

19 November 2020

# Electrifying EU city logistics

## European Clean Trucking Alliance Webinar

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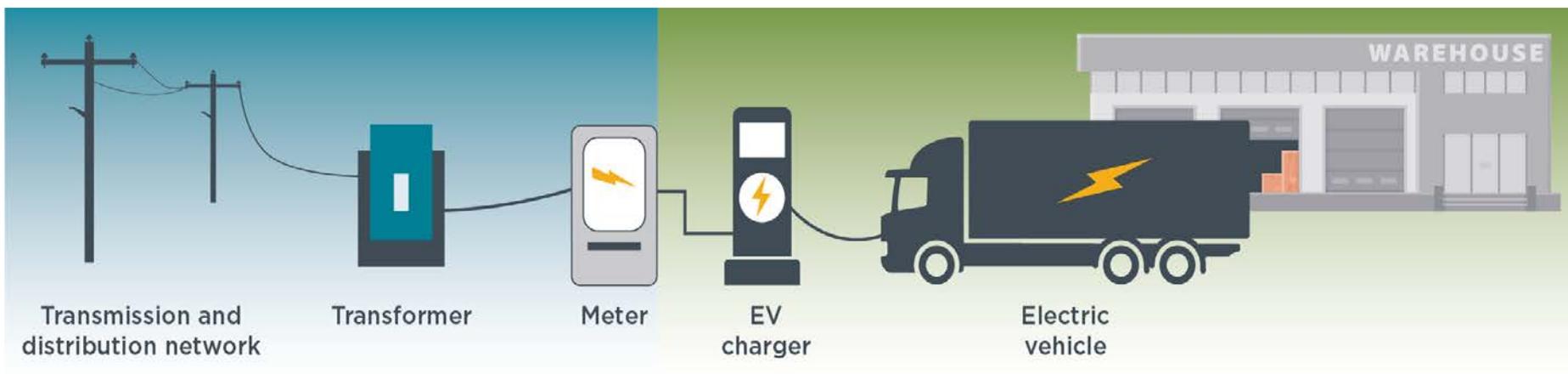
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Dr. Felipe Rodríguez

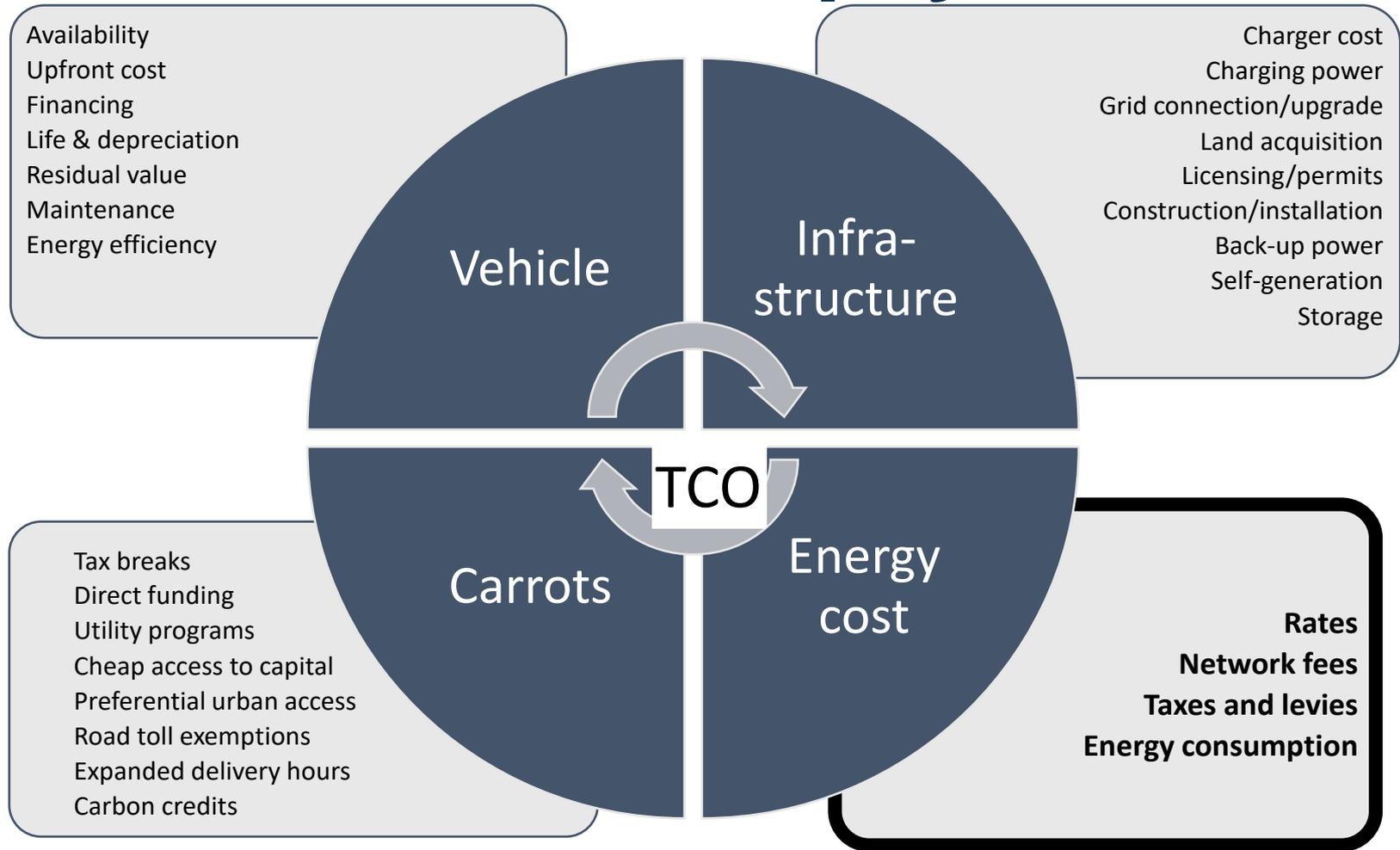
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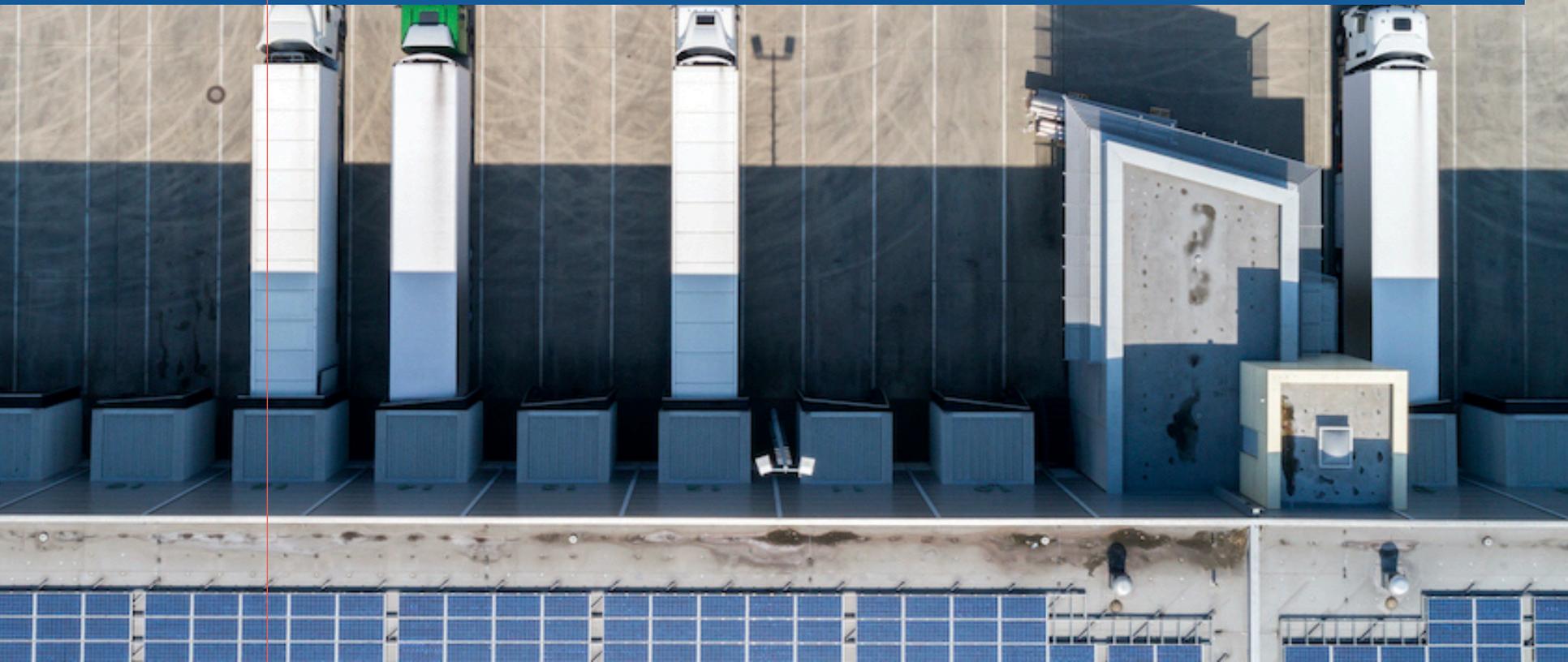
# The study



# ZEF vehicles must pay off



# Energy requirements of electric trucks



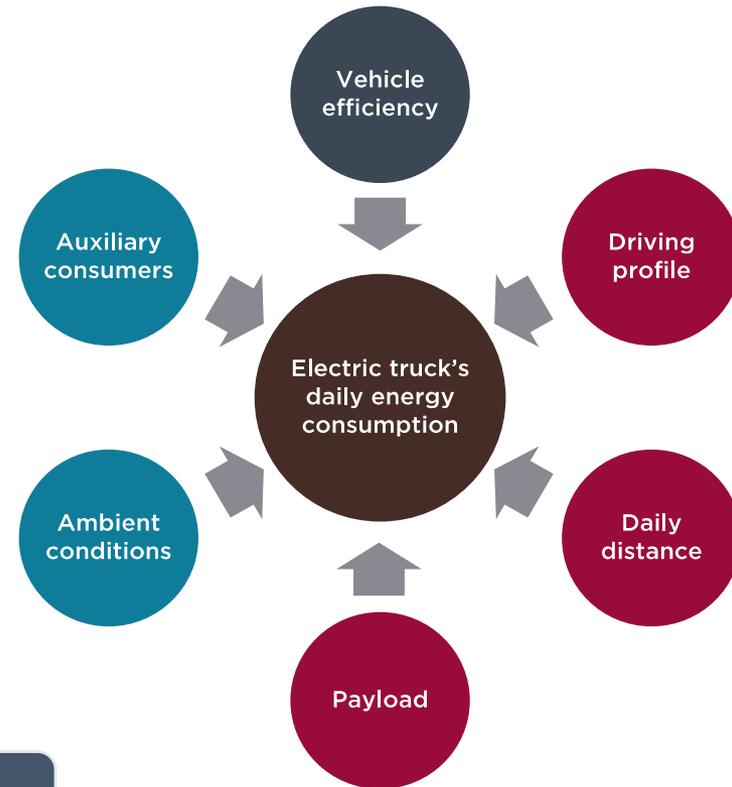
# Energy costs are dictated by the load profile

Drive cycles, payload and other operational considerations

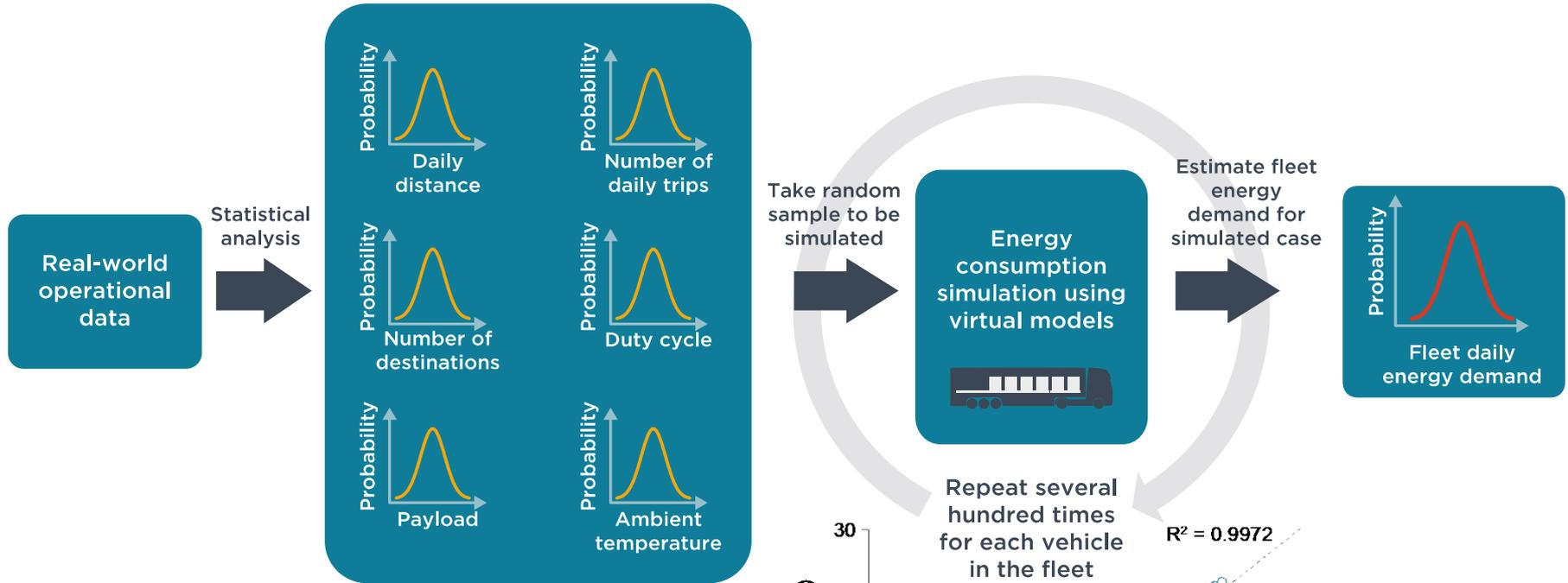
What vehicle technologies are available?  
How many trucks are electrified? What is the energy consumption of the fleet?

What is the daily/weekly/monthly/annual energy demand (kWh)?

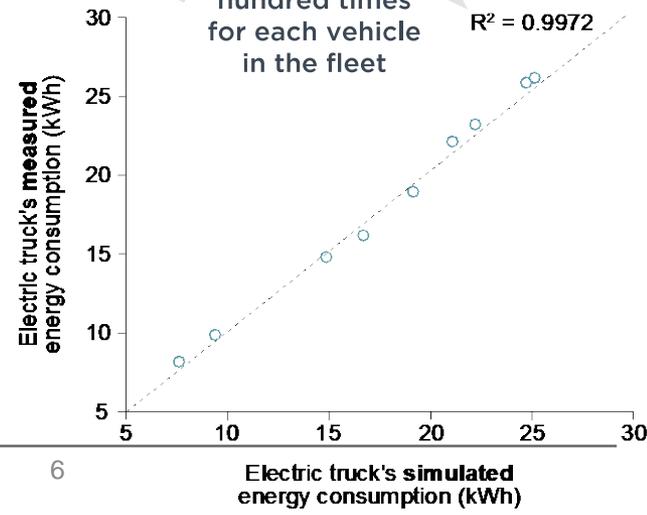
What charging power is needed? What is the power demand throughout the day (kW)?



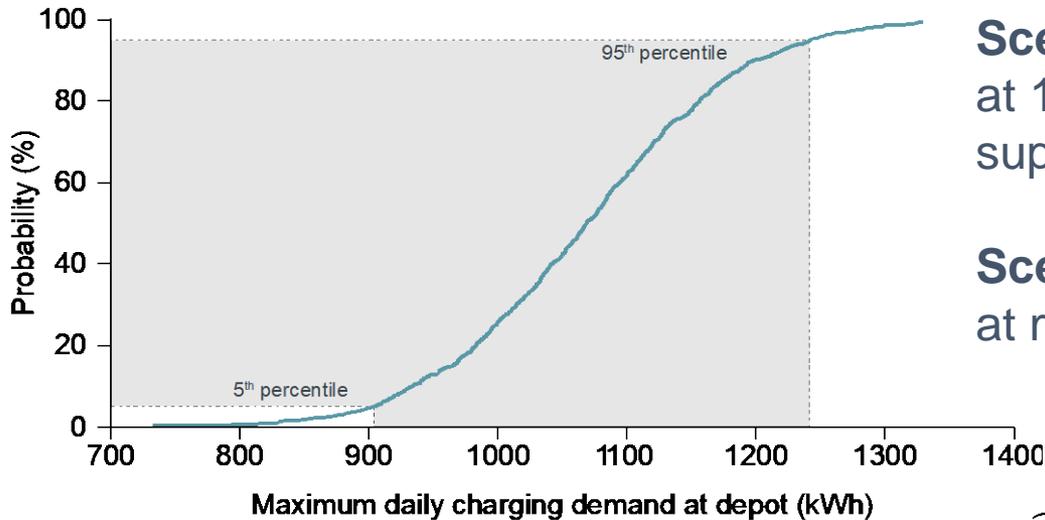
# Energy demand model



Digital twin approach and Monte Carlo modeling increases the reliability of the energy demand model



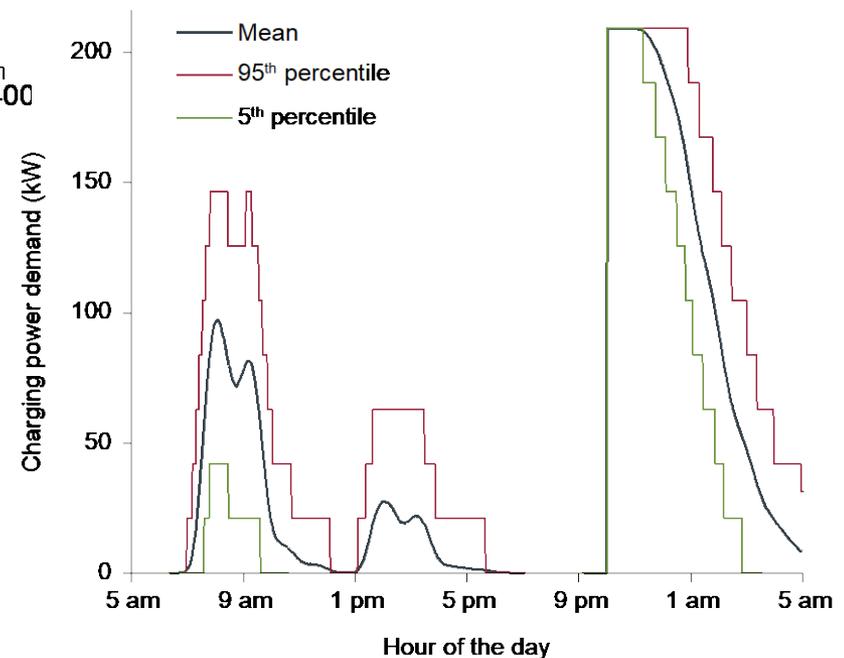
# Load and energy profiles for a 10-truck fleet



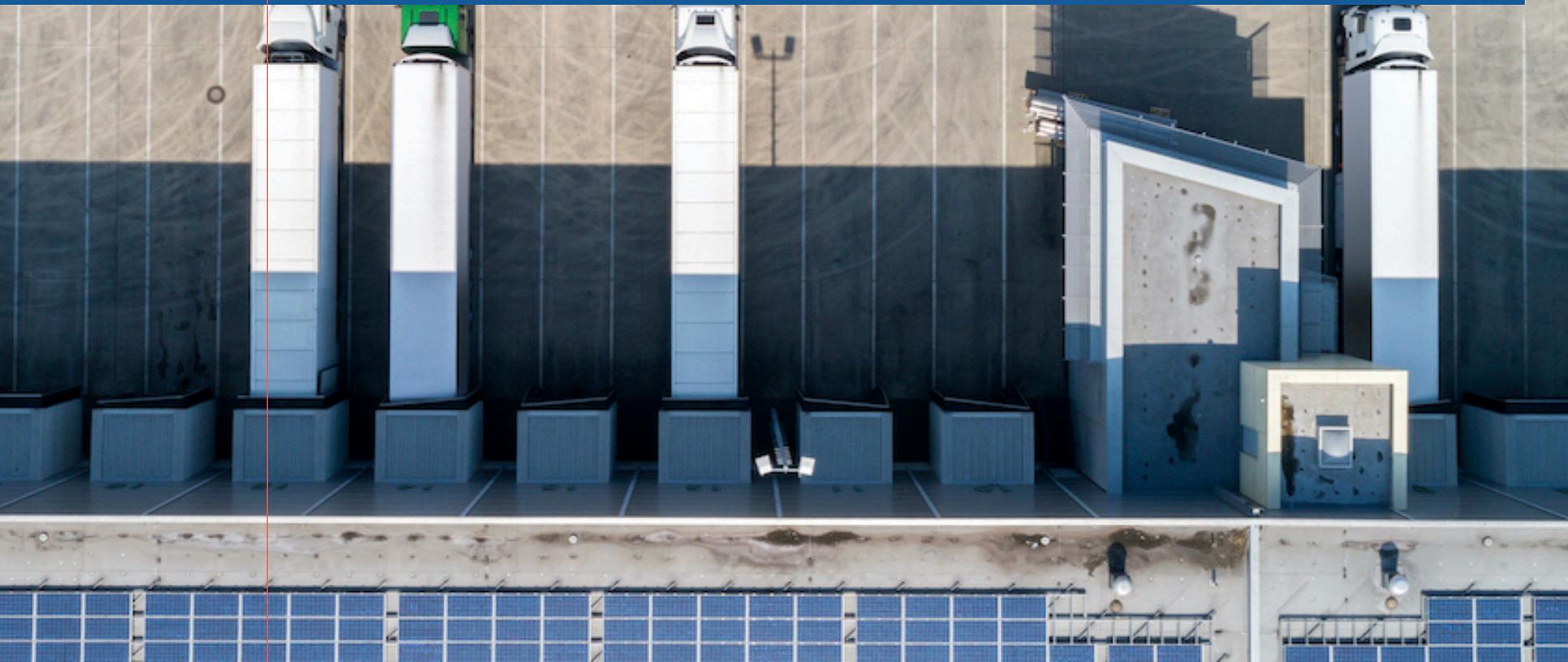
The average daily energy demand of the fleet is approximately 1,100 kWh, but energy consumptions as low as 750 kWh and as high as 1,350 kWh are possible.

**Scenario 1:** Overnight charging starting at 10 pm, with 22 kW of power, with support of daytime charging.

**Scenario 2:** Overnight charging starting at midnight, with 43 kW of power.

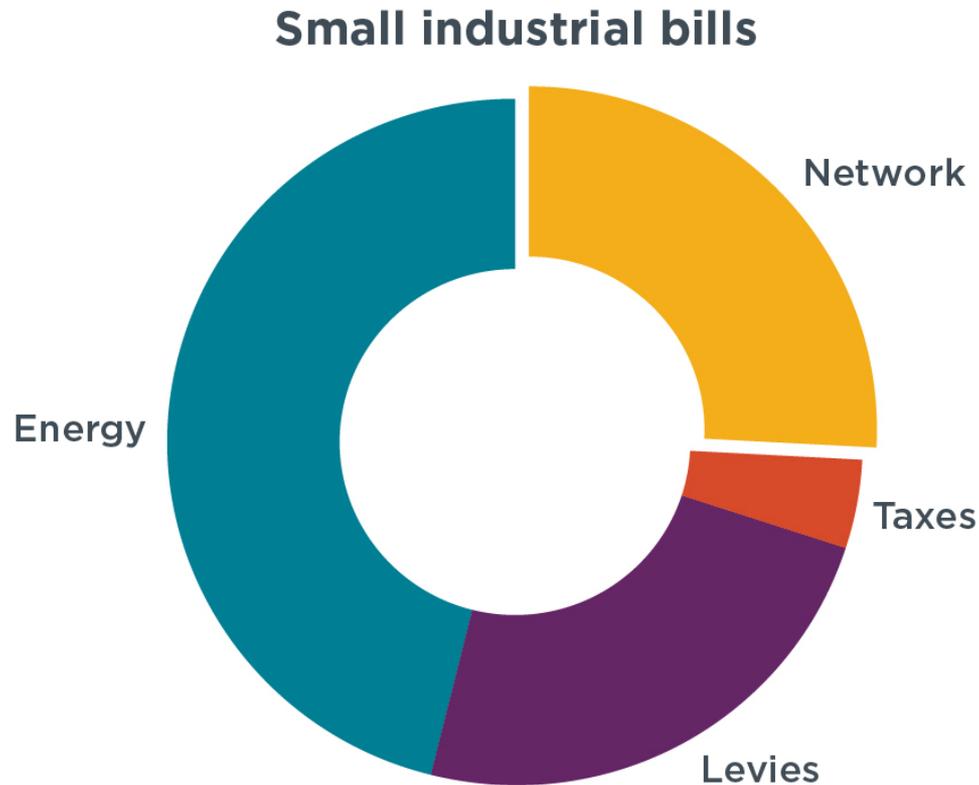


# Charging costs & optimisation strategies



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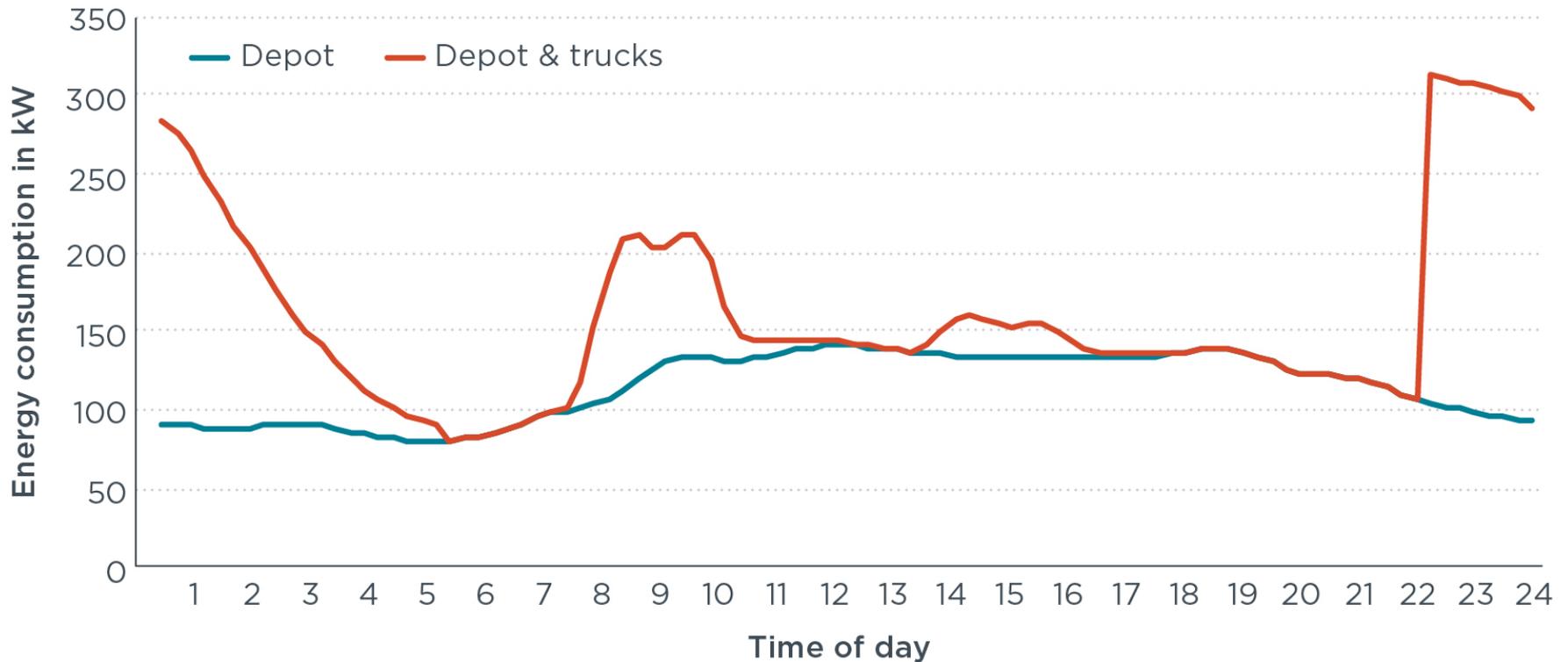
# Costs for e-truck charging



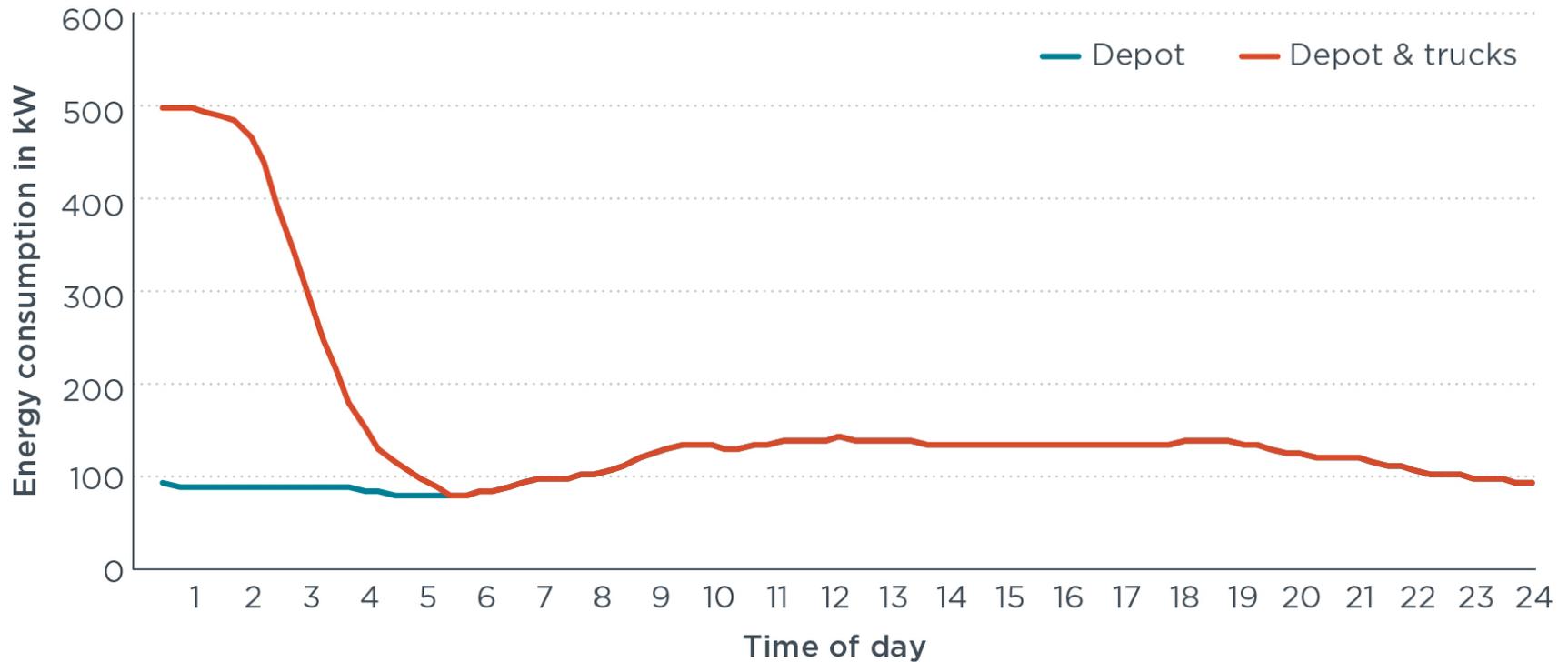
EU average electricity bill for small industrial consumers.

Source: [EU Commission 2016](#)

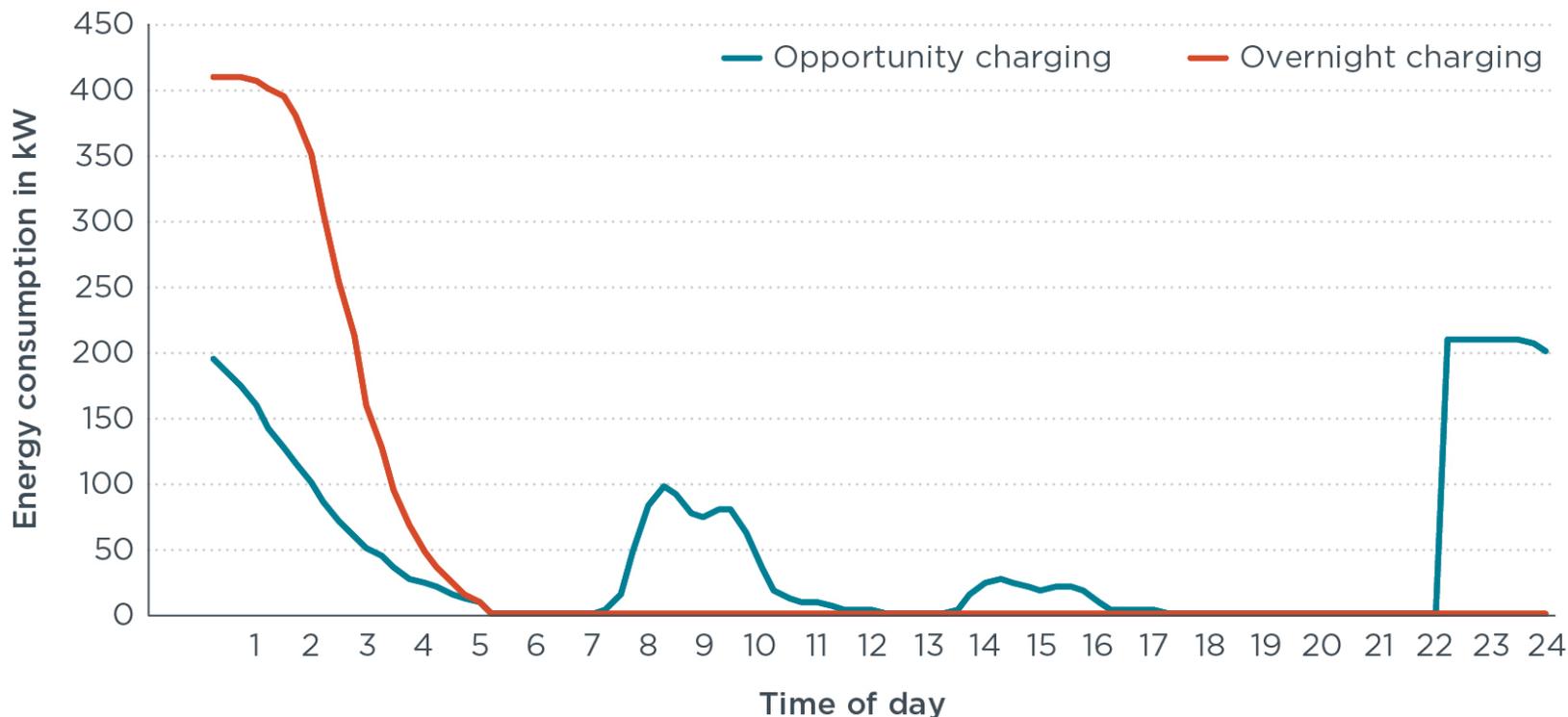
# Overnight + day charging



# Overnight charging only



# Network charges: largest cost driver

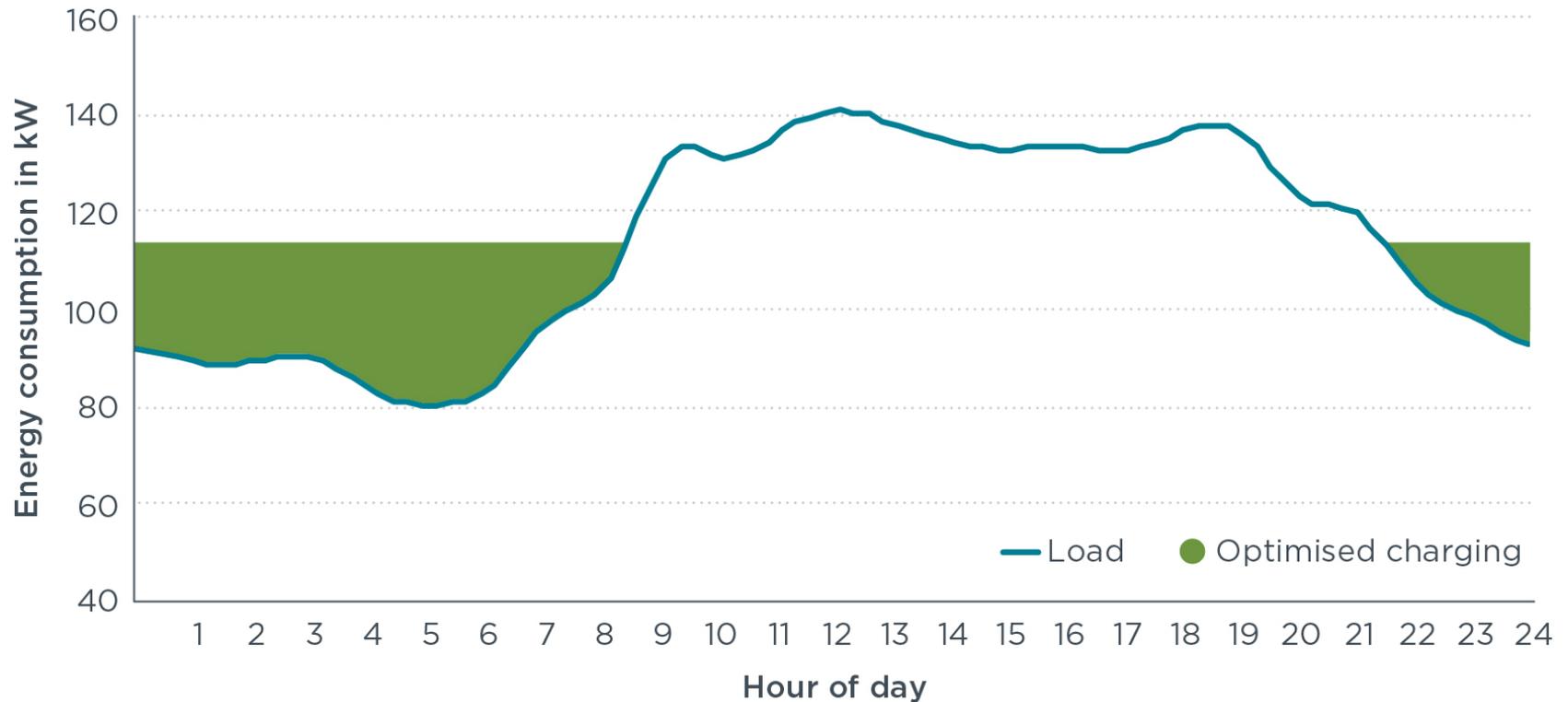


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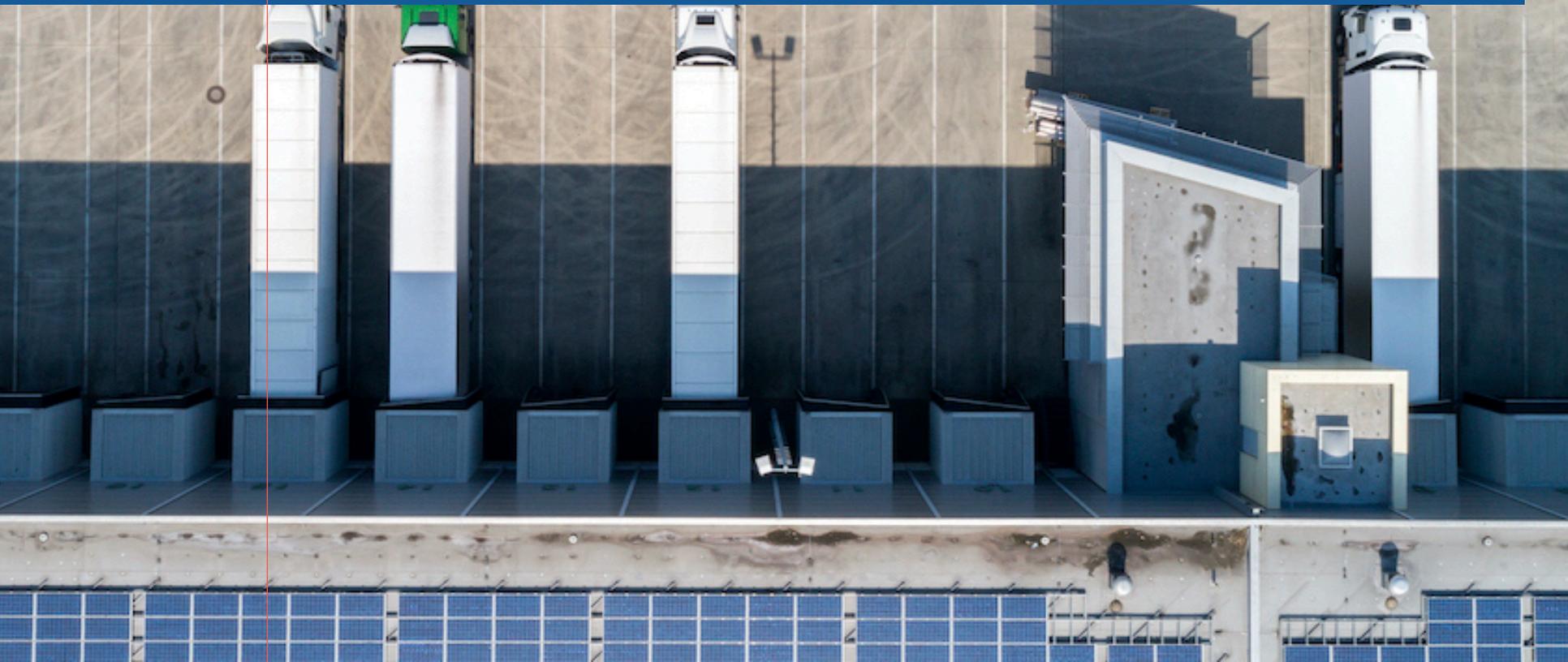
# Charging optimisation is key

- Network costs are the largest cost driver for a typical depot's total energy cost.
- Lower capacity [kW] charging at the depot can reduce charging costs.
- Longer hours for charging allow for better optimisation and more cost savings.
- To help operators charge optimally, time-varying tariffs should become default option.

# Smart truck charging



# Conclusions



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# Conclusions for operators

- Optimising truck charging is vital for success.
- Charging trucks overnight at the depot is the preferred option, but careful analysis is needed.
- Faster charging is not a guarantee for cost reduction.
- Optimisation strategies are likely to change with fleet size.
- Siting a depot where there is existing power infrastructure saves money.
- Collaboration is key.

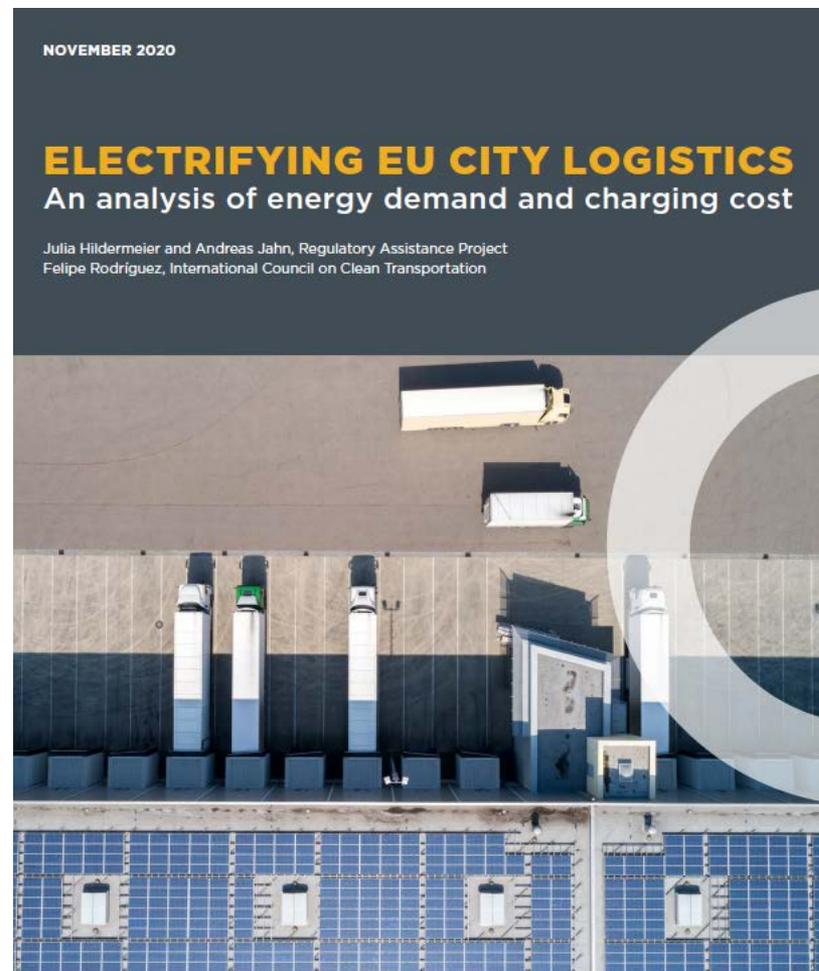
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# Conclusions for policy makers

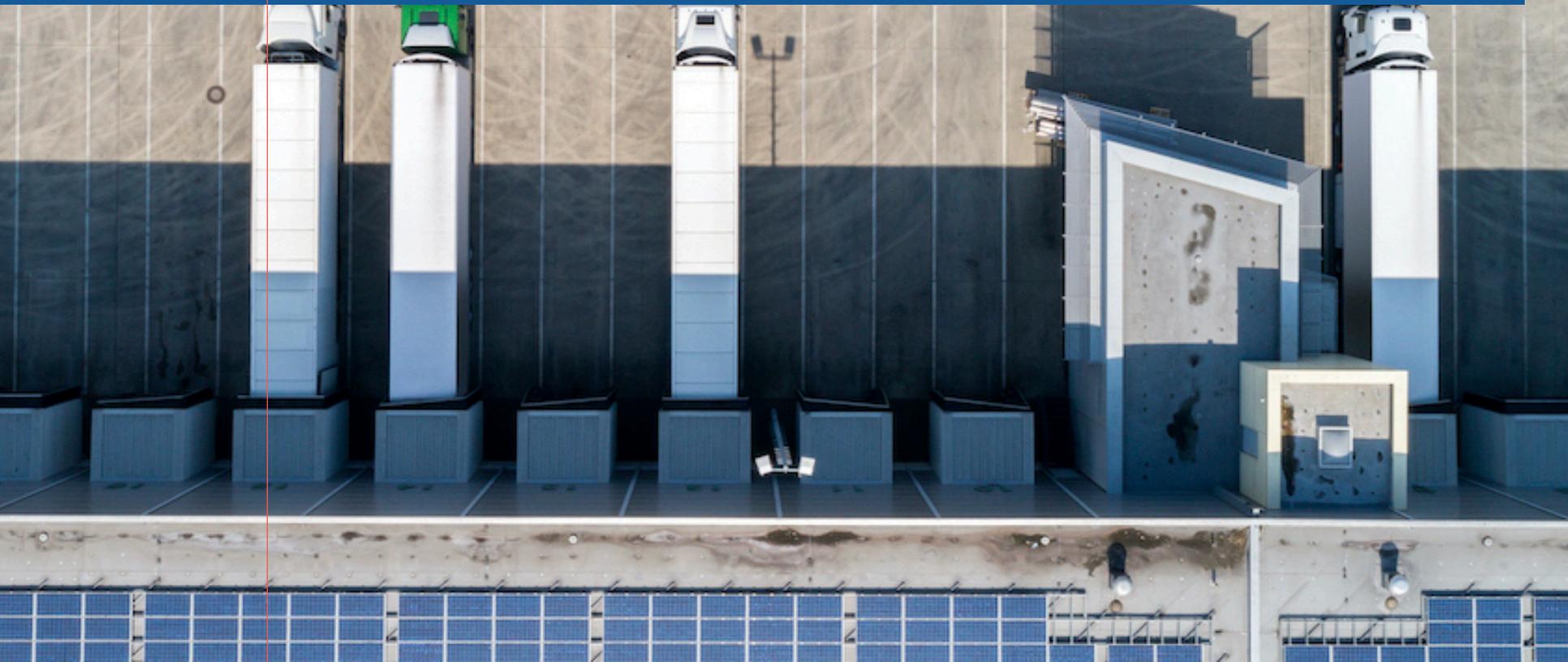
- Network tariff reform is crucial: Time-varying network charges can advance the decarbonisation of transport.
- Flexible delivery times support electric truck use.
- Integrated planning of transport and power infrastructure cannot wait.
- The Alternative Fuels Infrastructure Directive can provide guidance and tools for electric truck charging along routes and at destination centers.

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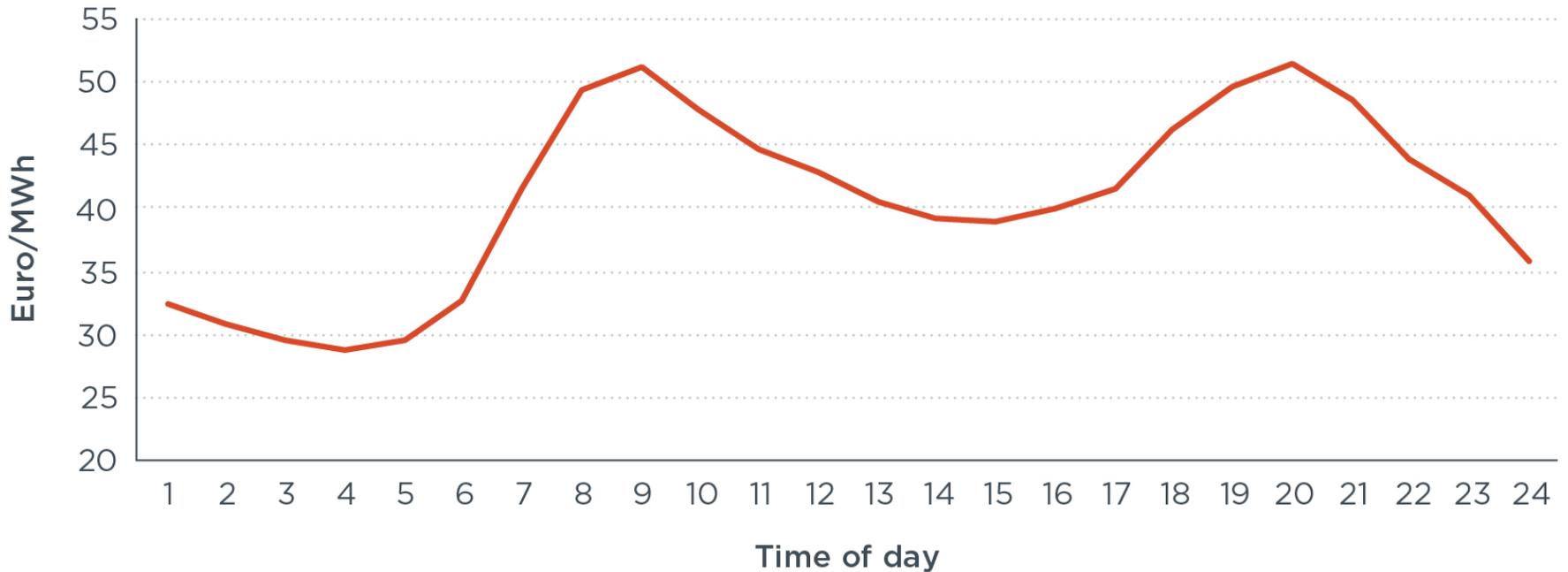
➤ Electrifying EU city logistics:  
An analysis of energy demand  
and charging cost



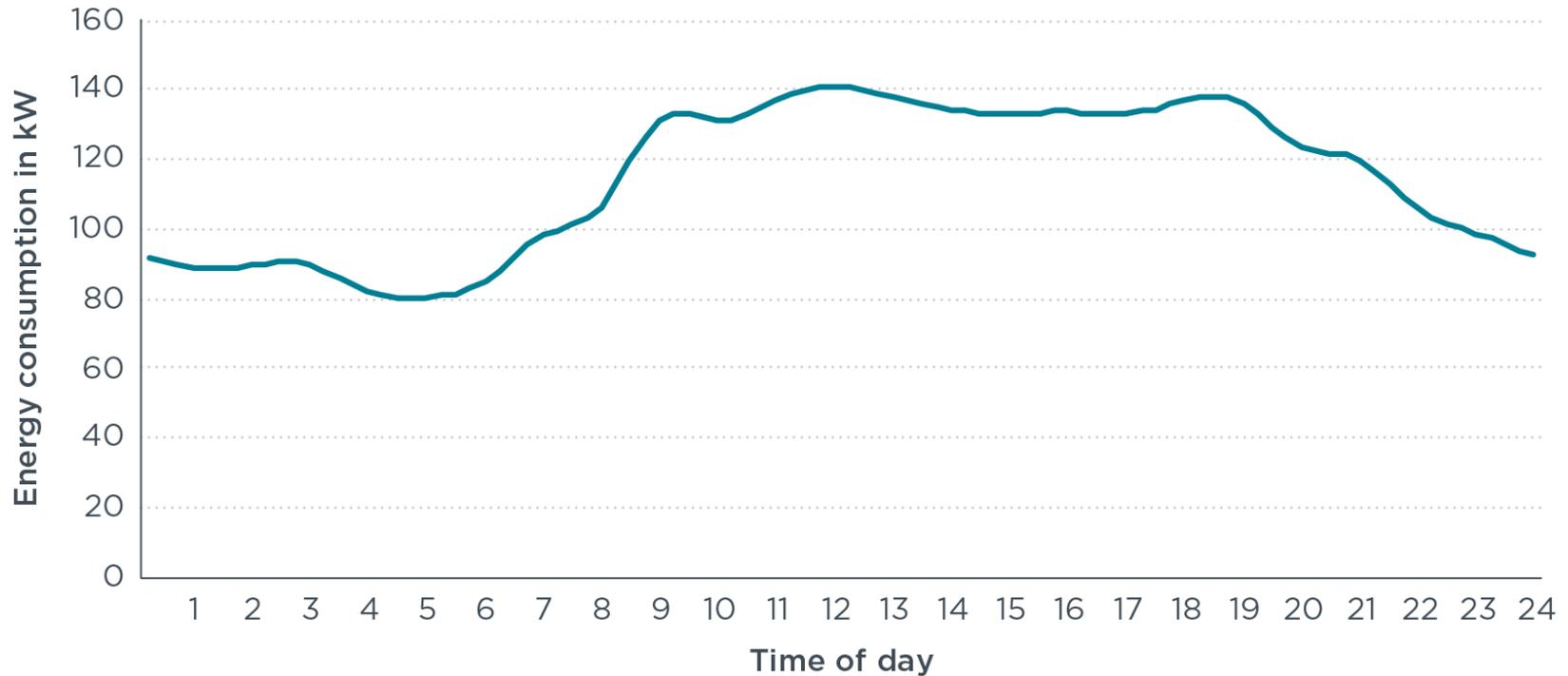
# Additional information



# Electricity costs



# Depot consumption



# Charging Costs – 10/20 trucks

	Electricity charges (Euros)	Network charges (Euros)	Total (Euros)	Total (Ct/kWh)
<b>Depot only</b>	34,000	18,300	52,300	5.3
<b>10 Trucks</b>				
<b>Depot &amp; opportunity charging*</b>	46,500	34,010	80,500	5.8
<b>Depot &amp; overnight charging*</b>	44,720	50,222	95,000	6.8
<b>20 Trucks</b>				
<b>Depot &amp; opportunity charging*</b>	59,090	53,641	112,731	6.3
<b>Depot &amp; overnight charging*</b>	55,049	86,256	141,304	7.9

\*Differences are based on modelling results.