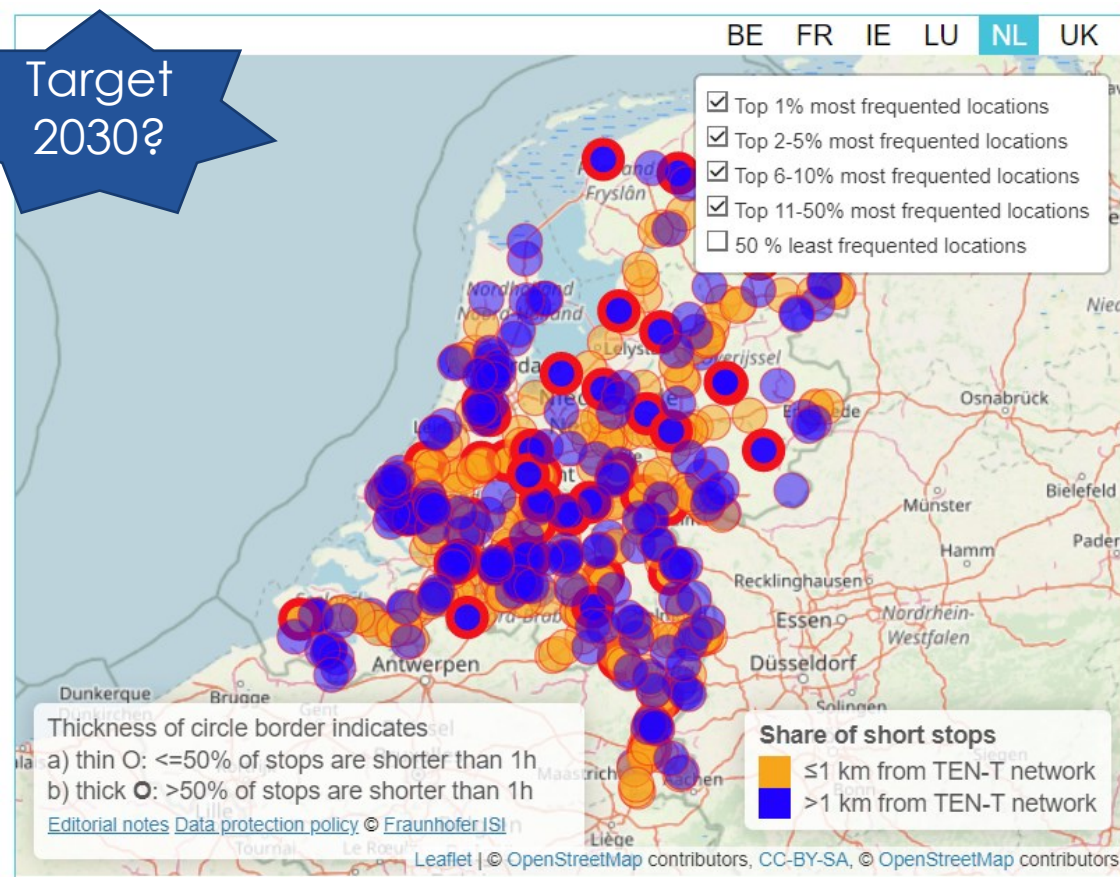
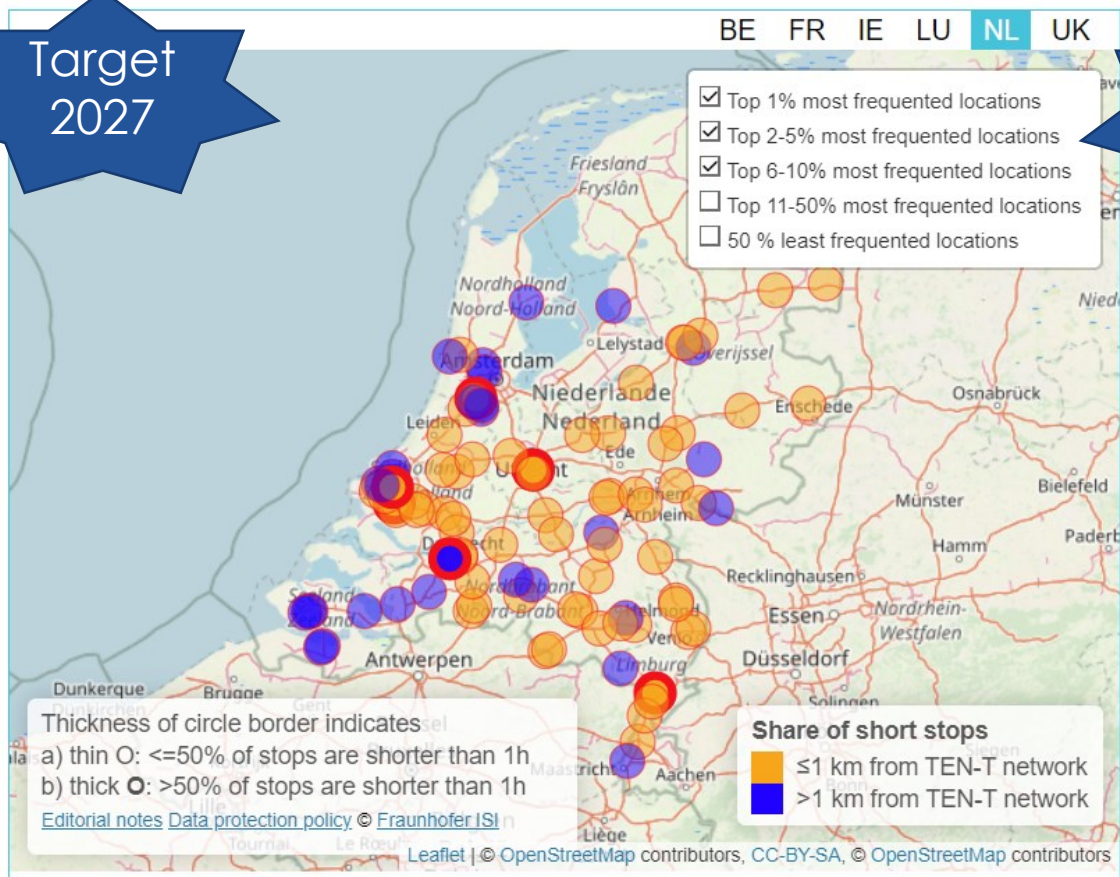
Focus: Netherlands

Top 10% of most utilised short truck stops

Top 50% of most utilised short truck stops

Target 2027

Target 2030?



The top 10% most utilised locations should be fully equipped with suitable chargers no later than 2027. A minimum network of charging stations must be fully operational by 2030 at the latest.



Long Stops:

Depot Charging & Logistics Hub/Centre +
Public Charging Long Overnight Stops

TRATON

Charging infrastructure for battery-powered electric trucks: 3 charging scenarios

Long Stop

1. Depot



Combined charging system (CCS)
or Megawatt Charging System (MCS)
Standard charging
Charging capacity: approx. 100kW
Charging time: overnight

Long Stop

3. Logistic hub



Combined charging system (CCS)
or Megawatt Charging System (MCS)
Mostly standard charging
Charging capacity: variable, e.g. 350kW
Charging time: while loading and unloading

2. Service station



Megawatt Charging System (MCS)
High-performance charging
Charging capacity: 800kW-1.2MW
Charging time: during one of the
driving breaks that is required by law
(every 4.5 hours 45 minutes)

T&E's recharging masterplan for trucks

SUPPORT ZERO EMISSION TECHNOLOGY ONLY

Long Stop

DEPOT CHARGING

- Start equipping depots with slow chargers as of now
- Funding for grid upgrades

Long Stop

DISTRIBUTION AND LOGISTICS CENTER

- Targets to have an increasing number of medium and high power chargers at distribution centers by 2025

PUBLIC CHARGING HUBS

- All large urban areas equipped with high power chargers by 2025

Long Stop

LONG HAUL TRIPS

- Bring electricity to the roads as of now
- Decide on a dominant technological pathway by 2025
- Coverage of key highways by 2030 and full coverage by 2035

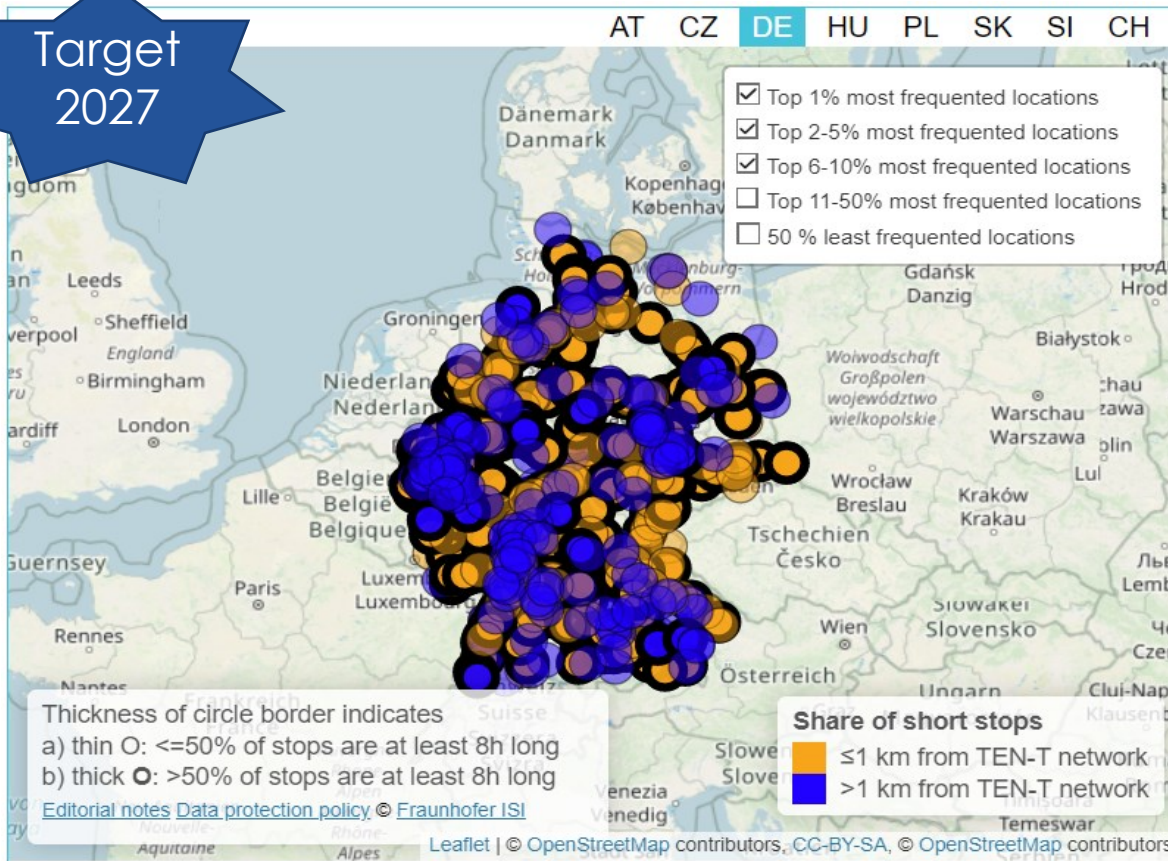


Long Stops (overnight chargers)

Focus: Germany

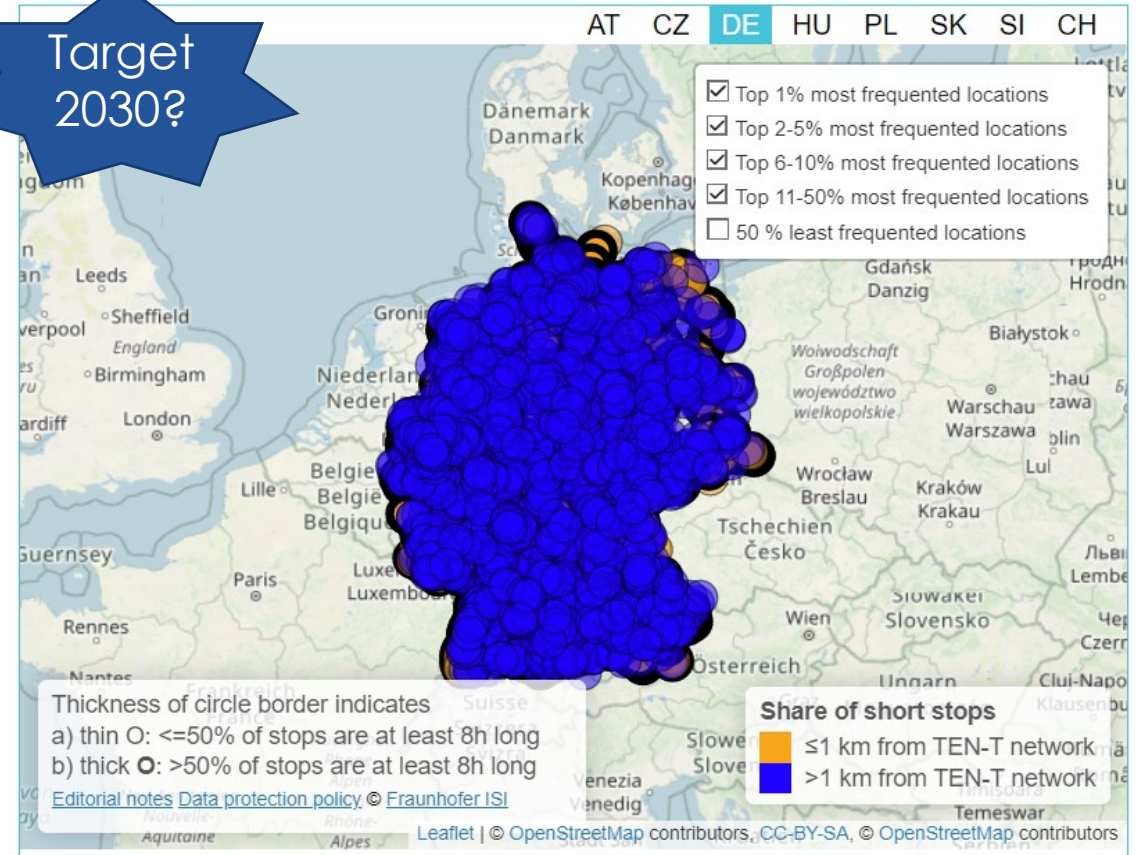
- Top 10% most frequented

Target 2027



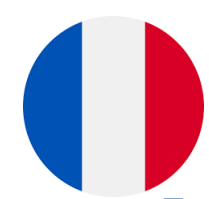
- Top 50% most frequented

Target 2030?



The top 10% most utilised locations should be fully equipped with suitable chargers no later than 2027. A minimum network of charging stations must be fully operational by 2030 at the latest.





Long Stops (overnight chargers)

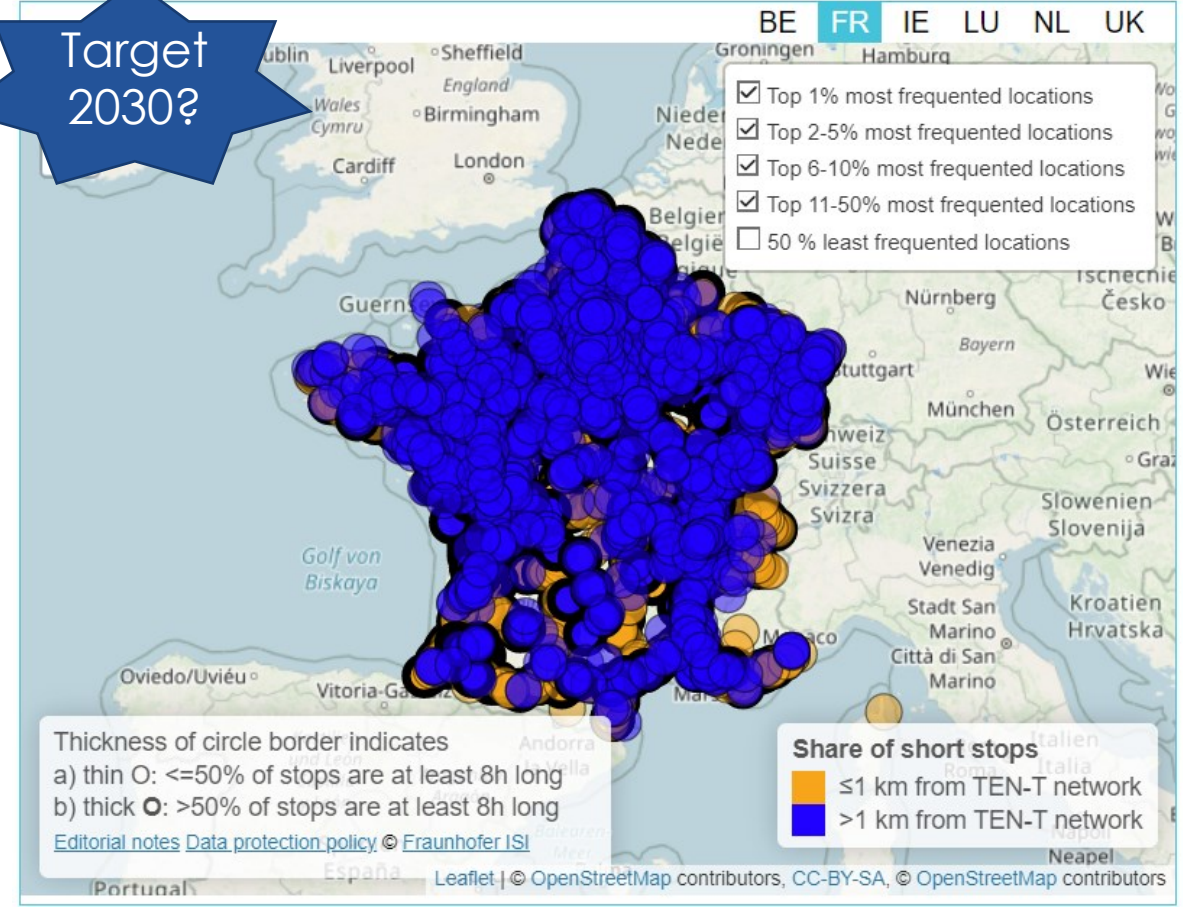
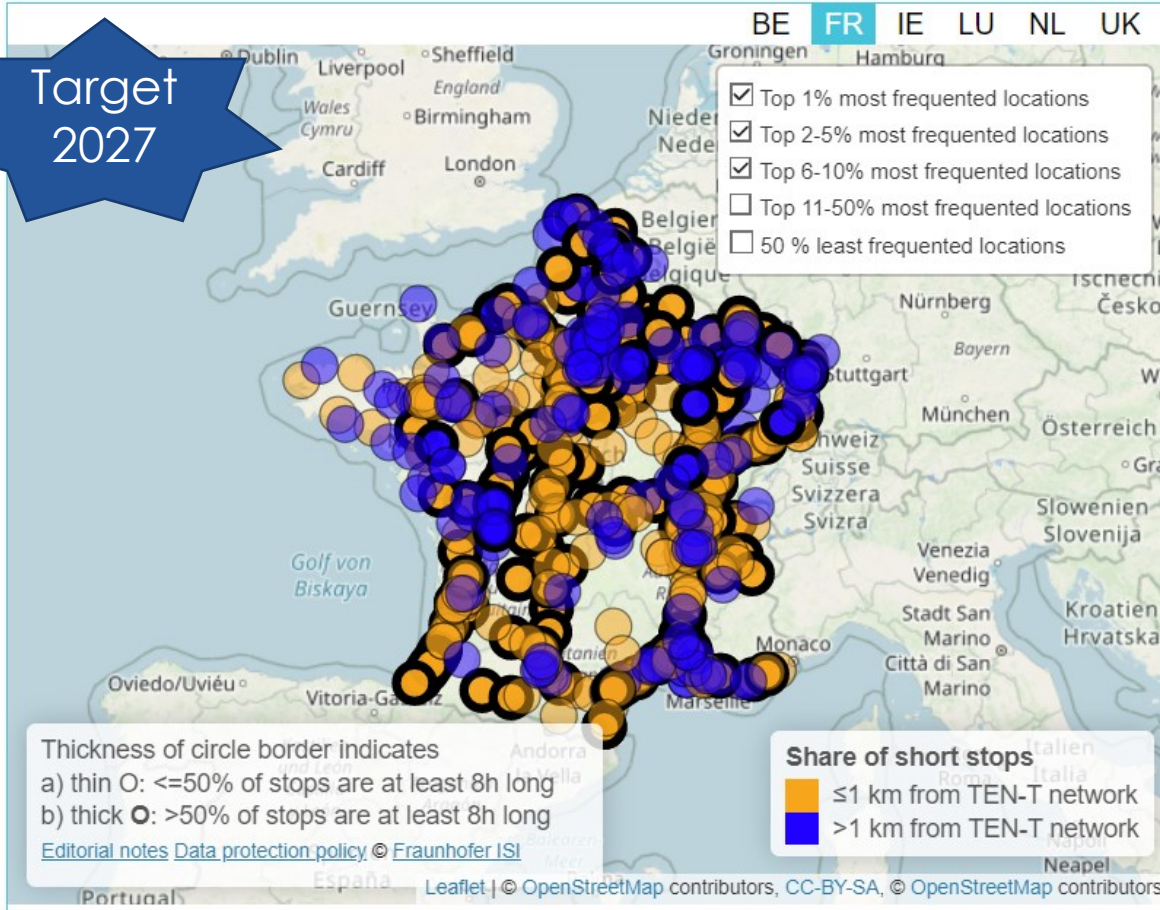
Focus: France

- Top 10% most frequented

- Top 50% most frequented

Target 2027

Target 2030?



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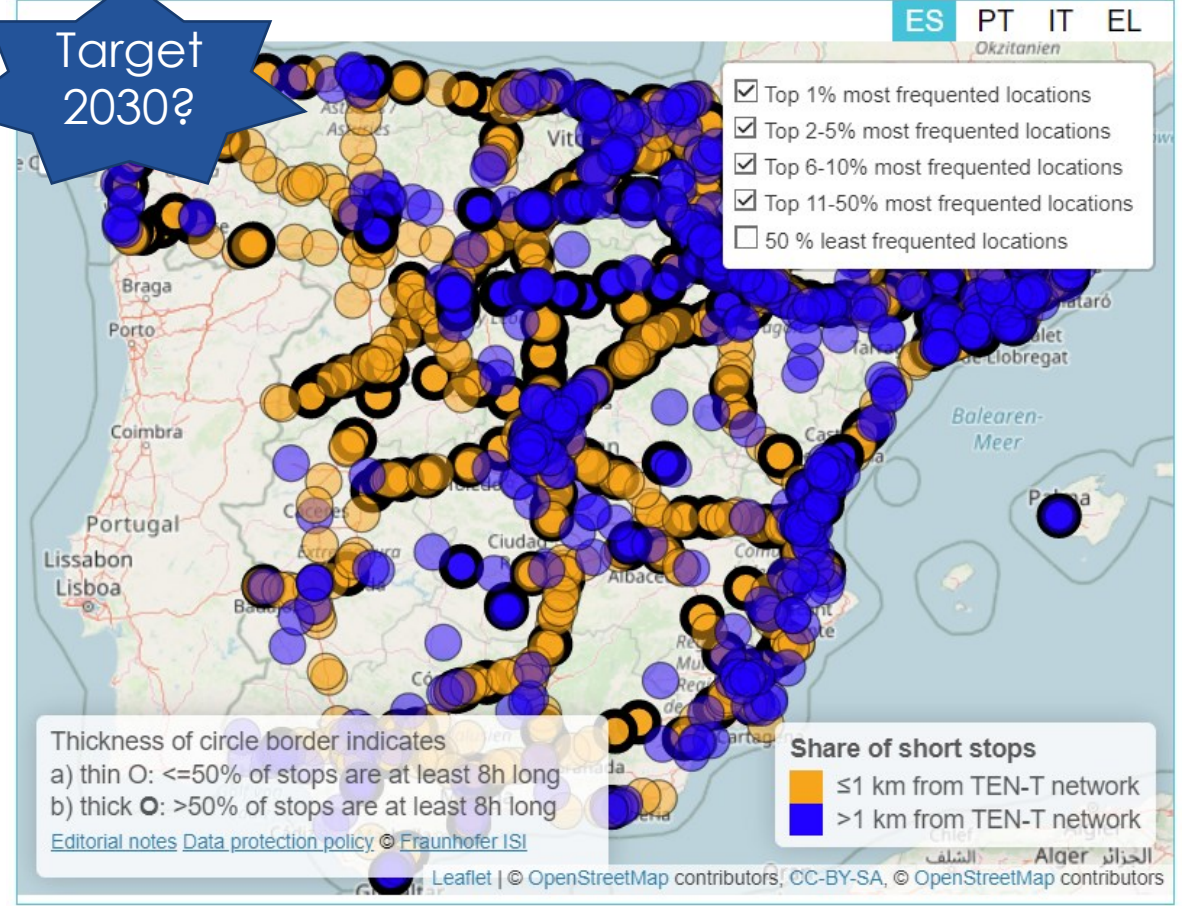
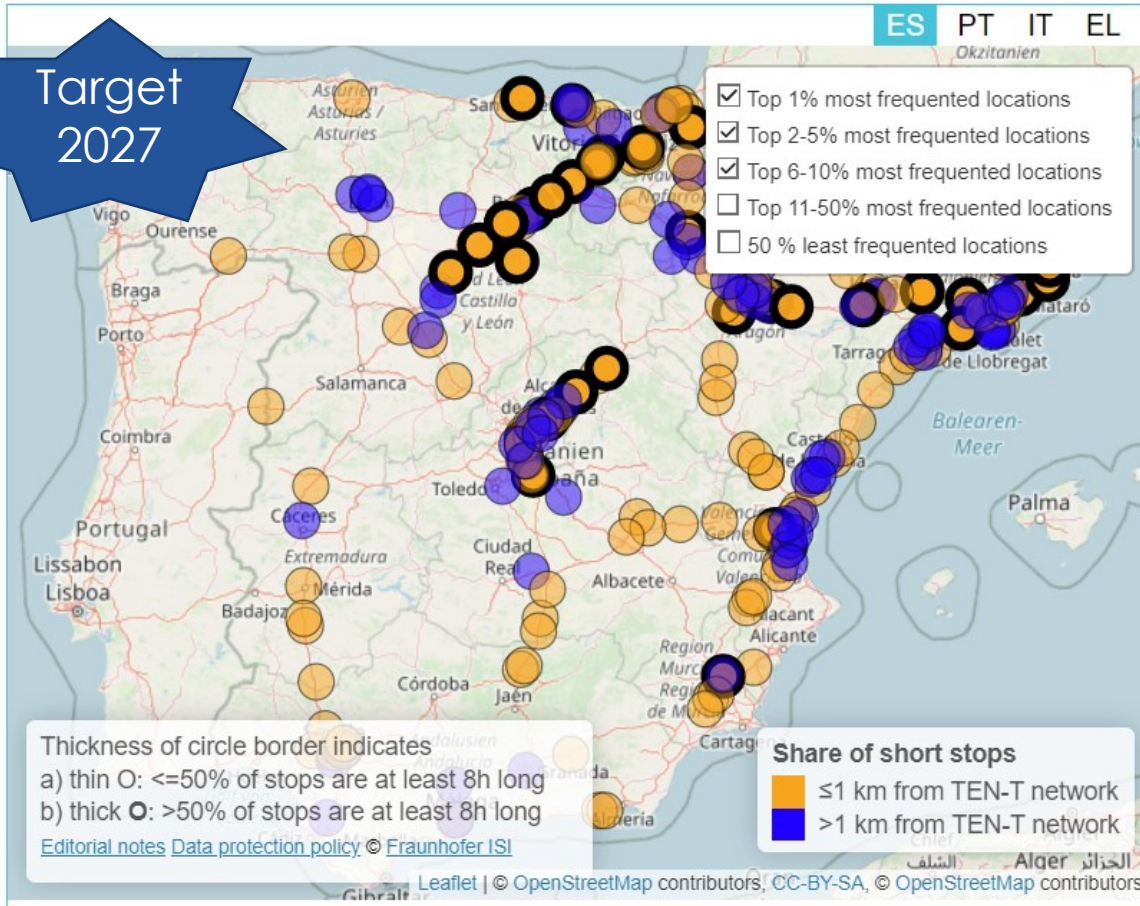
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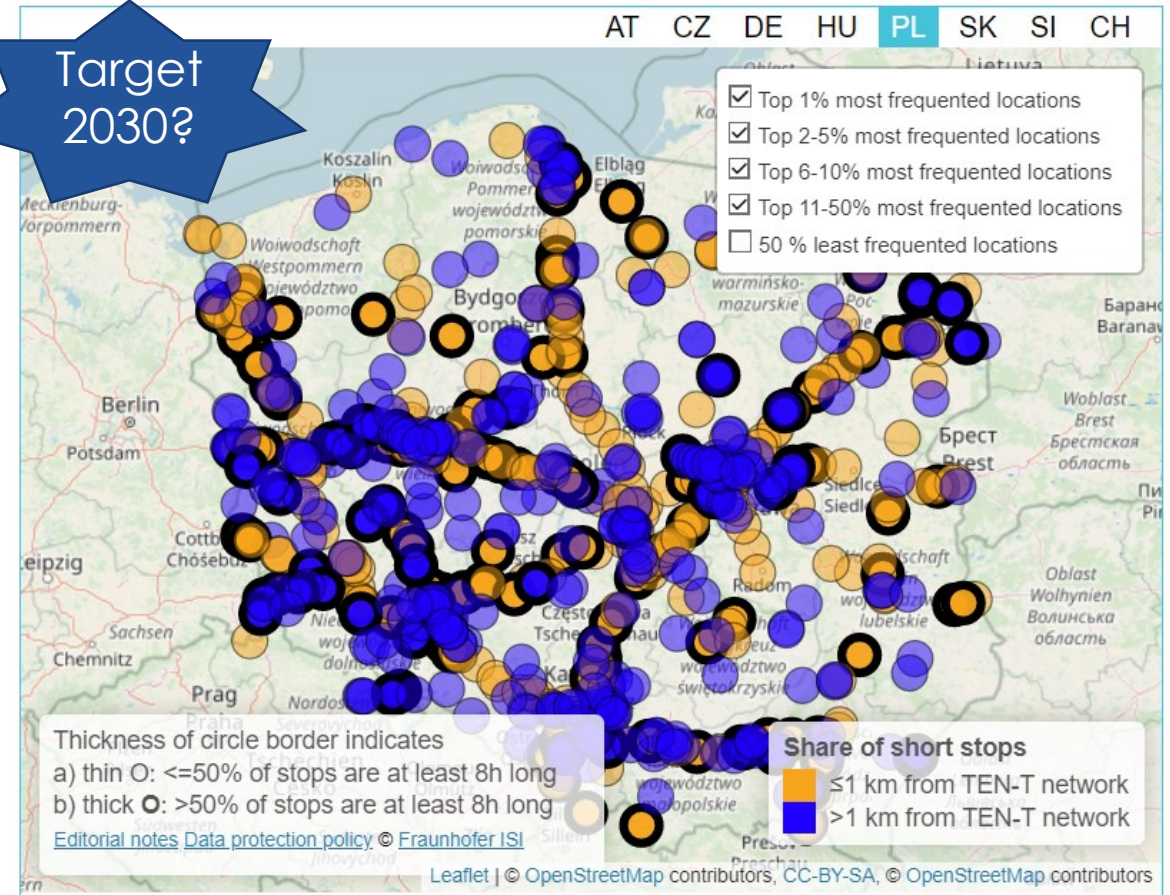
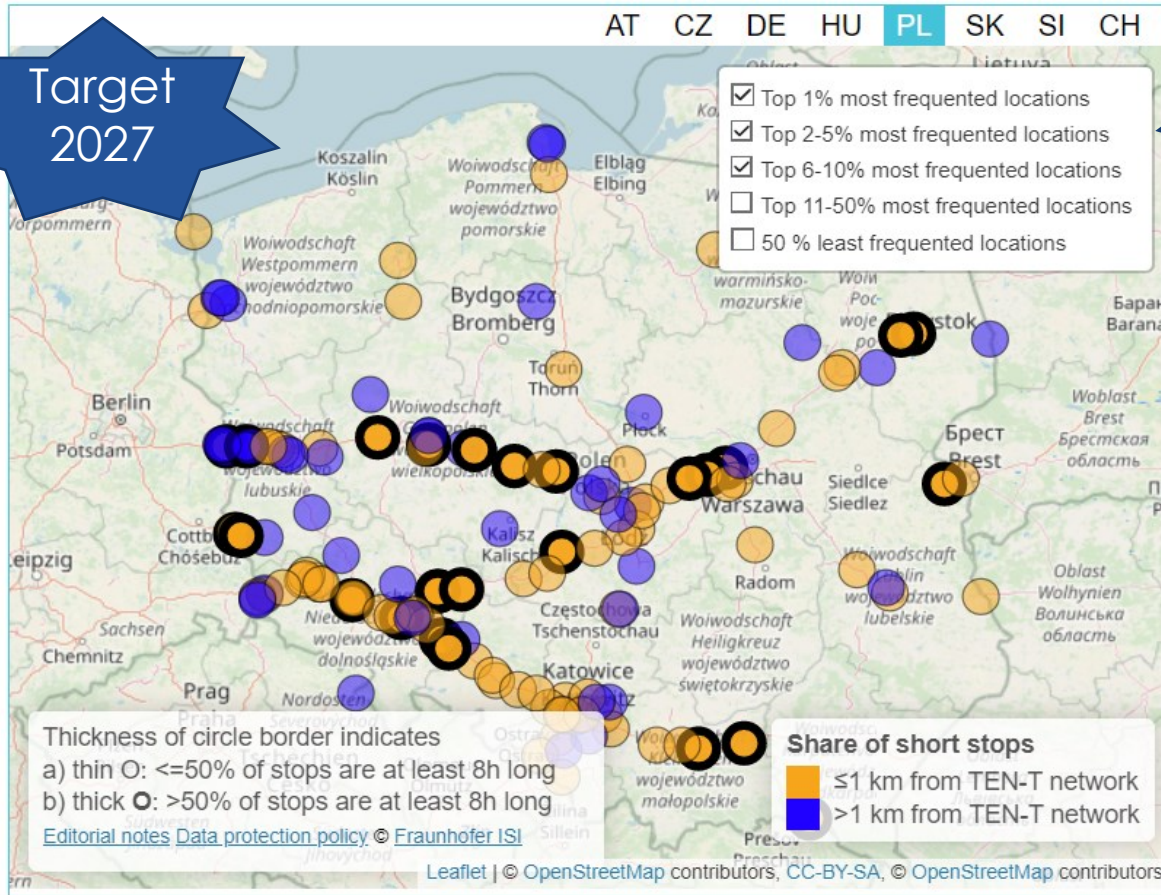
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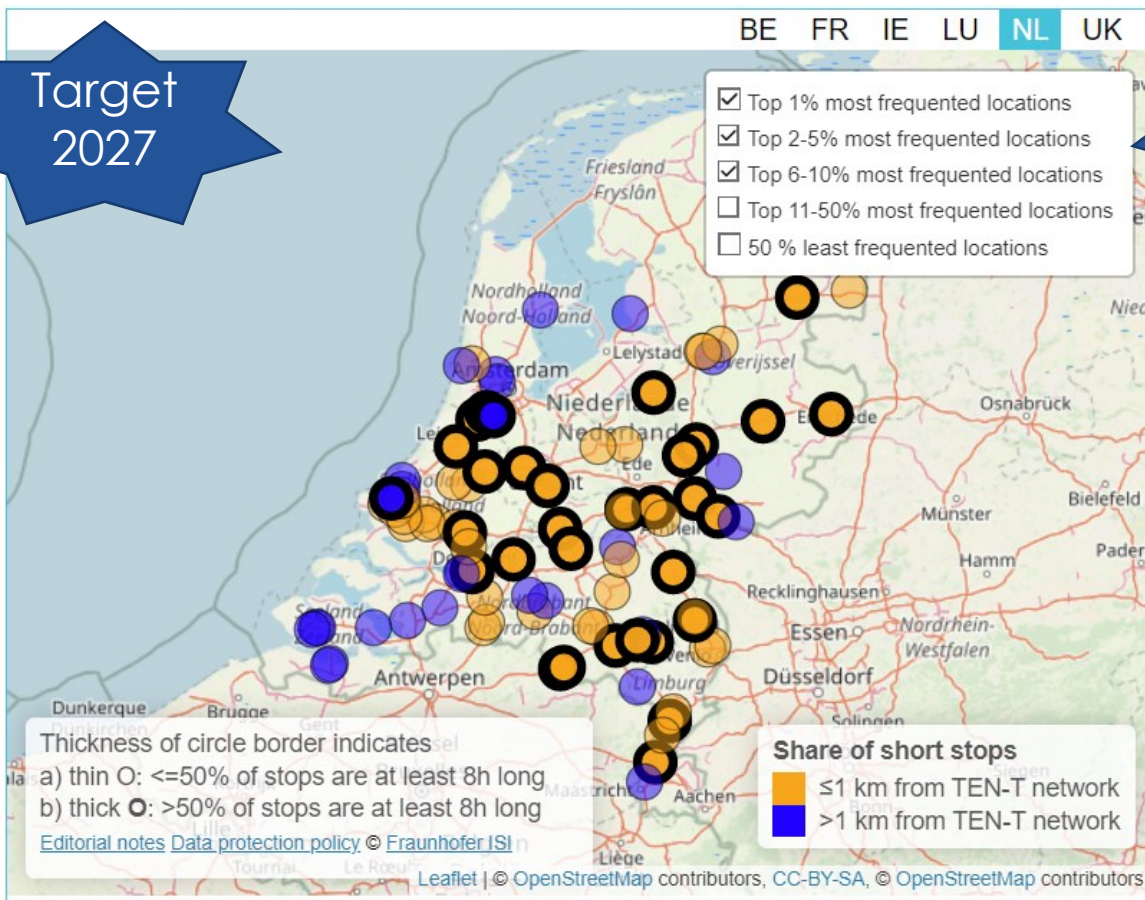
Long Stops (overnight chargers)

Focus: Netherlands

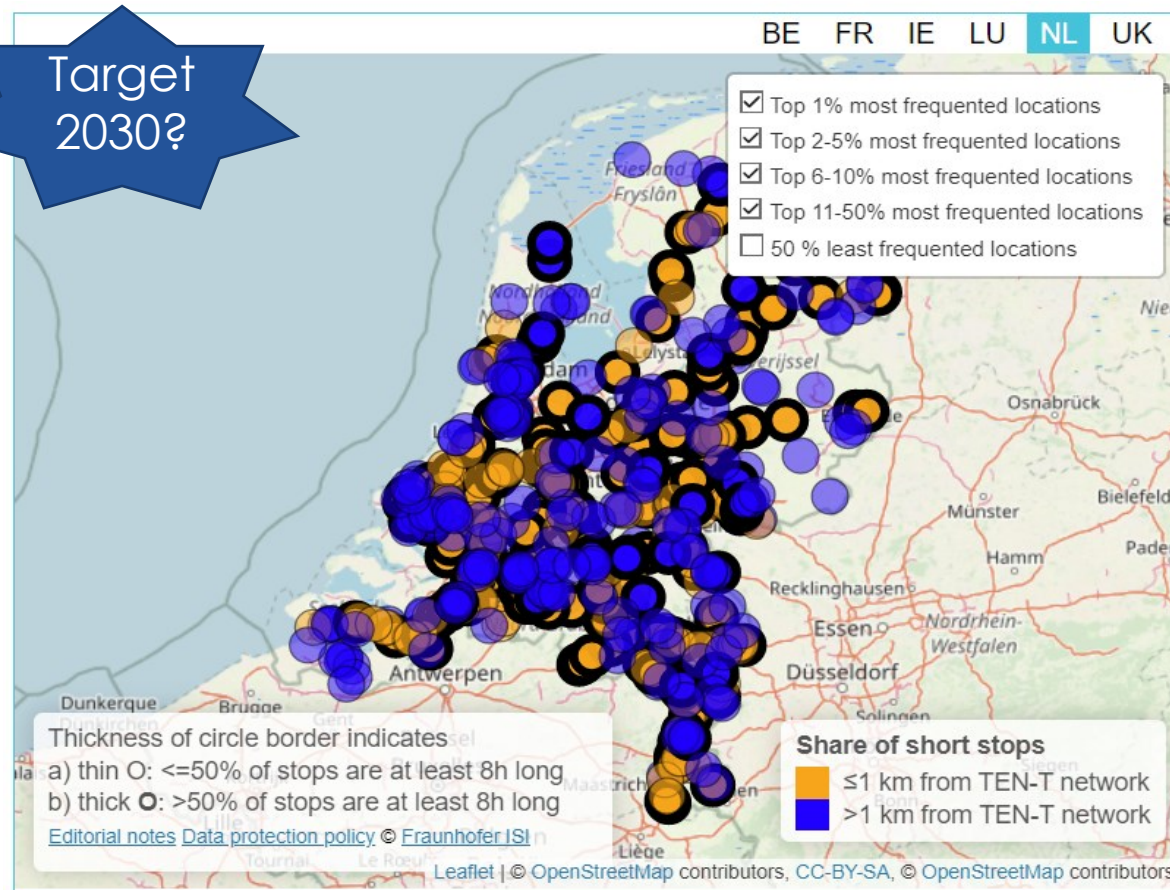
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Target 2027



Target 2030?



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Trucks energy demand (BEV only)

Trucks charging infrastructure (BEV only)

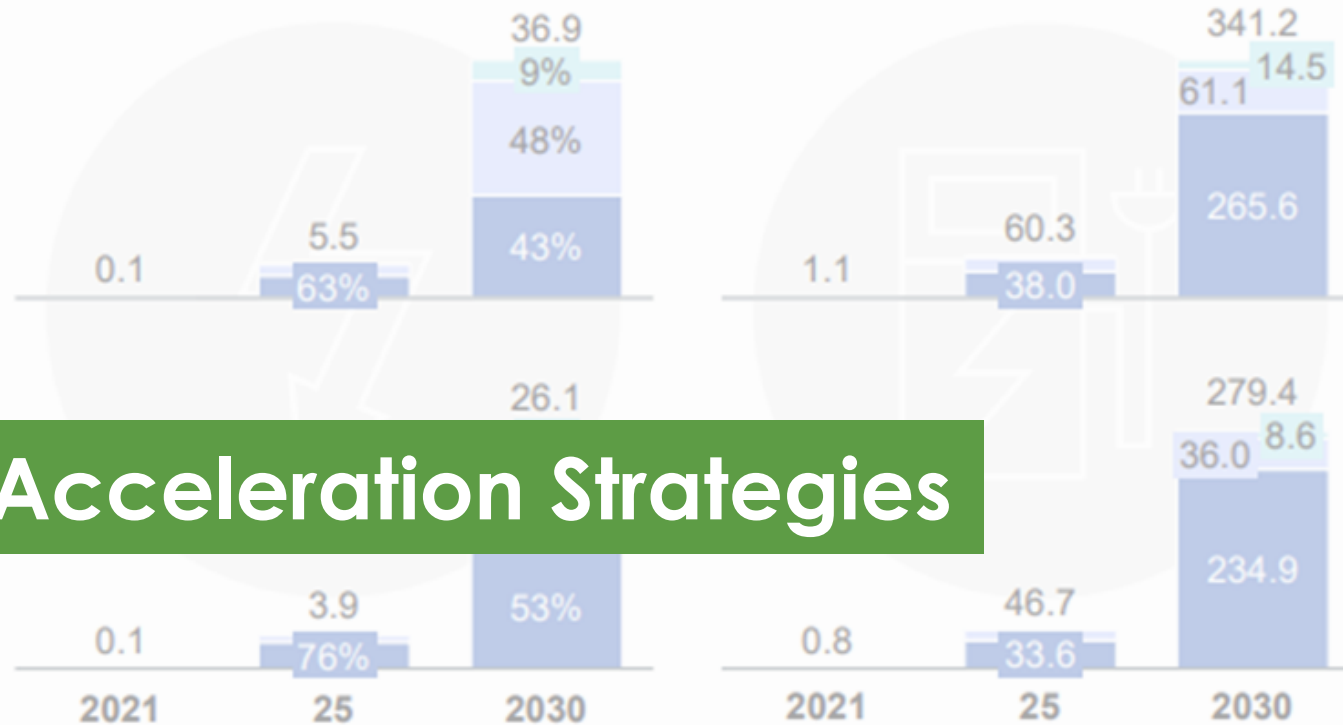
E-trucks charging energy demand, TWh

Th charging stations

-40% CO₂ emissions in 2030

Chapter 3

Masterplans & Acceleration Strategies



1. All scenarios are referred to EU-27 only, emissions savings vs 2020

Source: EU EV Charging Masterplan



Europe Charging Masterplan



■ Fleet hub
 ■ Public fast – highway
 ■ Public overnight

30% is reference scenario in report

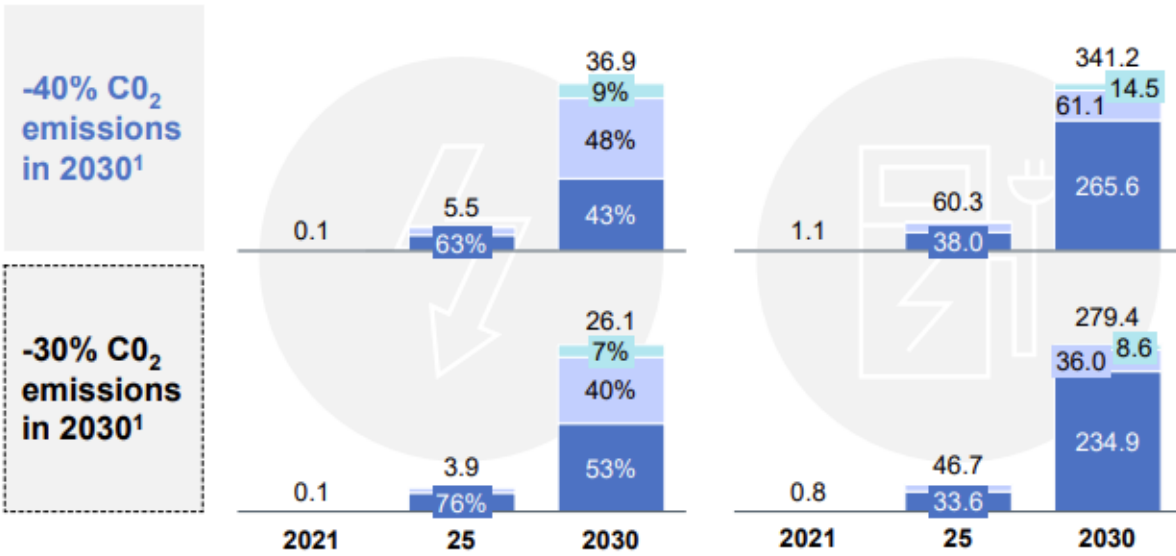


Trucks energy demand (BEV only)

Trucks charging infrastructure (BEV only)

E-trucks charging energy demand, TWh

Th charging stations



-40% CO₂ emissions in 2030¹

-30% CO₂ emissions in 2030¹

1. All scenarios are referred to EU-27 only, emissions savings vs 2020
Source: EU EV Charging Masterplan

While the EU Commission set official regulatory targets for CO₂ emissions reduction in new sales for the PC and LCV segment (-55% by 2030), policymakers are still debating a revised target level for commercial vehicles.

Two scenarios have been developed, driving two underlying EV (BEV) parcs for trucks: **-30% CO₂ emissions in 2030 and -40% CO₂ emissions in 2030.**



<https://www.acea.auto/files/Research-Whitepaper-A-European-EV-Charging-Infrastructure-Masterplan.pdf>

Trucks and buses energy demand will surge to ~26.1 TWh and ~2.7 TWh in 2030 respectively, requiring ~50,000 public charging stations



Europe Charging Masterplan...cont'd



- CVs are often charged in private-fleet hubs (where vehicles are safely parked and usually maintained).
- Long-haul and regional trucks and buses also rely on public charging for fast (daytime stops) and overnight charging (on long multiday trips).
- By 2030: trucks will require 279,000 charging points, of which 84% will be in fleet hubs. The remaining charging points will predominantly be made up of public, fast-charging points along highways (36,000) and public overnight charging points (9,000).
- The emergence of the Megawatt Charging System (MCS)—allowing average charging speeds of 700 to 800 kW for trucks and buses—is expected to become the industry standard for fast public charging for CVs by 2025.
- Considering that most installed public chargers could become MCS chargers, the number of public charging stations could be reduced by around 70%, as they would provide charging that is twice as fast and has one-and-a-half times higher utilization rates, assuming the energy demand from electric trucks remains constant

<https://www.acea.auto/files/Research-Whitepaper-A-European-EV-Charging-Infrastructure-Masterplan.pdf>



Europe Charging Masterplan...cont'd



30% CO₂ reduction target

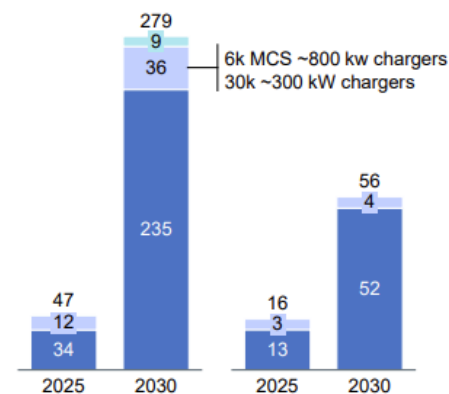
EU-27 – demand-driving-oriented pathway

Charging infrastructure (BEV only), number of charging points, thousands

Fleet hub Public fast – highway Public overnight

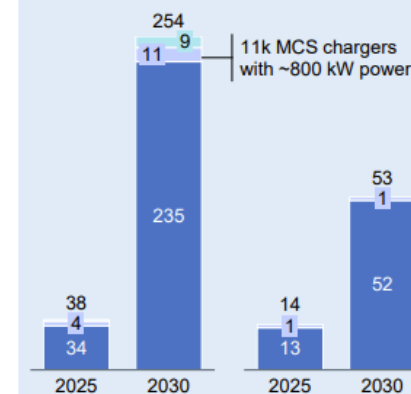
Balanced CCS and MCS scenario

Trucks Buses



MCS fast-charger-only scenario

Trucks Buses



Total fast public charging points, thousands

Scenario	2025	2030
Balanced CCS and MCS scenario	15	40
MCS fast-charger-only scenario	5	12

~12,000-40,000

fast public charging points for trucks and buses in 2030

~10,000

public overnight chargers for trucks

80%+

of chargers to be in fleet depots for trucks and buses

Megawatt Charging System (MCS)

Description

New **CV high-power charging** solution to maximize customer flexibility when using fully electric commercial vehicles, specifically class 12+ ton (N2+, M2+) trucks and buses. The technology can also be leveraged in marine (ie, ferries), aviation (short haul, VTOLs), and rail.

Motivation

Cross-industry effort involving truck manufacturers, suppliers, and charging operators to ensure fast charging of commercial vehicles at **charging speeds of up to 1+ MW**, since current technology (CCS) is limited to 500 kW, which is **not sufficient to drive electrification** of HDT transport and charge trucks within the 45 minutes breaks that truck drivers are legally required to take in the EU.

Requirements

MCS up to **1,250 V and 3,000 A**

Vehicles equipped with MCS should be able to charge from the **existing CCS infrastructure**.

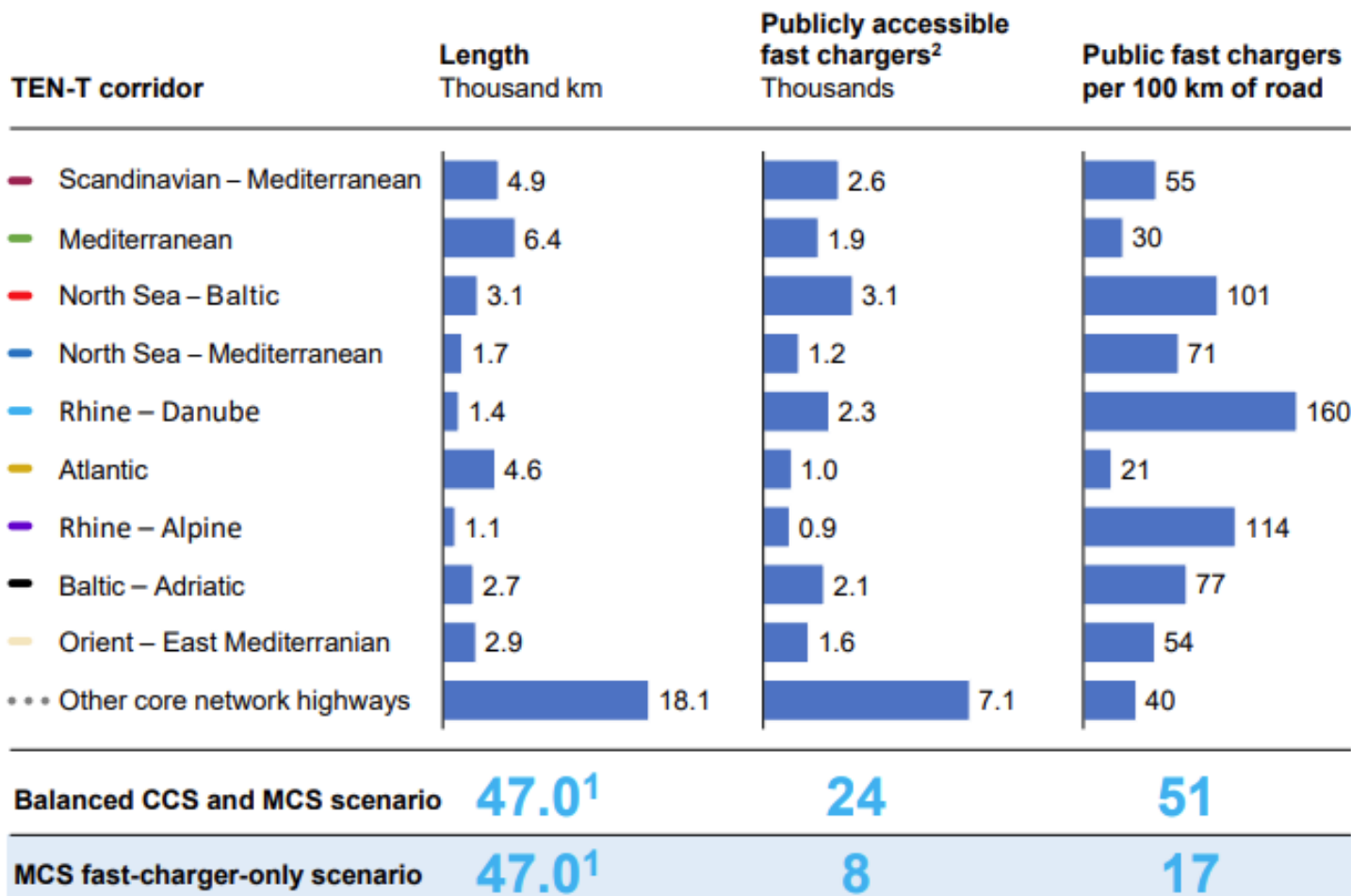


Europe Charging Masterplan...cont'd



30% CO₂ reduction target

EU-27 – demand-driving-oriented pathway



1. Referred to current completed kilometers of road along TEN-T 9 corridors and other core network highways

2. Incl. public fast – highway

Source: EU EV Charging Masterplan, Trans-European Transport Network (TEN-T), EU Commission

A reliable network of fast chargers on the TEN-T core network is of great importance for electric CVs, specifically trucks.

On average, 24,000 public fast chargers will be required across the 47 thousand kilometres.

Trucks and buses will require 51 fast chargers every 100 km of road to charge on core TEN-T corridors by 2030.



Europe Charging Masterplan Overview:

- On average, across the five CV subsegments, 57% of charging in 2030 will happen in fleet hubs, 36% will be public fast, and the remaining 7% will be public overnight.
- With the exception of long-haul trucks, all truck and bus subsegments are expected to charge 90% of the energy at fleet hubs.
- Long-haul trucks—43% of the electric trucks and buses parc—are expected to charge 50% of the energy at public fast charging stations.
- Long-haul trucks are expected to charge at a public fast charger once daily, and they will not make it to a fleet charger once every five nights, in which case they will charge at an overnight charger.

All three subsegments of trucks include medium-duty trucks as well as heavy-duty trucks.



Trucks and buses segment overview

Public overnight (DC) Fleet hub (DC)
Public fast (DC)

CV subsegment	Share of parc Percent	Estimated annual mileage ¹ Kilometers	Charging type ² Percent		
Urban trucks Heavy-duty and medium-duty trucks running last mile in urban centers	~13	60,000	10	90	
Regional trucks Heavy-duty and medium-duty trucks running interregional road connections	~26	74,000	10	90	
Long-haul trucks Heavy-duty and medium-duty trucks travelling overnight on long routes	~43	116,000	10	50	40
Municipal buses Buses and coaches running within the city area (incl. school buses)	~13	34,000	0	100	
Regional buses and coaches Buses carrying passengers along specified routes, with predetermined stops within regional areas	~6	60,000	5	95	
Average	100	67,000	7	36	57

1. Germany taken as reference data point

2. Figures referred to 2030

Source: EU EV Charging Masterplan based on IHS Markit and KBA sales data



HoLa – High performance charging for long-haul trucking

In the present project, two high-performance charging points with the so-called Megawatt Charging Systems (MCS) will be set up, operated and used in real logistics operations at each of four locations. In a first step, two CCS charging points for trucks will be planned and built at each of the four locations along the A2 between Berlin and the Ruhr region, making maximum use of the specification limits. Two locations directly at the motorway will be used, as well as two locations in logistics hubs. These locations will be used for the early integration of electric trucks into logistics processes and as a test case for the novel fast charging of electric trucks as well as the collection of real usage experiences. At the end of the project, eight CCS charging points and eight MCS charging points will be available at four locations to support the real-life testing of this new system and form the basis for a nationwide expansion of this technology. Four truck manufacturers are participating in the project and will supply a total of eight CCS and four MCS vehicles, operate them with the help of other partners and charge them along the route. The construction and operation of vehicles and infrastructure is accompanied by extensive research activities. The goal here is also to provide the blueprint for a nationwide expansion.



Daimler Truck

SIEMENS

P3

tu technische universität
dortmund





Megawatt Charging System (MCS)

To satisfy the market **demand of the Truck and Bus industry to charge electric heavy-duty vehicles within a reasonable time**, a new solution for high-power charging is needed.

To satisfy the market **demand of the Truck and Bus industry to charge electric heavy-duty vehicles within a reasonable time**, a new solution for high-power charging is needed. It will help meet climate and sustainability goals and offer maximized customer flexibility. Not just the truck industry will benefit from this solution. Other applications like Maritime and air vessels may use this charging system to fulfil their needs, too.

CharIN e. V. officially launches the Megawatt Charging System (MCS) at EVS35 in Oslo, Norway



A Consortium of interested partners from the industry and research institutes have already started a pilot in Germany, the HoLa project, to put Megawatt Charging for long-haul trucking in real world conditions, and to gain more information about the European MCS Network demand.

Published on: 06/14/2022



Pantographs as charging solution in trial

Large pilot to be initiated in 2023, blueprint for Europe

Siemens eHighway

Electrified road freight transport – contributing to a sustainable transport sector

The key innovation is the active pantograph, capable of connecting while driving at any highway speed

4,000 km network of contact lines on German autobahn is recommended by the Federation of German Industries (BDI) as a cost-effective decarbonization measure

11% of expected truck toll revenue (Lkw-Maut) would cover the investment in a 4,000 km network

16,000€ of fuel savings can be achieved by a 40-ton truck driving 100,000 km on the eHighway (based on 1.25 €/l diesel and 0.15 €/kWh electricity)

80% of heavy duty trucks would have an economic incentive to switch to contact line, given that the busiest 4,000 km of autobahn are electrified

>80% efficiency level with overhead contact lines

Driving on non-electrified roads (e.g. when overtaking or "first and last mile") is ensured by the hybrid drive technology of the truck and on-board energy storage

Braking energy can be recovered

>7,000,000 t of CO₂ savings per year if 30% of truck traffic on German highways is electrified and supplied with renewables

- Siemens Mobility & Continental Engineering Services (CES) co-operate in the development of pantographs for trucks
- Federal Ministry of Transport (Germany) aims for 4,000 km of autobahn to have pantographs by 2030
- Siemens Mobility's eHighway tested on 3 public routes :-
 - A5 autobahn in Hesse, between Zeppelinheim/Cargo City Sud junction and Darmstadt/Weiterstadt
 - A1 in Schleswig-Holstein between Reinfeld and Lubeck junctions
 - B462 in Baden-Wuerttemberg between Kuppenheim and Gaggenau

Commercial Vehicle Charging Europe



Approved July 8, 2022



DAIMLER
TRUCK

TRATON

VOLVO

HIGH PERFORMANCE CHARGING
NETWORK FOR EUROPE 

- 1,700 high performance charge points in 5 years
- Euro 500 million investment
- This kick-start is a call to action to all other industry players.
- Volvo Group, Daimler Truck, and Traton Group own equal shares in the JV but continue to be competitors in all other areas.



Chapter 4

Talking to the Industry



In Conversation with Anja van Niersen, CEO, CVCE



Anja van Niersen
CEO, CVCE

1. How will CVCE choose which locations to install charging infrastructure for heavy trucks?
Anja van Niersen: As we plan our charging network, we are choosing locations that ensure convenience for drivers and transport providers, as well as access to energy. Of course, the first charging locations will be close to the busiest logistics hubs and transport corridors. We are also keen to hear from transport companies who are interested in electrifying their fleets and would like public charge points to be installed in specific locations or along certain routes.
 - a. Which countries will CVCE prioritise to begin with?
Anja van Niersen : The intended priority markets are Germany, France, Belgium, Norway, Denmark, Sweden, Spain, Austria, Poland, Switzerland, Italy, the Netherlands and the UK, followed by other European countries.
 - b. Does CVCE have a target for how many charging points it will install annually?
Anja van Niersen: Our initial target is to install a minimum of 1,700 charge points by 2027.
2. Please explain what types of charging systems are needed for the two different types of stops:
 - i) Short Stops—where heavy trucks stop for not more than an hour:
Anja van Niersen: MCS (Megawatt Charging System) charge points will likely become the standard for rapid charging during statutory 45-minute breaks, with a power output of at least 800kW. Currently available CCS charge points are capable of a maximum of 350-400kW power output, which can charge today's electric trucks in 1-2 hours, depending on the charging capability of each truck.
 - ii) Long Stops –where heavy trucks stop for over 8 hours:
Anja van Niersen: 100-150kW of power is sufficient for overnight charging of regional and long-haul electric trucks.



iii) Will the MCS (Megawatt Charging System) become the main type of charging infrastructure for heavy duty trucks at Short Stops? What about for Long Stops? Will these have to have canopy charging systems or parallel charging systems?

Anja van Niersen: To simplify charging in the future, we believe that all trucks should ultimately use one charging standard for both short and long stops. The new MCS design is likely to become the standard because it's capable of handling the necessary power levels for fast charging trucks. It is yet to be determined whether this will be using power supplied from a canopy or via standalone or split charge points like those commonly used in passenger car charging.

3. The EU mandates that the entire vehicle fleet is carbon neutral by 2040-2050. But for this the charging infrastructure needs to be fully in place by 2030— is this feasible?

Anja van Niersen: We expect that 10-20% of Europe's heavy truck fleet will be zero-emission in 2030, including both battery-electric and fuel-cell vehicles. We aim to accelerate the growth of battery-electric trucks by doing our part to ensure that the public charging supply is always ahead of the power demand. Of course, charging infrastructure for heavy-duty trucks and coaches will continue to be built in the 2030s and 2040s as more ICE trucks are phased out and replaced with zero-emission vehicles.

4. For current electric truck operators, how do you suggest they best check where the latest charging infrastructure is installed so they can plan their routes?

Anja van Niersen: There is currently very little public charging infrastructure for electric trucks. However, as we build our first charging locations in the coming years, we will have tools available to help transport operators plan their fleet electrification and transport routes. We also intend to announce new charging locations as early as possible so that transport operators can take this into consideration as they expand their fleets of zero-emission vehicles.

5. How quickly does the infrastructure need to be in place for electric heavy trucks to be able to do both regional and long haul journeys in Europe?

Anja van Niersen: It is our mission to support and accelerate the electrification of heavy-duty transport in Europe. This we will do best when we build the charging infrastructure as soon as possible, to solve the “chicken-and-egg” discussion and to enable transport operators to use electric trucks in their operations. We expect the demand for charging infrastructure to grow very rapidly in the next few years. By 2025, there should already be hundreds of public charging locations for heavy-duty vehicles in Europe. While we plan to scale up our operations rapidly, we do need competitors to enter the market very soon in order to meet the expected demand.

6. What type of partnerships will invest in these charging facilities? And how soon will this happen?

Anja van Niersen: We will work with a wide variety of partners – including grid operators, energy companies, charging technology providers and location owners, among others – in order to accelerate and support the transition to heavy-duty electric vehicles in Europe. Many of those potential partners are also very willing to invest or co-invest with our company to accelerate the expansion of our network. Furthermore, we are in contact with national and European governments to support and co-fund building our network. We are already having these discussions today.

7. Anything else?

Anja van Niersen: *We really want to provide reliable and convenient charging solutions to ensure the best-possible rest and recharge experience for drivers and transport companies.*

In Conversation with Dr. Patrick Plötz, Scientific Project Lead, HoLa



Dr. Patrick Plötz,
Scientific Project Lead-
HoLa,
Fraunhofer Institute for
Systems and Innovation
Research ISI

Question 1: Infrastructure for charging heavy electric trucks is currently lacking in Europe, and while automakers are requesting their new vehicles be moved using low carbon emission or zero emission transport modes, our ECG members are limited in where they can charge their electric car carriers/ heavy electric trucks. In your opinion what is the timeline for when adequate public charging infrastructure will be accessible in Europe for electric trucks?

Dr. Patrick Plötz : *The number of heavy-electric trucks manufactured today is also still limited, but the transition will start soon and happen quickly. Some CCS chargers designed for cars are already useable for battery electric trucks (BET), but which ones is not easy to get to know. Charge point operators are now starting the roll out of public CCS chargers for BET and with the alternative fuels infrastructure regulation (AFIR) we will see a starting network of chargers covering all of Europe by 2025.*

Question 2: Please explain what the HoLa project's aims are? When will the two MCS charging points be set up along the A2 between Berlin and the Ruhr region? Why was this location chosen?

Dr. Patrick Plötz : *Our HoLa project (high power charging for trucks in long-haul operation) has two aims. First, we plan to build the first four public megawatt charging locations equipped with two MCS (megawatt charging system) chargers per location and test them in real world logistics operations. Second, we want to learn about the requirements for and layout of such stations to have a blueprint for the German, and potentially European, MCS charger network to be rolled out.*

Construction, operation and accompanying research for the first megawatt charging systems for trucks in Europe



In Conversation with HoLa...cont'd



Model Close Meshed Network: 267 charging locations with 1198 charging points, with mean distance 50km – aim to electrify 15% of German HDVs

Question 3: When does the HoLa project expect to have the findings ready so as to plan the 'nationwide expansion' of high speed charging for long haul trucking in Germany?

Dr. Patrick Plötz : *We already have some findings on the number of stations and locations in a future high power charger network for trucks which are accessible via the project website <https://www.hochleistungsladen-lkw.de/hola-en/publications/>*

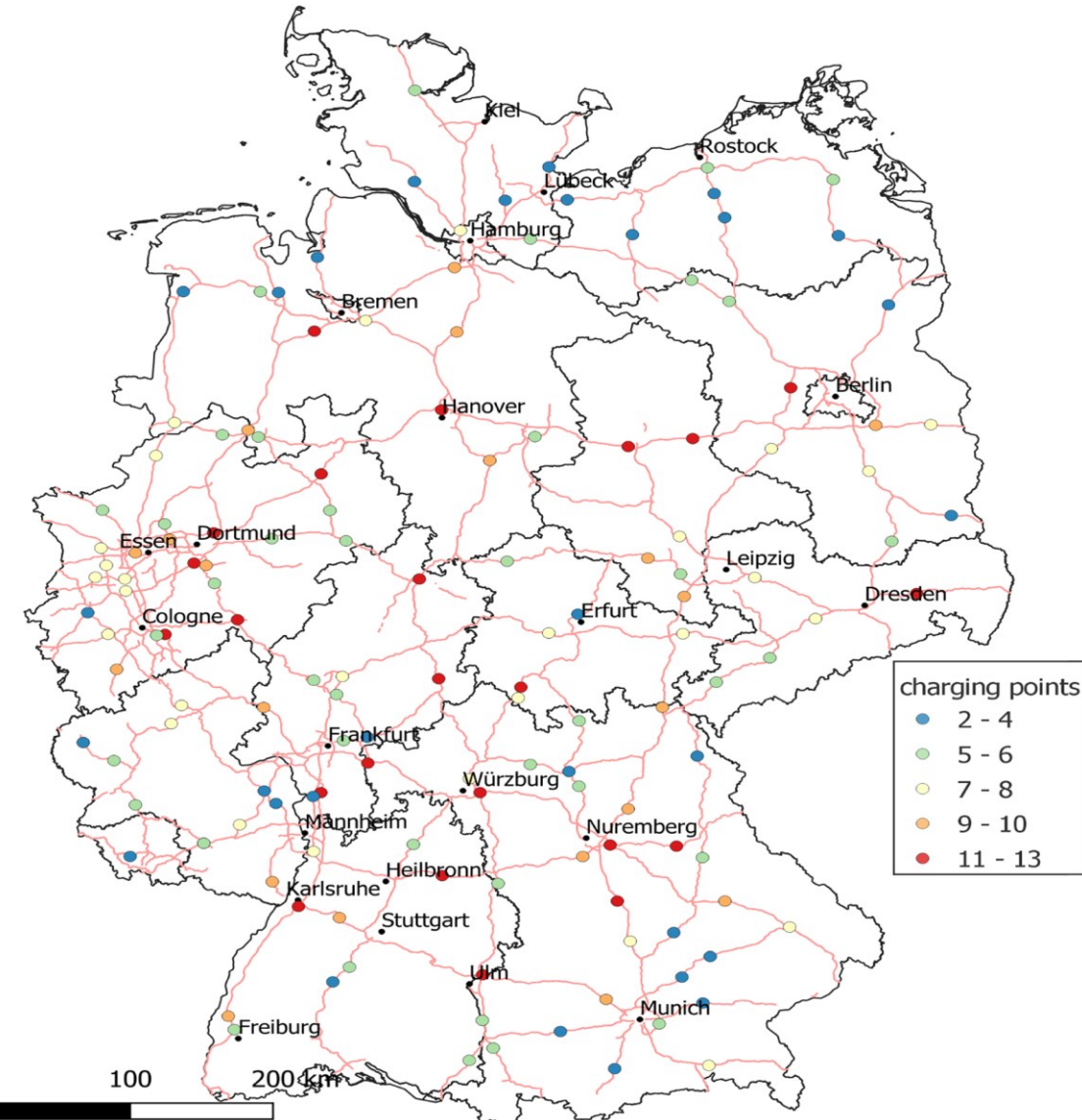
We will add further results by the end of 2022 and during the further course of the project.

Question 4: Does the HoLa project plan to expand outside of Germany?

Dr. Patrick Plötz : *The focus is to construct actual chargers on locations along the A2 highway in Germany. But as long-haul trucking is international, we are in contact with other similar projects in Spain, Poland and Sweden. We believe a European co-ordination, especially on identification and billing, can speed up the transition towards zero emission trucking in Europe.*

Question 5: Anything else?

Dr. Patrick Plötz : *We plan to open our chargers also for logistics companies outside the project to support their truck operations and to gain additional insights. They would be required to close a small contract to get a charging card and for liability reasons. We will be happy to welcome trucks from other projects!*



© GeoBasis-DE / BKG 2020 (background)

In Conversation with Scania

“This initiative is a perfect example of how new ecosystems and user models are being created to come up with the electric solutions that we urgently need to decarbonise the transport system, to make it sustainable for the long-term,” says Fredrik Allard, Head of E-mobility, Scania.

Scania is delivering 1.6 MW charging equipment to Swedish company Falkenklev Logistik for the site in Malmö, to open as a public charging facility in November 2022. 5 Scania electric trucks will be used by the haulier for goods distribution throughout Skåne in southern Sweden.

Site is planned as a 22 vehicle electric charging station, but can be expanded to charge 40 vehicles simultaneously.

The charging station in Malmö will be supplied by Finnish manufacturer Kempower and delivered by Scania.

The system is built on smart technology that can supply energy based on the number of vehicles charging simultaneously, with an initial maximum output per vehicle of 250 kW and the potential to upgrade to 320 kW per vehicle in the future.





In Conversation with BP



Emma Delaney, executive vice president, customers & products, bp

- Emma Delaney, executive vice president, customers & products, bp, said: “With the transition to electric vehicles well underway in Europe, we’re now seeing the move towards electric trucks. Truck manufacturers and truck fleet operators are demanding low carbon alternative fuels and electrification is an attractive option. Opening our first truck charging facilities at Schwegenheim is an important milestone for bp and the industry.”
- bp has opened its first ultra-fast-charging facilities aimed at medium and heavy-duty electric trucks to support the decarbonization of the sector
- Operated by bp’s Aral brand, the retail site at Schwegenheim in Rheinland-Pfalz, Germany now has two 300kw chargers intended for electric trucks, powered by 100% renewable energy. Site opened 27 July 2022.
- Mercedes Benz Trucks worked closely with bp on layout, charging speeds for trucks



- First bp Aral ultra fast charging station for heavy trucks opened July 2022
- Located in retail site at Schwegenheim in Rheinland-Pfalz, Germany
- Two chargers, 300kW



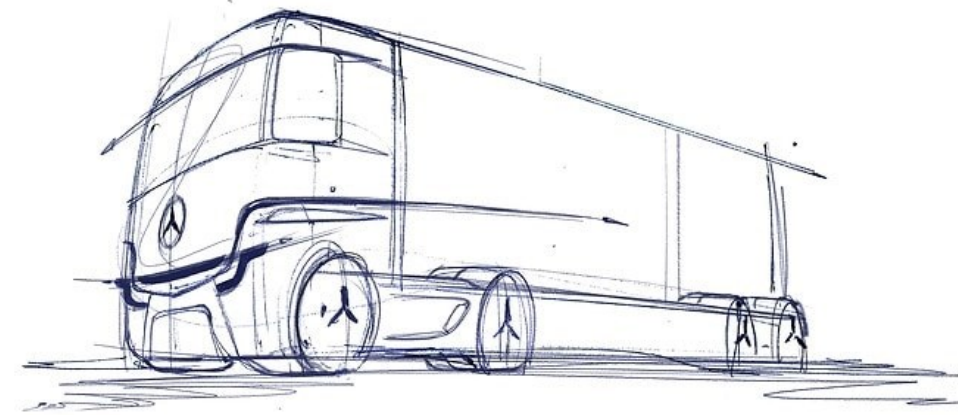


In Conversation with Mercedes-Benz Trucks



Karin
Rådström,
CEO
Mercedes-
Benz Trucks

- Karin Rådström, CEO Mercedes-Benz Trucks: *“The electrification of heavy long-distance transport is the next milestone on our road to CO₂-neutrality. The eActros LongHaul is a battery-electric vehicle which is planned to be economically feasible for our customers. My team and I look forward to presenting this innovative truck to our customers and the public in September.”*
- Daimler Truck, Traton Group and Volvo Group have signed a binding agreement to establish a joint venture for a high-performance charging network for battery-electric heavy-duty, long-distance trucks in Europe. The charging network of these three parties should be available to fleet operators in Europe, regardless of brand.
- When it comes to depot charging, Mercedes-Benz Trucks works with Siemens Smart Infrastructure and ENGIE.
- Daimler Truck participates in the “high-performance charging in long-distance truck transport” (HoLa) project. The goal of the project, under the patronage of the VDA, is the planning, construction and operation of a selected high-performance charging infrastructure for battery-electric long-haul trucking.
 - Two high-performance Megawatt Charging System (MCS) charging points will be set up at four locations in Germany and tested in real-world use.



Mercedes-Benz Trucks to unveil the eActros LongHaul electric truck for long-distance transport in September



In Conversation with Mercedes-Benz Trucks ...cont'd



- Michael Scheib, Head of Product Management, Mercedes-Benz Trucks: *“We want to provide an integrated solution that includes consulting and charging infrastructure solutions from a single source. Our charging park for customers in Wörth is an integral part of this approach and shows customers, in a practical and tangible way, what charging infrastructure for their application can look like.”*
- At the eTruck Charging Park, electric truck customers can now test charging stations and charging concepts from various manufacturers as well as work with on-site experts from Mercedes-Benz Trucks to develop tailor-made charging solutions for their respective applications. Charging technology is provided for testing.
- The eTruck Charging Park has six charging stations from different manufacturers with outputs between 40 kW and 300 kW. Since charging technology continues to develop rapidly, this park has a modular structure so that charging stations can be added or replaced as necessary. Therefore the installation of an MCS charging station (megawatt charging system) is possible as a next step.
- NOTE: this site is NOT open to public, only open to Mercedes Benz eTruck customers



- 6 charging stations from different manufacturers for Mercedes truck buyers to consider.
- Outputs between 40kW and 300kW
- Modular structure
- Installation of MCS planned as next step



In Conversation with Galliker Transport

Question 1: With the lack of public charging infrastructure do you feel electric trucks/car carriers can only be used for short journeys on pre-designated routes such that charging can be done daily at the depot?

Galliker Transport: *We only use our electric car transporter for vehicle transports within Switzerland. This is for two reasons: Firstly, the E-Truck is only approved for use on the Swiss road network. This is due to its extra length (+1m) and its higher permitted payload. Secondly, the public charging infrastructure for e-trucks is not yet sufficiently developed. We therefore charge the electric car transporter at our headquarters in Altishofen and at 5 of our own external branches.*

With its battery capacity of 900 kWh, the electric car transporter has a range of approximately 500 km.

Question 2: How involved are you, as a logistics company with a fleet of vehicles, in the public infrastructure needed to run electric trucks? And do you have to share any costs associated with this?

Galliker Transport: *We are not involved in the creation of a public charging infrastructure for e-trucks.*

As already mentioned under point 1, we have created our own charging infrastructure at our headquarters and in our branches. The costs per charging station range from CHF 100,000 to CHF 200,000, depending on whether it is a normal or a fast-charging station.



NEW!

In conversation with CHARIN



- In Conversation with Semih Tetik, Project Manager, CharIN

Q: How soon will CharIN open the first actual MCS charging facility for electric trucks?

Semih Tetik, CharIN: To clarify we are a non-profit organization to give a platform for the industry to discuss several topics regarding charging of EVs, so we don't plan to build a charging facility.

Q: By 2027 it will be mandatory for all short stops for electric trucks to be fitted with MCS chargers—are you involved in this?

Semih Tetik, CharIN: I am not aware of any mandatory regulations regarding this. We are not involved in this particular discussion but with our regulatory part in Brussels we discuss a couple of items regarding the AFIR.

Q: Alpitronic is the company behind the MCS charging system used at the Oslo EV35 event—will all MCS charging systems used under CharIN be Alpitronic?

Semih Tetik, CharIN: There will be no CharIN charging stations. These were as a demonstration of the current developments and we have a couple of more members which are developing MCS so far.

Q: How soon do you think electric trucks will be capable of using MCS systems? Will the existing electric trucks need to be tweaked in some way so they can use the MCS system?

Semih Tetik, CharIN: It is a chicken and egg problem. There are no charging stations available and also no trucks. So we will see which ones come first. It needs definitely more support from the governments to build the infrastructure, which will consume most of the time. There will be also a transition phase of the electric trucks which will use CCS and MCS because MCS will be limited to find. But in long term the transportation sector with electric trucks will need a fast charging system like MCS.



NEW!

In Conversation with Designwerk

- In Conversation with **Christian Mascarenhas**, marketing director, Designwerk

Q: How critical is the charging infrastructure for heavy duty electric trucks?

Christian Mascarenhas: Future CO₂ targets can only be met if the share of low-emission or zero-emission means of transport continues to increase. Electromobility must therefore also be applied to medium- and long-haul freight logistics. However, this change requires a charging infrastructure that is tailored to the requirements of the (heavy) vehicle and differs greatly from regular car charging infrastructure. Infrastructure is one of the most important aspects in the purchase and operation phase of e-trucks. Just 12 months ago, the first question in the conversation with potential customers was: How far can I drive? Is the range high enough? Today, the first question after that of the price is, how to charge the vehicle according to the fleet operator's need. The possibilities of what is technically feasible are shifting more and more in favour of electromobility.

Q: Is the move to electric trucks currently being slowed down by the lack of adequate charging infrastructure in Europe for electric trucks?

Christian Mascarenhas: Surely, yes! The logistics branch needs a dense network of fast charging stations for mid- and long-haul E-truck. The battery capacities for such applications are in some cases even over 800 kWh, which requires fast charging. Designwerk was the first and so far only manufacturer in Europe, that launched a 900 kWh Semi Truck in Autumn 2021. We see a great demand for this category and have just launched a version with 1'000 kWh. The branch now needs enough leeway, charging points and capacities of the power grid.

NEW!

In Conversation with Designwerk...cont'd



Q: We are excited to learn that Designwerk is developing a Megawatt Charging System (MCS) for release in 2023 in Europe—please could you explain how this will work?

Christian Mascarenhas: The system you are referring to is currently being developed with established partners within a pilot and demonstration project supported by the Swiss Federal Office of Energy (SFOE). The Battery backed Charger is installed in a kind of shipping container with classic dimensions equipped with our second-life battery systems including a Battery management system (BMS), climate control systems, security installations, general controllers and the power transformers. The system is basing on CharIN's Plug standard known as Megawatt Charging System (MCS), respectively, a standard that all OEMs have agreed on this year. The usage of second-life battery systems to buffer the energy is an important step to reduce the CO₂ emission. The system's batteries can be charged with electricity from renewable sources - including solar power - and could even behave in a grid-serving manner. **Our goal is to make it possible to charge big e-trucks within a 45 minute break for the driver. This is possible with charging powers of up to 2'100 kW and a capacity of 1'800 kWh.**

Q: Do you already know where the Designwerk MCS will be installed in Europe? Are you working with any infrastructure companies? Which are the main target markets?

Christian Mascarenhas: If the development and the project, about which we will soon provide information, are successful, we plan to enter further markets. The demand for such systems is big. **Our initial focus markets are the DACH-region, Spain, France, Benelux and Scandinavia.**



NEW!

Latest Updates:

- 19/August/2022: **Shell Deutschland GmbH** has signed an agreement with Schaltbau Holding AG to buy 100% stake in **SBRS GmbH**, a provider of charging infrastructure solutions for commercial electric vehicles, including e-buses, e-trucks and e-vans. The transaction is subject to regulatory approvals and is expected to close later in 2022.



Conclusion

- Charging infrastructure today (August 2022) for heavy commercial vehicles is **'relatively non-existent'**
- Lack of public charging infrastructure for long haul trucks force electric trucks to use short regional routes, with depot charging to avoid **'charge anxiety.'**
- Use of electric HDVs will jump once megawatt charging systems **(MCS) systems are mandatory at short stops from 2027**
- **Logistics firms must liaise with infrastructure projects** CVCE, HoLa etc. to accelerate charging points at most needed locations across Europe's transport corridors
- **OEMs & LSPs need to work with infrastructure projects to accelerate truck charging infrastructure in Europe, then plan delivery routes based on infrastructure feasibility**
- Lack of electric charging infrastructure for heavy trucks forcing FVL players to **delay electric truck** purchases, and some are moving to other alternatives such as Hydrotreated Vegetable Oil (HVO) – a biofuel - as interim solution.
- **Current PV charging infrastructure 'not designed for heavy trucks'**
 - Maximum load capacity of the surface of PV charging sites is usually only 7.5 tonnes, therefore cannot support heavier trucks
 - No adequate turning space for heavy trucks / car carriers at public electric PV charging stations
 - Time taken to charge electric HDVs not part of the original plan for PV + LCV charging facilities

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