

WEBINAR APRIL 9, 2024

Electric Truck Charging – The Next Big Challenge

The smarter E Europe – Europe's Largest Alliance of Exhibitions for the Energy Industry

19.–21. Juni 2024: 19 halls plus outdoor Area



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e es
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international exhibition for
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**POWER
DRIVE**
EUROPE

The international exhibition
for charging infrastructure
and e-mobility

hall B6, C6 & Outdoor Area
→ directly at Entrance East ←



EMPOWER
EUROPE

The international exhibition for
energy management and
integrated energy solutions



Power2Drive Europe – Welcome to the New Mobility World in context of a renewable energy World



Charging Infrastructure, electric vehicles and mobility services as well as solar parking.



Auszug aus der Ausstellerliste The smarter E Europe 2023, Stand Juni 2023

115,000+ VISITORS	2,800 EXHIBITORS	160+ COUNTRIES	206,000 sqm EXHIBITION SPACE
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700+ provides of charging infrastructure, electric vehicles, ev-batteries and mobility services

Welcome our experts today



Raphael Héliot

Policy Manager,
The European Association for
Electromobility



Dr. Julia Hildermeier

Senior Associate EU
Programme,
Regulatory Assistance Project



Koen Noyens

Head of Public Affairs,
Milence



Pierre-Louis Ragon

Researcher on Heavy-Duty,
International Council on Clean
Transportation



ELECTRIC TRUCK CHARGING- THE NEXT BIG CHALLENGE

**POWER
DRIVE**
EUROPE

#Webinar

ELECTRIC TRUCK CHARGING – THE NEXT BIG CHALLENGE

Tuesday, April 9, 2024

3:00 pm – 4:15 pm CEST



Raphael Héliot
Policy manager of AVERE



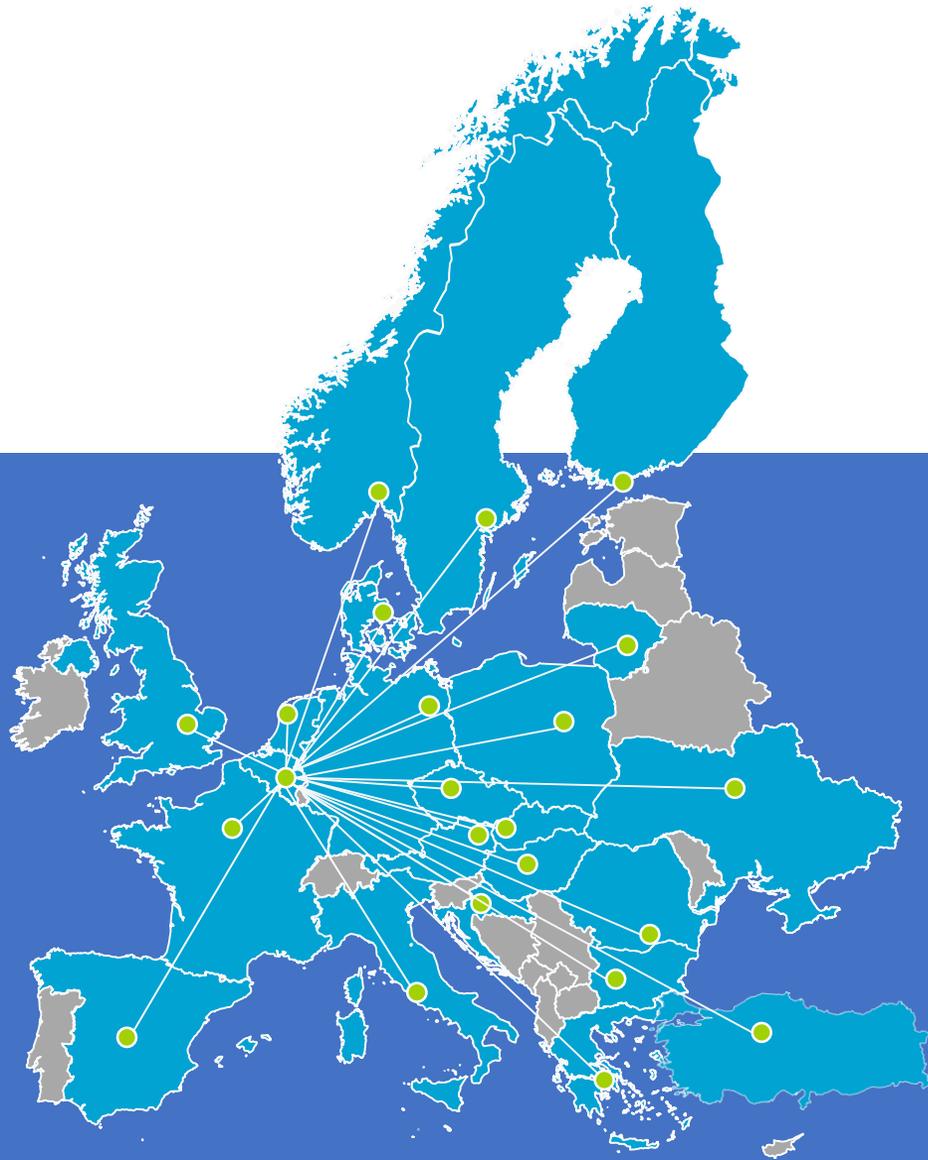
Julia Hildermeier
Senior Associate EU
Programme of RAP



Koen Noyens
Head of Public Affairs of
Milence



Pierre-Louis Ragon
Researcher, ICCT



AVERE

The European Association for Electromobility

Representing the e-mobility value chain:
OEMs, CPOs, EV users, Public Institutions, etc.

65+ members present in 26 states

- **e-Drivers**
- **e-Chargers**
- **e-Vehicles**

Started 1978, from academic perspective
to a drivable & convenient EV reality

AVERE

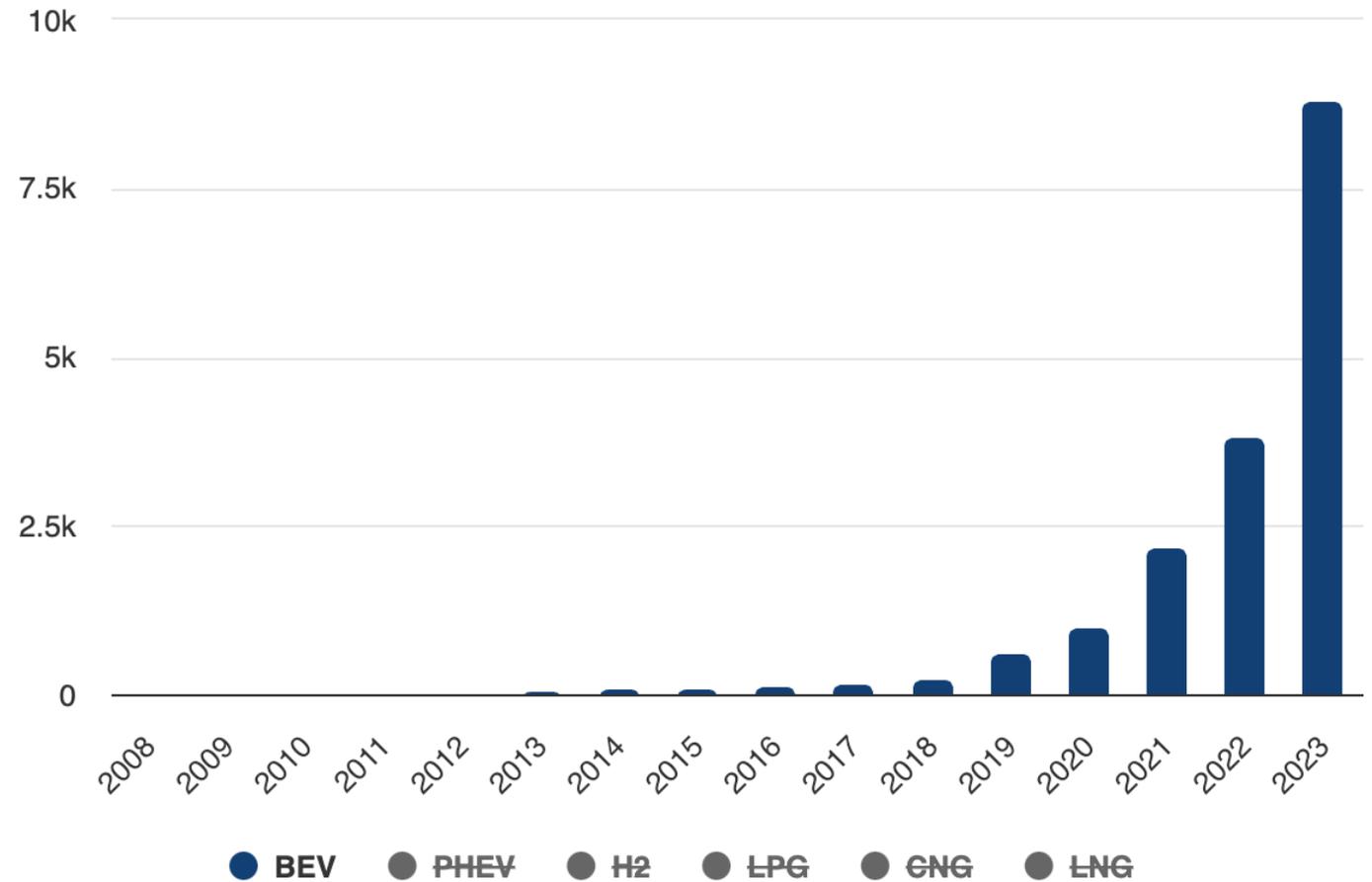
The European Association
for Electromobility

EU MARKET CONTEXT

www.ave.org

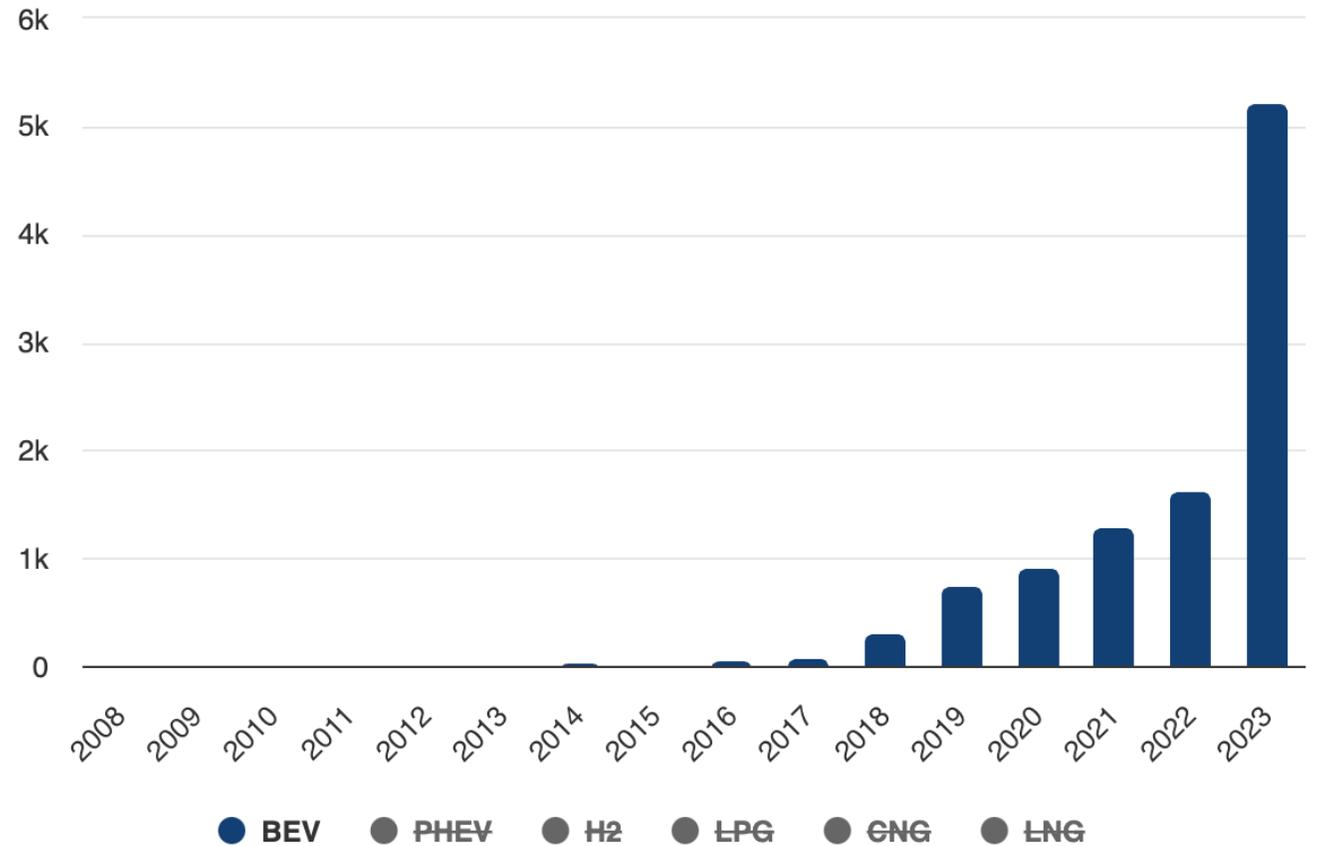


EU fleet of fully electric trucks



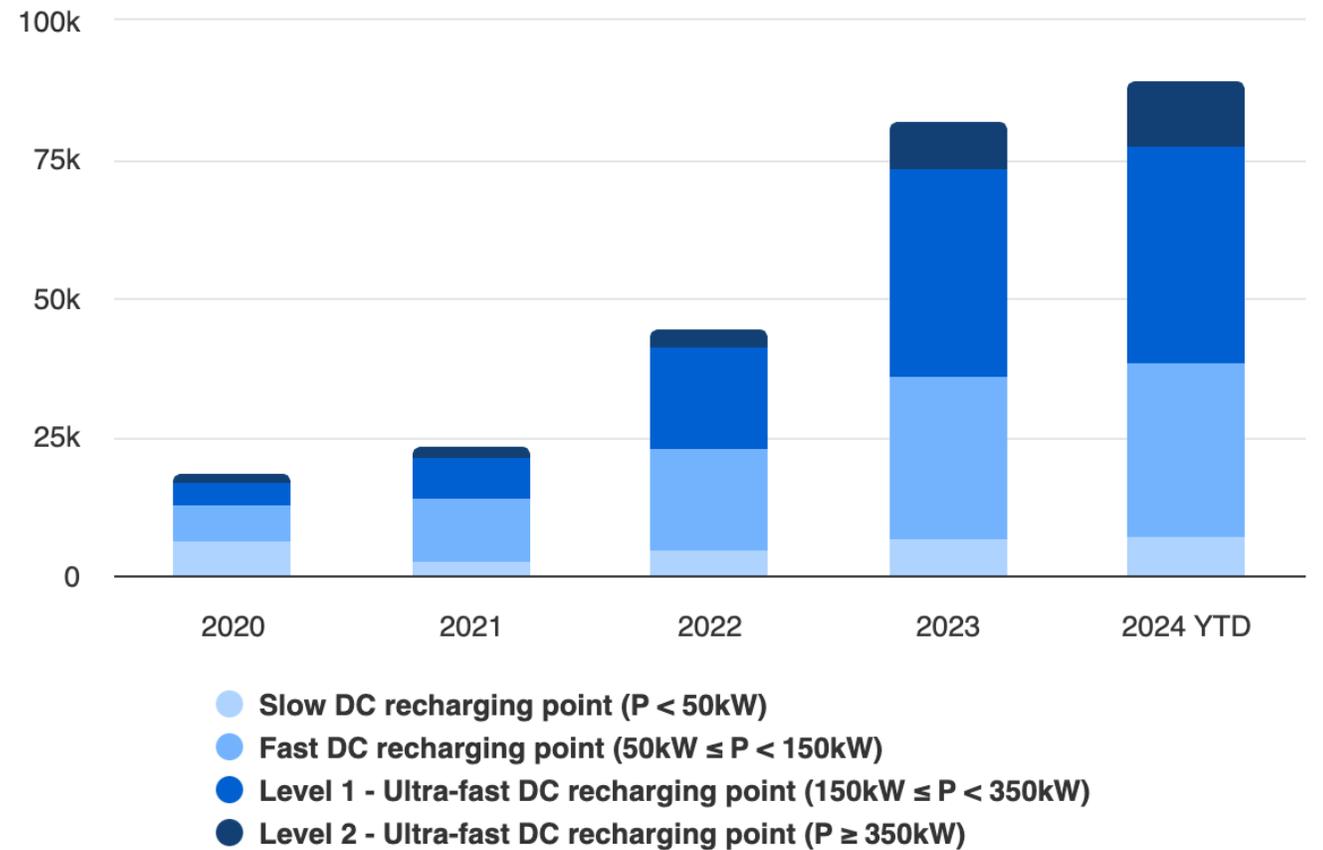
Source: EAFO,
2024

EU new registrations of electric trucks



Source: EAFO,
2024

EU DC Recharging points



Source: EAFO,
2024

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The European Association
for Electromobility

EU Policies aiming to accelerate recharging points roll-out for HDVs



Alternative Fuels Infrastructure Regulation

- AFIR creates rules for the deployment and operation of publicly available recharging points

Commencement of application
of AFIR provisions - **13th of April
2024**



Some provisions have specific
timelines



AFIR does not need to be
transposed in national
legislations (direct applicability)

Targets for charging infrastructure for eHDVs

Distribution of public charging hubs – TEN-T core network

By the end of _____ **2025**



At least **15%** of the length of the TEN-T network must be provided with charging hubs with a power of

≥ 1,400 kW each

including at least **1 charging point** with a power of

≥ 350 kW



Charging hubs
in every direction of travel

By the end of _____ **2027**



At least **50%** of the length of the TEN-T network must be provided with charging hubs with a power of

≥ 2,800 kW each

including at least **2 charging points** with a power of

≥ 350 kW

By the end of _____ **2030**



Charging hubs must be provided at intervals of **up to 60 km** with a power output

≥ 3,600 kW each

including at least **2 charging points** with a power of

≥ 350 kW

Targets for charging infrastructure for eHDVs

Distribution of public charging hubs – TEN-T comprehensive network

By the end of _____ **2025**



At least **15%** of the length of the TEN-T network must be provided with charging hubs with a power of

≥ 1,400 kW each

including at least **1 charging point** with a power of

≥ 350 kW



Charging hubs
in every direction of travel

By the end of _____ **2027**



At least **50%** of the length of the TEN-T network must be provided with charging hubs with a power of

≥ 1,400 kW each

including at least **1 charging point** with a power of

≥ 350 kW

By the end of _____ **2030**



Charging hubs must be provided at intervals of **up to 100 km** with a power output

≥ 1,500 kW each

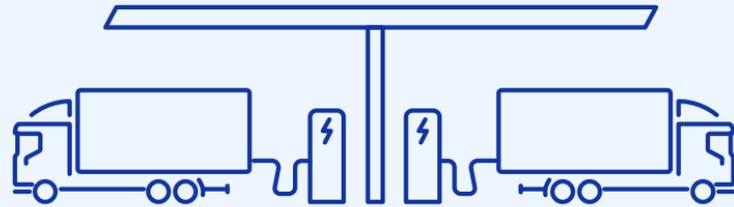
including at least **1 charging point** with a power of

≥ 350 kW

Targets for charging infrastructure for eHDVs

Distribution of public charging hubs

General requirements for the TEN-T network



A single public charging hub can be set up for two directions of travel if:

- It is readily accessible on both sides of the road
- It is marked accordingly
- The same requirements as for 2 directions of travel have been met regarding the following:
 - distance
 - total power output of the charging hub
 - number and power output of charging points

Energy Performance of Buildings Directive (EPBD)- a missed opportunity

- **Would set rules for charging points at private locations (multi-unit buildings & non-residential)**
- **Pre-cabing and charging points deployment targets for new, renovated and existing buildings**
- **Missing proper depot / HDV targets**
 - **Implementation at national level could**

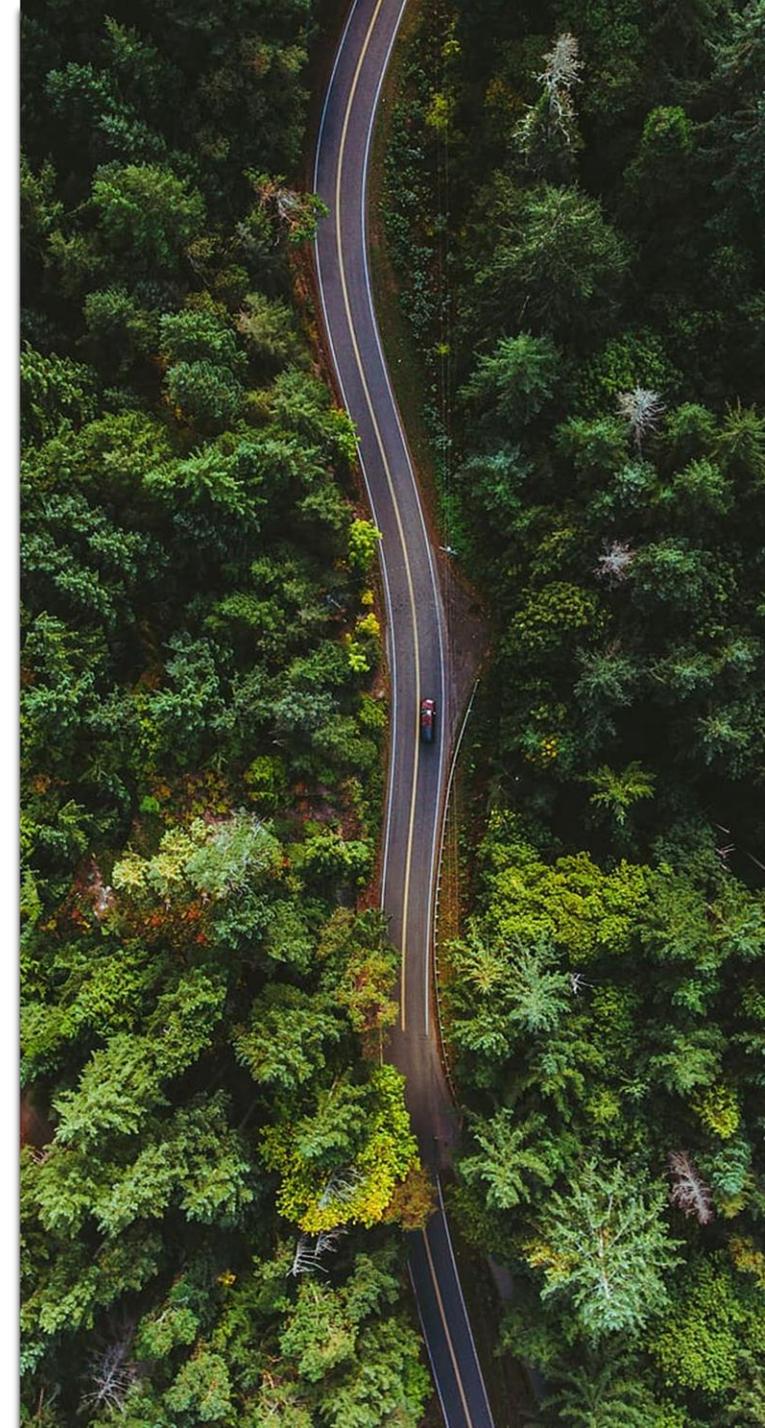


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The European Association
for Electromobility

Thank you!

Raphaël Héliot
raphael@avere.org



Truck charging deployment in Europe – AFIR compliance and the role of depot charging

Pierre-Louis Ragon

09/04/2024

Power2Drive webinar, online

ABOUT THE ICCT & OUR MISSION

- An independent nonprofit research organization since 2005
- Providing exceptional, objective, timely analysis to environmental regulators
- Empowering them to improve the environmental performance of transportation to benefit public health and mitigate climate change

The recent revision of the HDV CO2 standards gives certainty on e-truck adoption

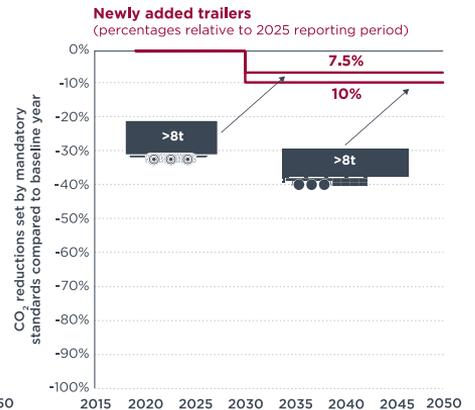
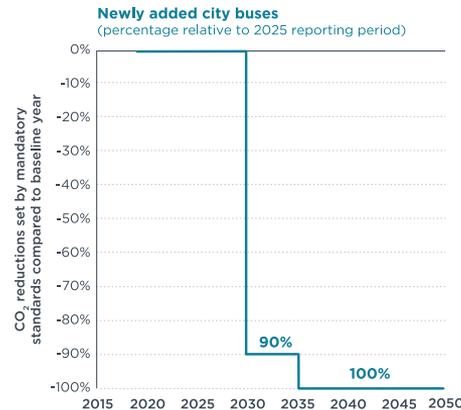
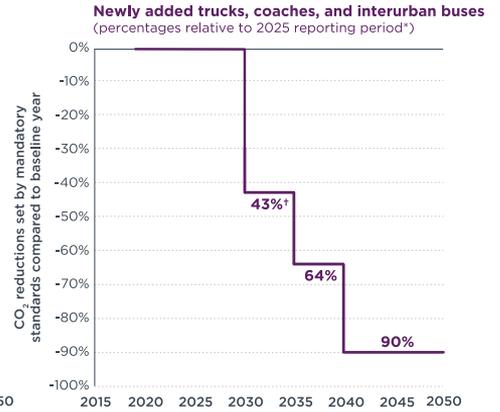
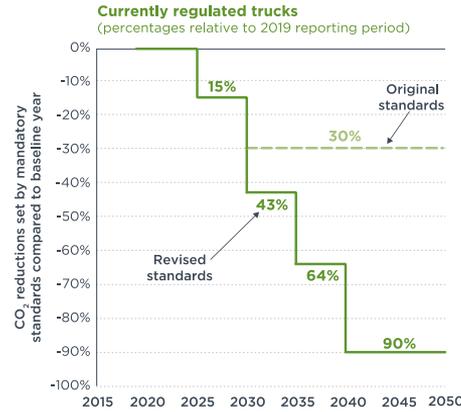
Trucks have new emissions reduction targets:

- 43% in 2030
- 64% in 2035
- 90% in 2040

At least 33% of newly sold trucks need to be electric

Truck manufacturers target up to 53%

<https://theicct.org/publication/infrastructure-deployment-mhdv-may23/>



Long-haul trucks will drive an increasing share of HDV charging energy needs from 2030 onwards

Electric LH truck uptake will become significant towards the end of the decade

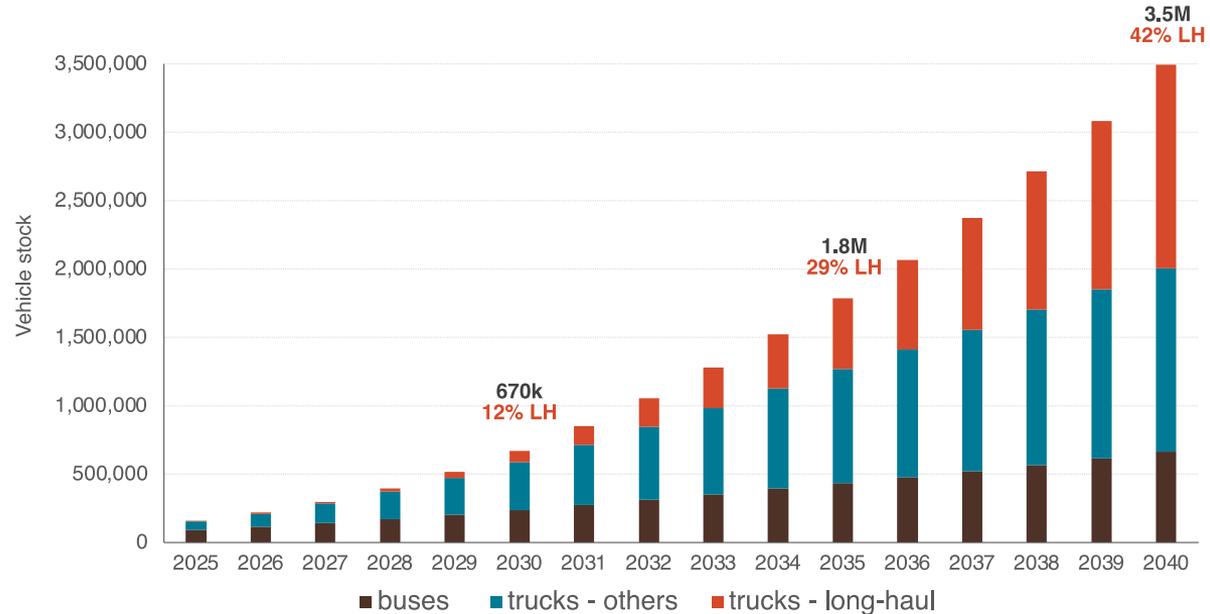
Electric LH trucks energy consumption

2030

33 GWh/day (48% of the total e-HDV energy consumption)

2040

611 GWh/day (80% of total)



<https://theicct.org/publication/infrastructure-deployment-mhdv-may23/>

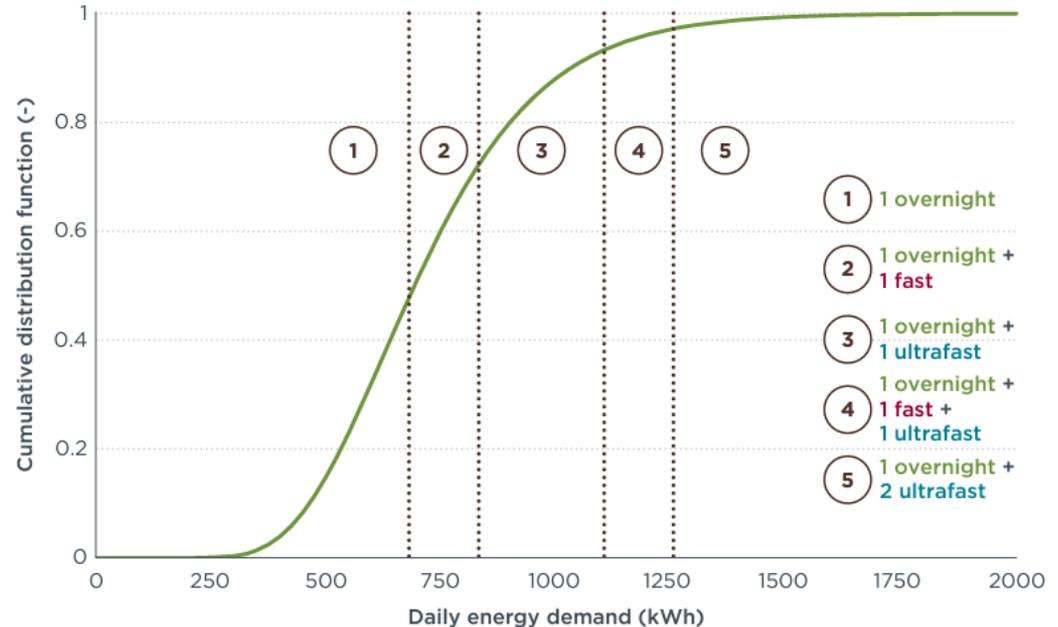
Overnight charging can cover a significant share of trucks energy needs

Up to 50% for long-haul trucks

Up to 100% for other vehicle segments (urban logistics, buses)

Dependent on fleet charging strategy and vehicle specifications, opportunity charging can contribute a higher share

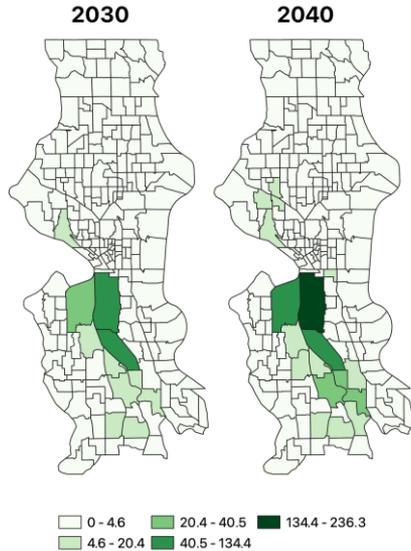
5-LH truck with 800km driving range in 2030



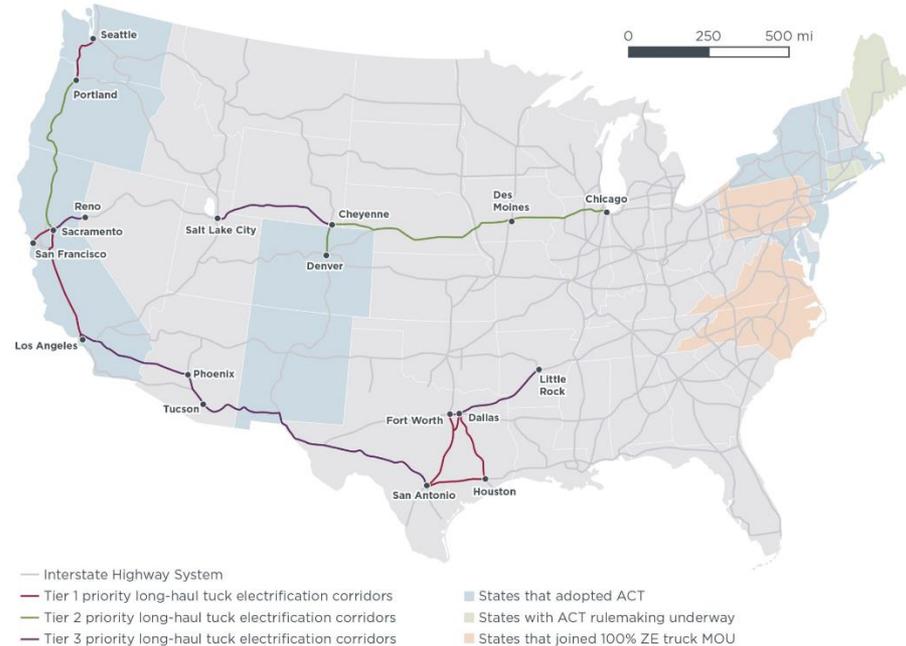
<https://theicct.org/publication/afir-eu-hdv-infrastructure-mar22/>

The deployment of depot and warehouse charging, and public charging are subject to different challenges and opportunities

Depot overnight chargers for class 4 and 5 rigid short-haul trucks



- ✗ Geographic flexibility of load ✓
- ✓ Potential for high utilization ✓
- ✓ Potential for smart charging ✗
- ✓ Operational flexibility ✓



<https://theicct.org/deploy-charging-infrastructure-in-no-regrets-freight-zones-and-corridors-to-keep-us-commercial-truck-electrification-aligned-with-climate-goals-dec23/>

In Europe, public infrastructure deployment is regulated by the AFIR

Target date	Scope	Minimum capacity requirement	Minimum distance requirement
December 31, 2025	15%* of core and comprehensive TEN-T	One recharging pool with 1,400 kW of aggregated power	Every 120 km* in each direction of travel
	Urban node	One recharging pool with 900 kW of aggregated power	-
December 31, 2027	50% of core and comprehensive TEN-T	One recharging pool with 2,800 kW of aggregated power in the core TEN-T and 1,400 kW in the comprehensive TEN-T	Every 120 km* in each direction of travel
December 31, 2030	TEN-T core	One recharging pool with 3,600 kW of aggregated power	Every 60 km in each direction of travel
		One hydrogen refueling station	Every 200 km
	TEN-T comprehensive	One recharging pool with 1,500 kW of aggregated power	Every 100 km in each direction of travel
	Urban node	One recharging pool with 1,800 kW of aggregated power	-
		One hydrogen refueling station	-

*A portion of the TEN-T can count towards the percentage coverage requirement, in each direction of travel, only if it is between two recharging pools separated by a maximum of **120 km**.

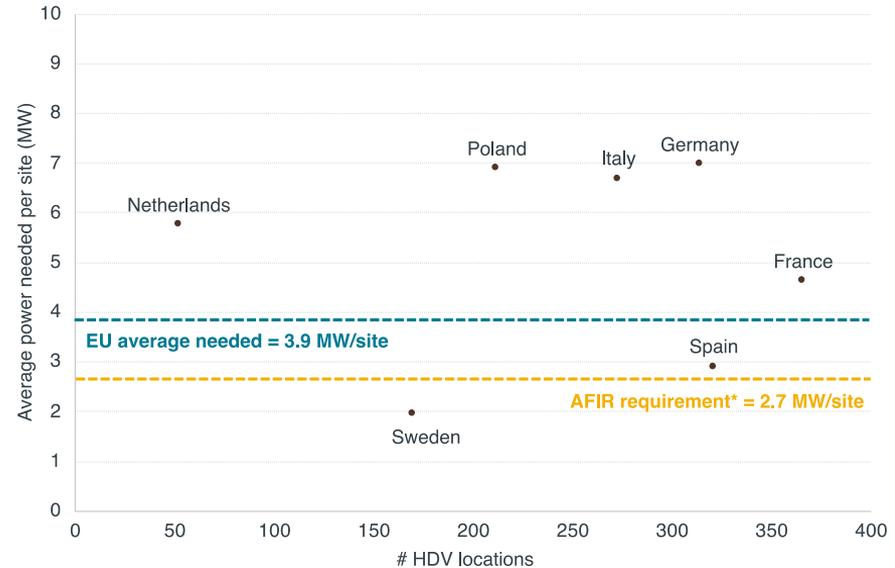
Densely trafficked areas show a higher case for MCS deployment

Areas with the most HDV traffic need to significantly over comply with AFIR targets

For countries including FR, DE, PL, IT, NL, MCS deployment may be an effective way to satisfy energy needs

In other areas, the required power/hub may not mandate MCS

2030, # locations fixed by AFIR, 6-8 vehicles/day

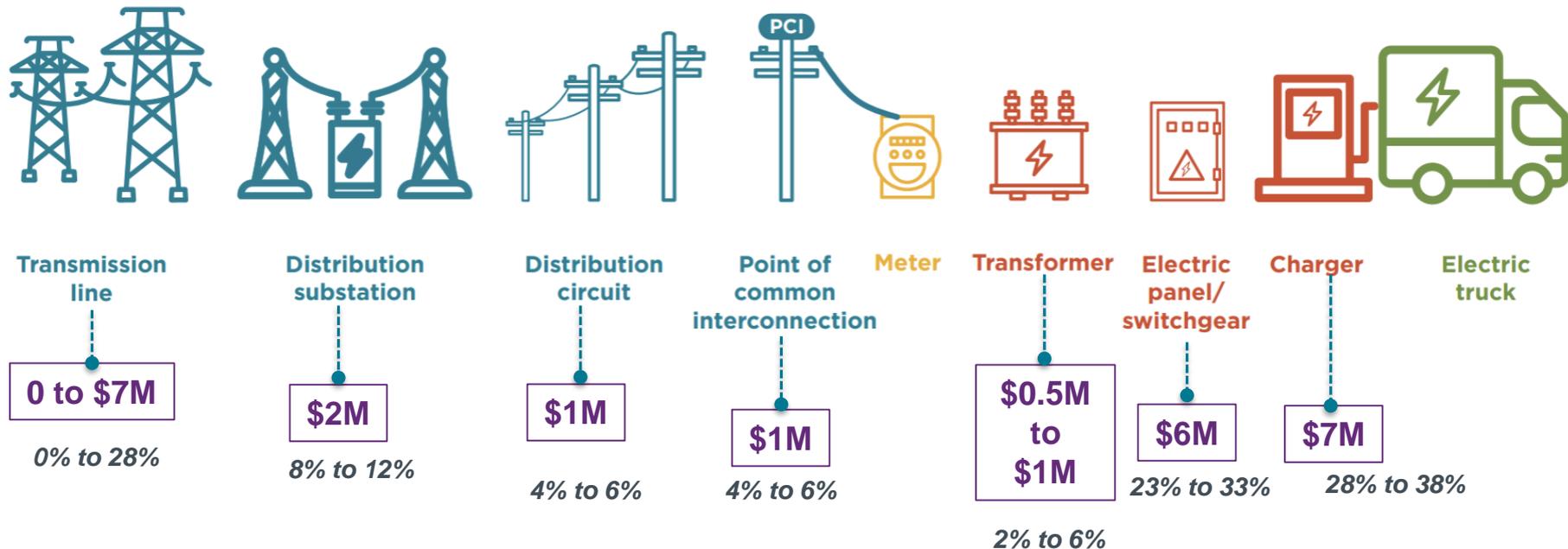


*average of TEN-T core and comprehensive requirements

https://hochleistungsladen-lkw.de/hola-en/results/megawatt_charging_networks.php

Megawatt charging can occur significant costs

For a typical 20 MW station



<https://theicct.org/publication/tco-alt-powertrain-long-haul-trucks-us-apr23/>

Ensuring high utilization is key to enable megawatt charging

20-30 cents/kWh

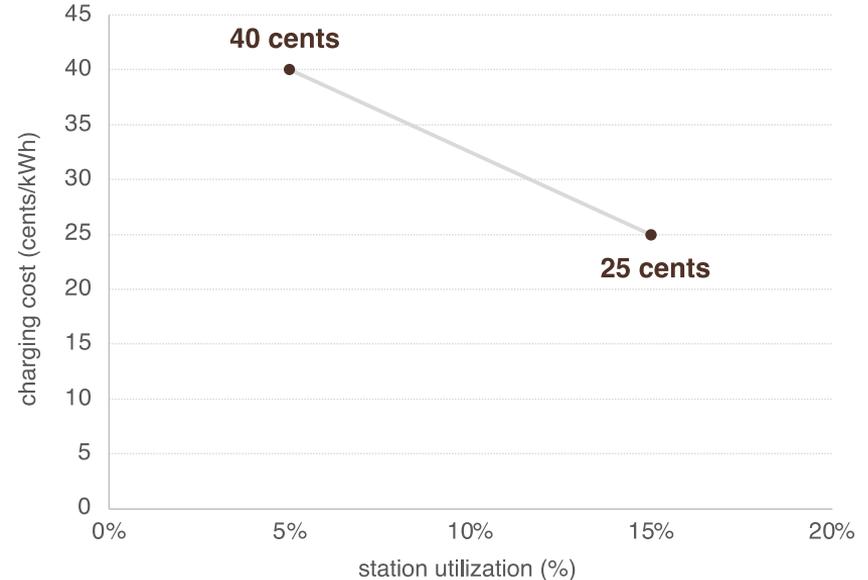
Break-even charging cost for TCO parity between electric and diesel trucks

(depending on local diesel fuel prices, financial incentives, and battery technology development)

MW charging cost is highly sensitive to station utilization, for example

- ~ 40 cents/kWh @ 5% utilization
- ~ 25 cents/kWh @ 15% utilization

For a typical 20 MW station



Key takeaways

Depot charging will cover the majority of electric HDV energy needs and presents opportunities for managed charging.

Key freight corridors in Europe will see significant energy demand from electric LH trucks, making the case for high power charging hubs. There is a need for collaboration between Member States to electrify those corridors. Some countries will need to significantly over-comply with AFIR requirements.

Ensuring high utilization is key to ensure the economic viability of MCS. Modularity is key to ramp up charging capacity at truck charging hubs while ensuring high utilization.

CCS can cover a significant share of HDV charging needs in locations where MCS does not make economic sense. The absence of MCS should not be a major barrier to the electrification of trucks.

Thank you
Please direct questions to p.ragon@theicct.org





9 April 2024

The power of moving loads: Costs of Megawatt Charging in Europe

AVERE/Power2Drive Webinar “Electric Truck charging”

Dr. Julia Hildermeier
Senior Associate
jhildermeier@raponline.org



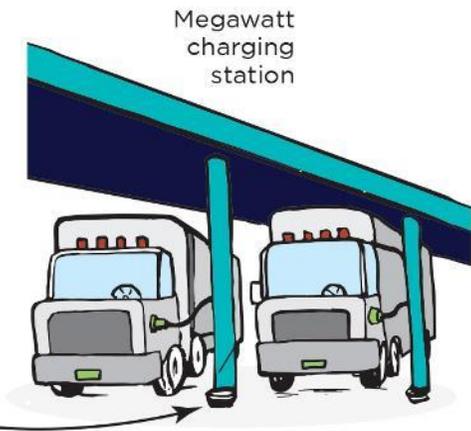
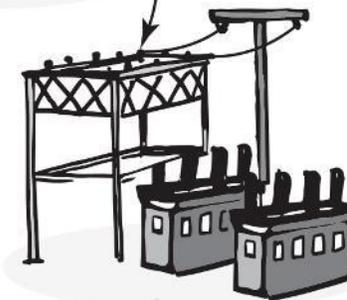
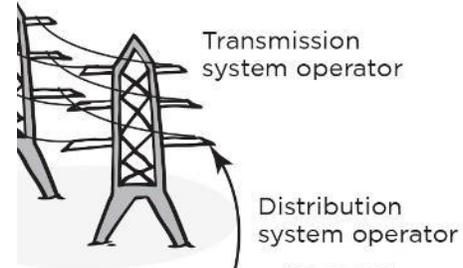
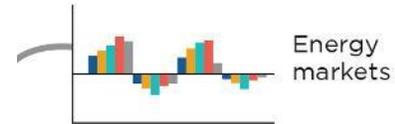
E-truck charging: steep price differences

- AFIR: buildout starting 2025
- Competitive market for charging services
- Challenge: balance out steep price differences across truck charging locations



Source: Milence

“fuel tourism” vs “charging tourism”

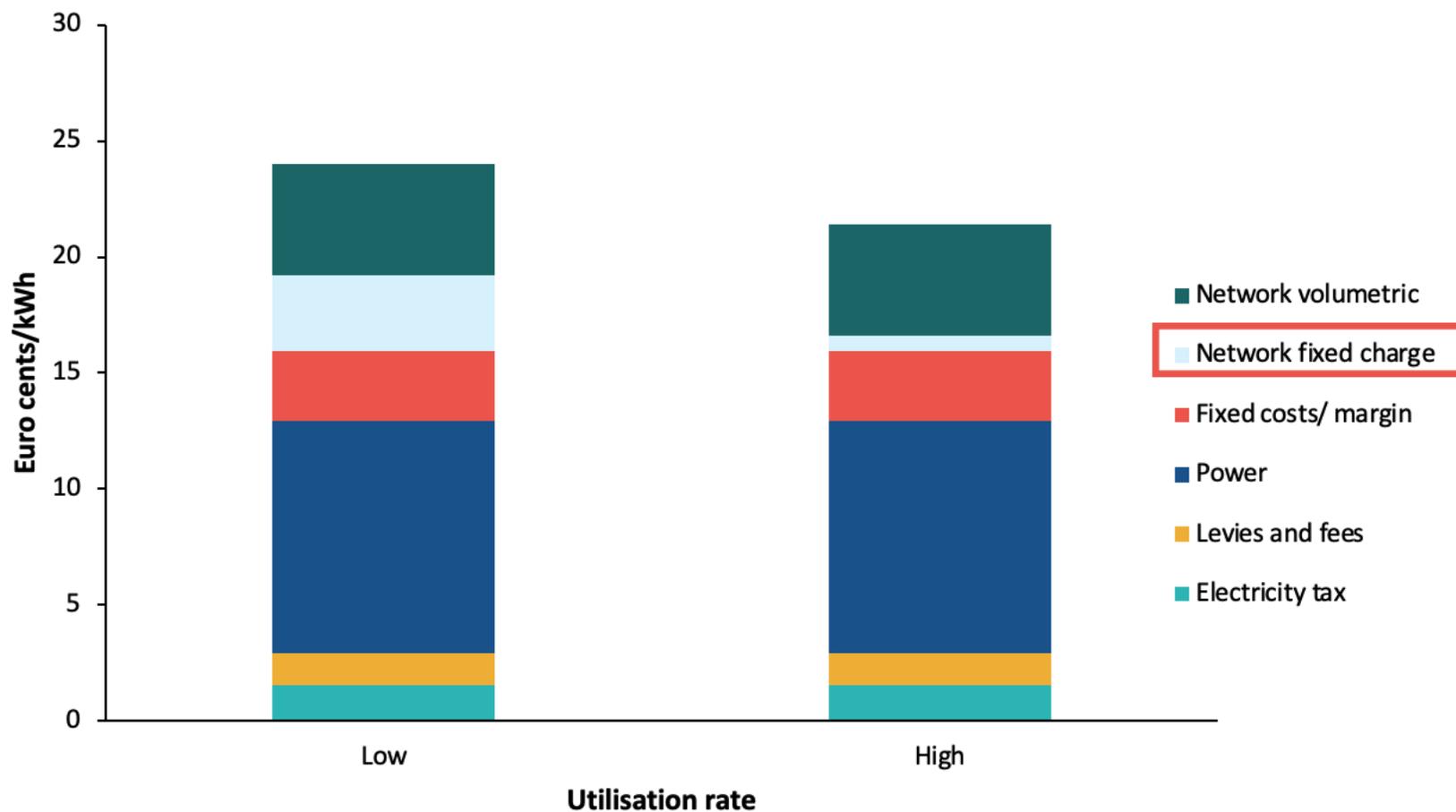


The driver reroutes the truck for the next stage of the route in one



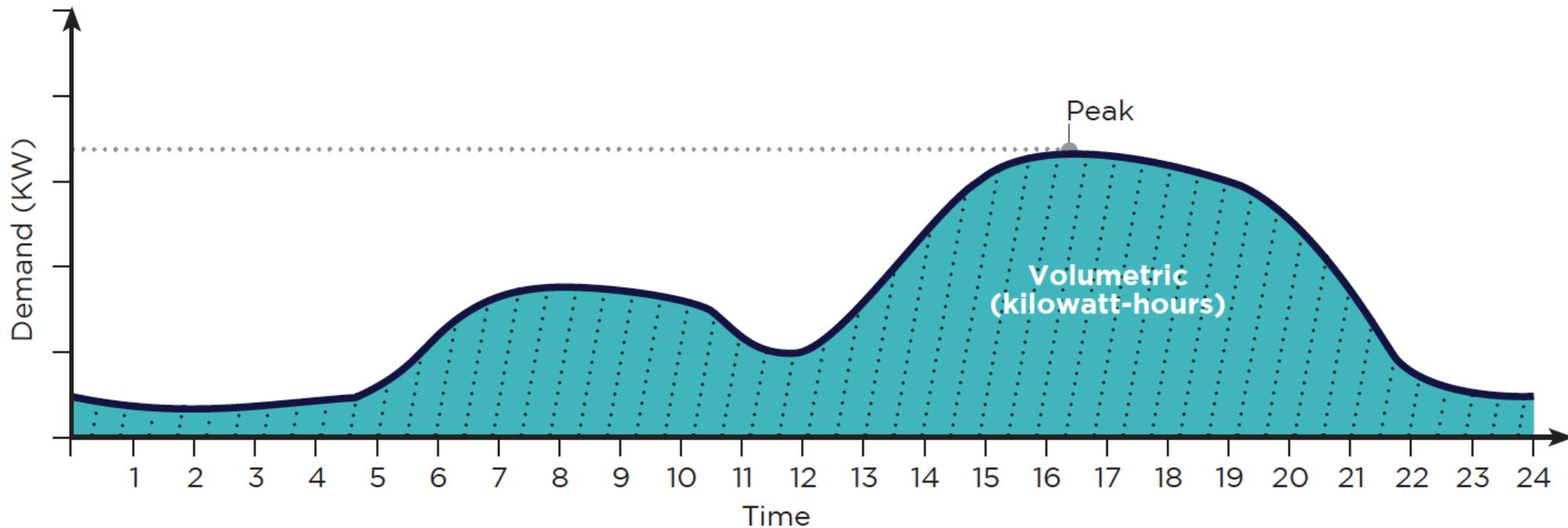
Source: [Focus online](#)

Utilisation determines cost per kilowatt-hour



Example: Germany

Demand charges make truck charging at low utilisation rates costly



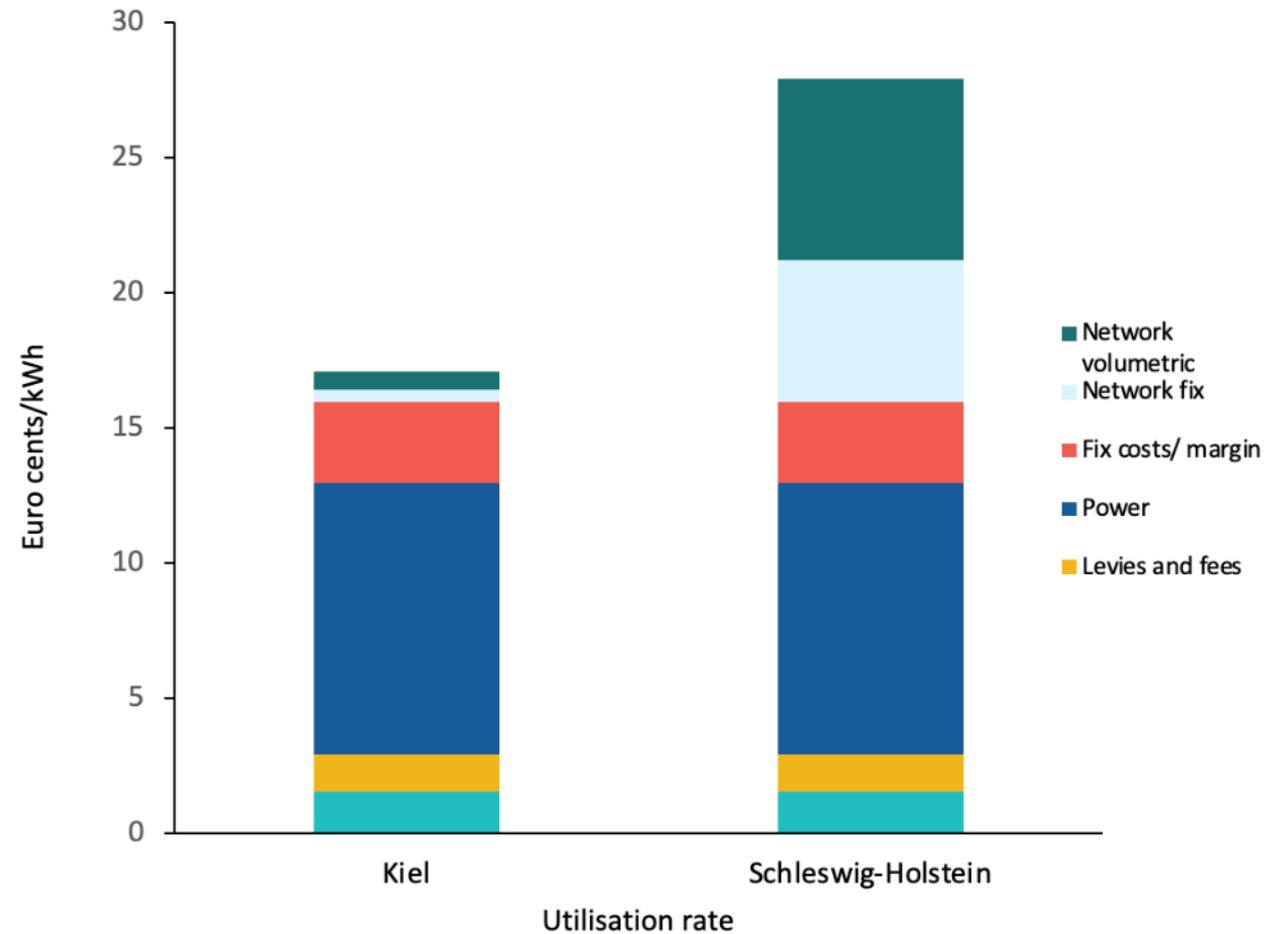
Case studies: border traffic



Border Crossing Points (BCPs)

- Comprehensive
- Core
- Core network corridor

National case study





Key Findings

- **Build-out of megawatt charging in Europe requires coordination across MS to avoid “charging tourism”**
- **Network pricing should be more cost-reflective**
- **MS should better coordinate taxes and levies for truck charging**



About RAP

Regulatory Assistance Project (RAP)[®] is an independent, global NGO advancing policy innovation and thought leadership within the energy community.

Learn more about our work at raponline.org

Resources

- [Electrifying last-mile delivery. A total cost of ownership comparison of battery-electric and diesel trucks in Europe](#)
- [Smart Network pricing. RAP Power System Blueprint.](#)
- [Flex and the City: cities need dynamic pricing for public charging](#)
- [EV smart charging: A golden opportunity for distribution system operators](#)
- [The joy of flex: Embracing household demand-side flexibility as a power system resource for Europe](#)
- [The time is now: smart charging of electric vehicles](#)

The power of moving loads: Cost analysis of megawatt charging in Europe

Julia Hildermeier, Andreas Jahn

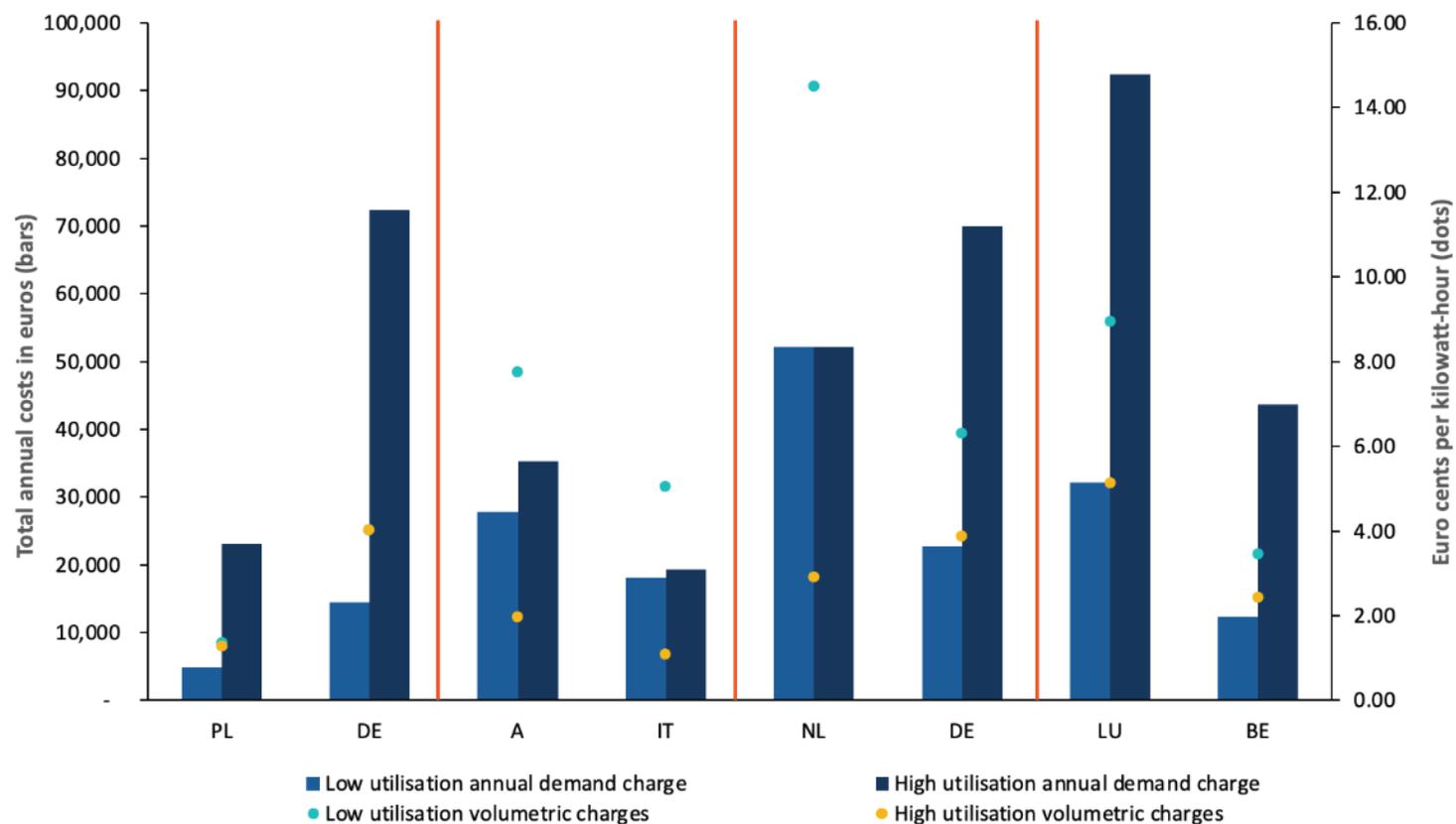
Executive summary

To accelerate the uptake of electric trucks and advance the electrification of long-haul freight across Europe, it will be crucial to build and operate facilities to provide the necessary high-capacity charging along highways, also known as 'megawatt charging,' at reasonable cost. The Alternative Fuels Infrastructure Regulation requires Member States to build out megawatt charging sites along core EU highways starting in 2025. With this process in mind, it will be helpful for policymakers, planners and operators of charging infrastructure to have a better understanding of the costs and likely market effects of megawatt charging along core freight corridors. Recognising that current discussions on freight electrification and charging infrastructure build-out fail to consider this angle, RAP seeks to provide critical input to the debate with this new analysis.¹

We found steep price differences for megawatt charging between charging sites, often between sites located in neighbouring EU Member States. It is important that truck fleet operators can choose where to charge their trucks; this choice, however, can expose the weaknesses in national grid regulation and taxation policies. It can also cause negative impacts on power grids if charging is heavily concentrated in certain regions, straining the system, while remaining light in other areas. If the various actors involved in integrating electric trucks into the grid fail to coordinate, it will hamper the build-out of a high-capacity charging network and slow down the overall electrification of freight.

¹ The authors would like to acknowledge and express their appreciation to the following people who provided helpful insights in to early drafts of this briefing: Fabian Spejka, Transport & Environment (T&E), Dr. Tili Kraft, Mincze, and Dr Hussein Barma, The International Council on Clean Transportation, as well as Jaap Burger, Zsuzsanna Pató, Louise Sunderland and David Farnsworth at RAP. Deborah Bynum provided editorial assistance.

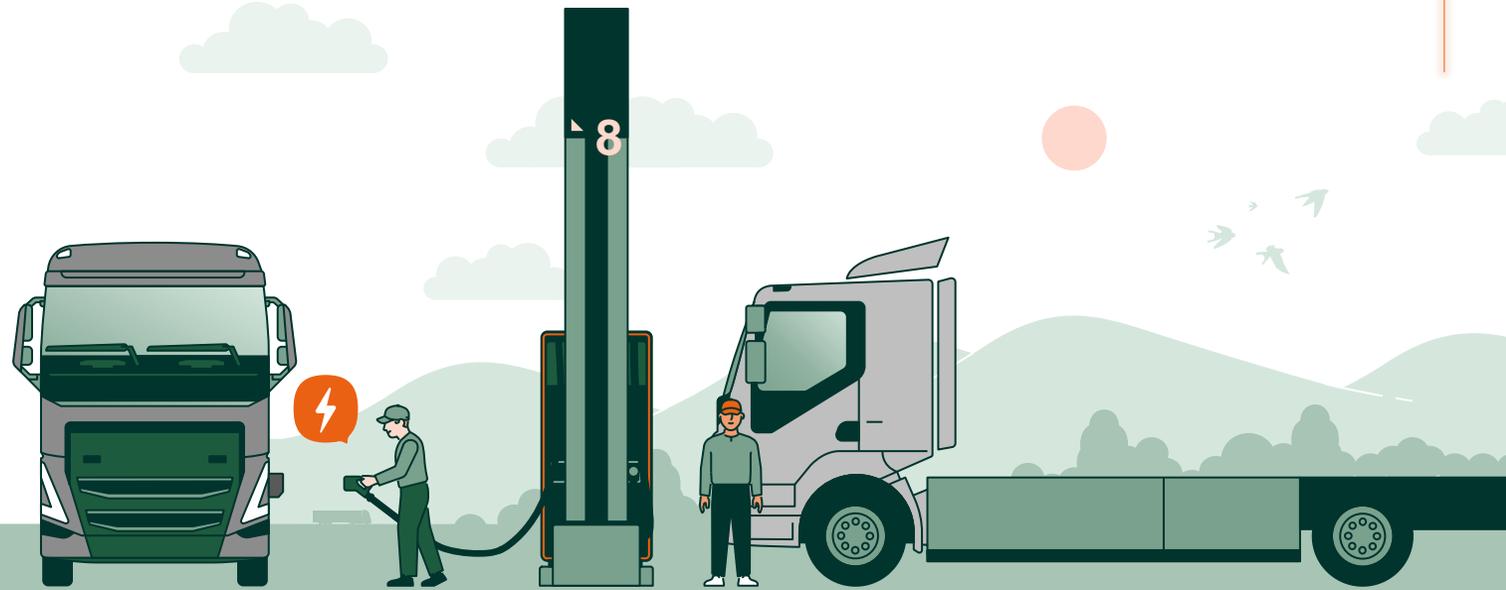
Absolute and relative charging cost differences at border crossings, at high and low utilisation



An aerial photograph of a port terminal, showing numerous trucks parked in rows and a large industrial building. The image is overlaid with a semi-transparent orange and green filter. A vertical orange line is on the left side. The word "milence" is written in a white, italicized, sans-serif font across the center. To the right of the text is a white graphic element consisting of three horizontal bars of varying lengths, stacked vertically and slightly offset to the right.

milence





Founded in
July 2022

**Clear commitment to
electrification &
zero emissions road transport**

DAIMLER
TRUCK



TRATON

Offices in Amsterdam (NL) & Arnhem (NL)



Offices in **14 additional countries** are open



100+ employees (December 2023), growing to **200+** by 2024





Our Vision

A world of **fossil-free transport** for all



Our Mission

Accelerate the transition to **zero-emission heavy-duty vehicles** across Europe



Our Roadmap

Launch **1700+ high-performance charging points** in Europe within 5 years, ensuring optimal rest-and-recharge experiences

We build & operate charging hubs



Acquire



Plan



Build



Commission



Operate

Tailored to Customer Preferences



Rest & Recharge

Planning

- Easy route planning for dispatchers
- Prebooking parking (and possibly charging)
- Simple route cost estimating
- Maximize range planning

Fast, convenient & safe

- Fast-charging stations
- No waiting times and strategically located near main motorways for easy accessibility
- Secured parking especially for overnight charging ensures driver safety

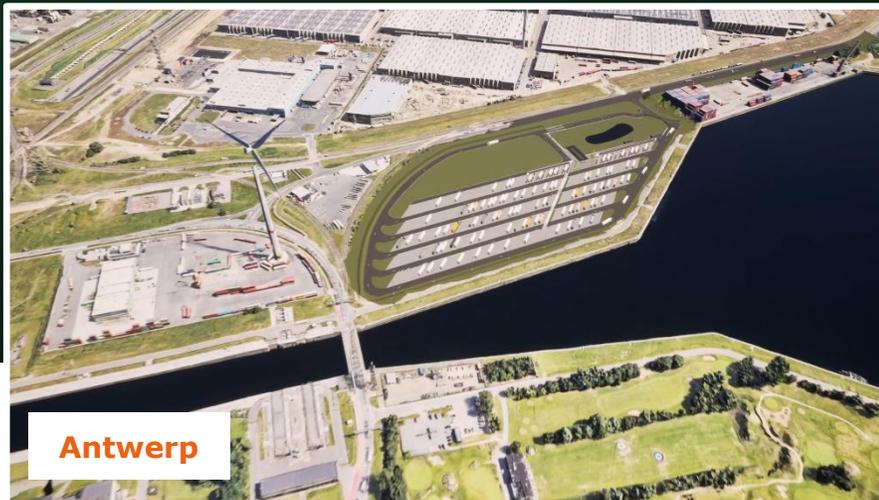
Integrated solutions & support

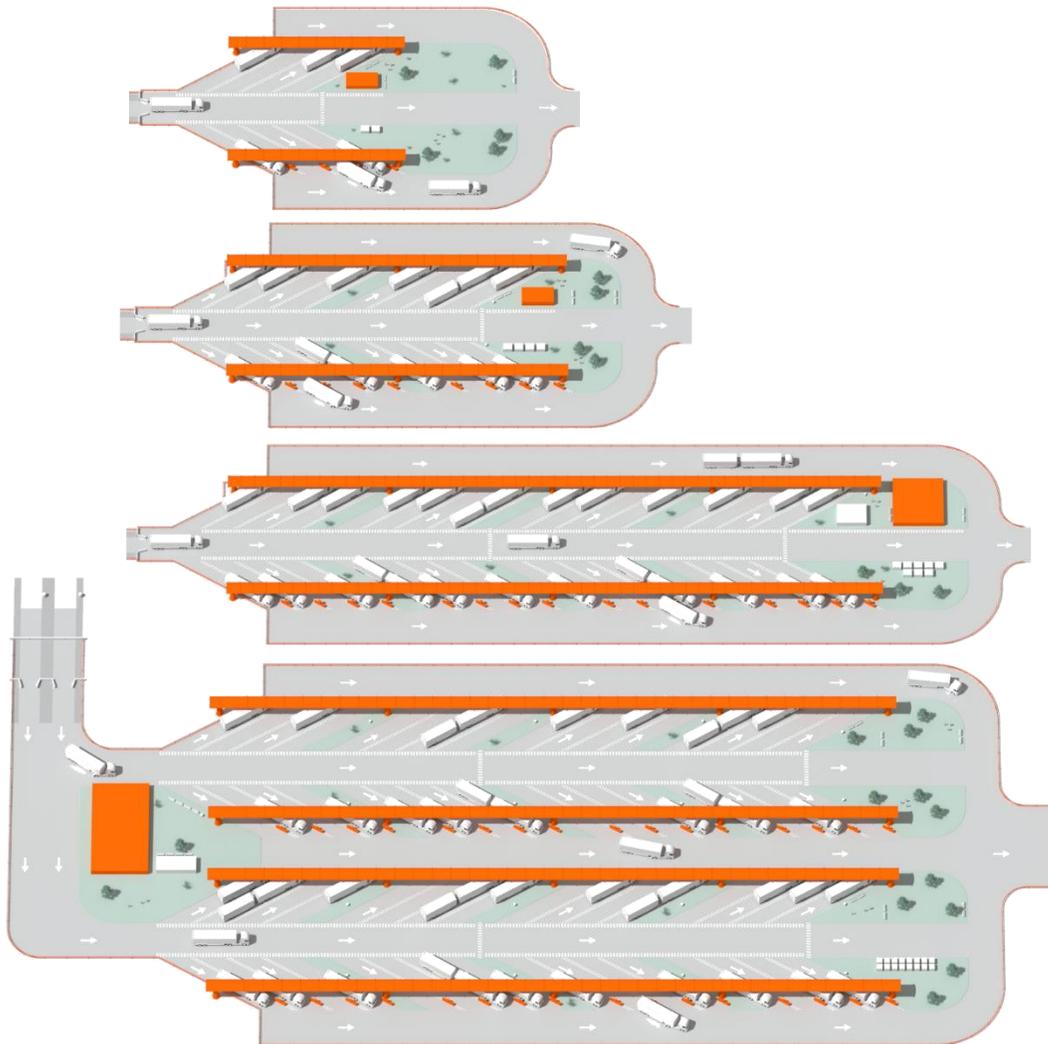
- Single-invoicing
- Plug-N-Play simplicity reducing onboarding resources
- Universal standard – logging system, charging cable/plug, etc.
- Training to help fleet and drivers

Promise

Customer journey truck operator

The Sites





And a modular approach with focus on **reliability, driver comfort & security**



Charging locations are also secure truck parking areas



Focus on access to green space and creating a comfortable working and resting environment for drivers



Amenities such as clean toilets and showers, food and beverage services, and recreation facilities provide drivers the comfort they deserve

Policy enablers



- ✓ Ambitious CO2 standards
- Extended weight across the EU
- Purchase incentives
- ➔ Resting rules fit for (MCS) charging

- ✓ Financial support building new SSTPAs (AFIF)
- ➔ Define new minimum criteria for sustainable charging hubs



- MCS adoption
- ➔ Adapt grid codes and rules to MCS
- ✓ Incentives for green electricity (credits)

- ✗ Adequate & timely planning by DSOs/TSOs
- ✗ Anticipatory investments
- ✗ Faster and transparent connection processes

- New standards for ecosystem data sharing

- ✗ Highest priority
- ➔ In focus of attention

National HDV infrastructure public finance plans to meet HDV needs

1. Consider rollout plans of private players

- Tendering schemes should be complementary to and integrate existing rollout plans of market players and should not interfere with them

2. Be open for innovation and competition for the best solutions

- Formulate output-based criteria / avoid overly detailed specifications, e.g., for the technical design (no additional national rules to AFIR)

3. Focus on trucks (not cars) and their drivers

- Focus on BE-trucks only (MCS!) to improve the business case, and take needs of truck drivers into consideration by supporting appropriate amenities

4. Support sector coupling

- Promote projects that create flexibility for the wider energy system (renewable generation + battery storage + charging infrastructure)

5. Promote standardization and interoperability

- Ensure non-discriminatory access for service providers through open interfaces and standardization

Let's
charge
some
trucks!

webinars,

Podcast or

Live onsite



Di 14.Mai 11:00 CET (GER)

Wärmepumpe, Wallbox & Batteriespeicher: Was bedeutet die Neuregelung von **§14a EnWG** in der Praxis?

Di 16.Mai 11:00 Uhr CET

Best selling **charging features**



TSEP#170: **Megawatt Charging**: The Future of a Sustainable Heavy Duty Transport? (Dr. Julia Hildermeier, RAP)

TSEP#167: But not on my Doorstep, Please! – The Energy Transition and its **Social Acceptance** (Antonella Battaglini, Renewables Grid Initiative)

TSEP#155: **Open Source** & Electromobility: The Future of Charging Infrastructure (Marco Möller, PIONIX)



Exhibition June 19–21, 2024 Messe München

Conference June 18 +19, 2024 ICM Messe München

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- SAN DIEGO, USA | JANUARY 17–19, 2024
- GANDHINAGAR, INDIA | FEBRUARY 21–23, 2024
- DUBAI, UAE | APRIL 16–18, 2024
- MUNICH, GERMANY | JUNE 19–21, 2024
- SÃO PAULO, BRAZIL | AUGUST 27–29, 2024
- MEXICO CITY, MEXICO | SEPTEMBER 3–5, 2024

- GANDHINAGAR, INDIA | FEBRUARY 21–23, 2024
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- SÃO PAULO, BRAZIL | AUGUST 27–29, 2024

185,000+
VISITORS

3,700+
EXHIBITORS

8,300+
CONFERENCE
ATTENDEES



14+
seit 2009

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COFFEE

Thank you
for your attention!

See you in München
19.–21. Juni 2024 ☺



**POWER
DRIVE**
EUROPE

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