



# Sector coupling and e-charging infrastructural development in Slovenia

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Sustainable and Green mobility  
Joint workshop

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# Driver

## ENTSO-E's Research, Development and Innovation Roadmap

### Flagship 1: Optimize cross-sector integration

Optimise cross-sector integration

P1/ Smart charging for optimal large-scale electromobility integration  
P2/ Innovative models and tools for coordinated multi-sector system operation and planning  
P3/ Design of a pan-European cross-sector data model

F1

AFID

- Impact on electromobility: charging infrastructure requirements.
- New regulations for airports and waterway ports.
- Digitally connected chargers (**bi-directional charging**).
- **Four milestones affected:** planning, optimization, interoperability and regulatory framework for integrated systems.

RED III

- Electromobility & re-charging operations:
  - Increase of number of EVs to **30 million EVs** by 2030.
  - Optimized re-charging operations.
  - Expansion to all type/mode of electric transport (EV, marine, aircrafts).
- Heating/cooling:
  - A new indicative EU target of renewables in buildings of 49% by 2030.
  - Operators of district heating and cooling systems can **participate in the electricity markets**.
- Priority on **small or mobile systems, district heating and cooling**. **Second priority - hydrogen** and other energy networks.
- Additionality principle (do not cannibalize RES).
- Concrete targets for decarbonising industry and heavy-duty and long-distance transport: for **50% renewable H2 share in industry**; **2.6% of renewable fuels of non-biological origin in transport**.

EED

- **Criteria of H&C system as efficient.**
- **Transmission system operators and distribution system operators to encourage high-efficiency cogeneration to be sited close to areas of heat demand by reducing the connection and use-of-system charges**

ETD/  
CBAM

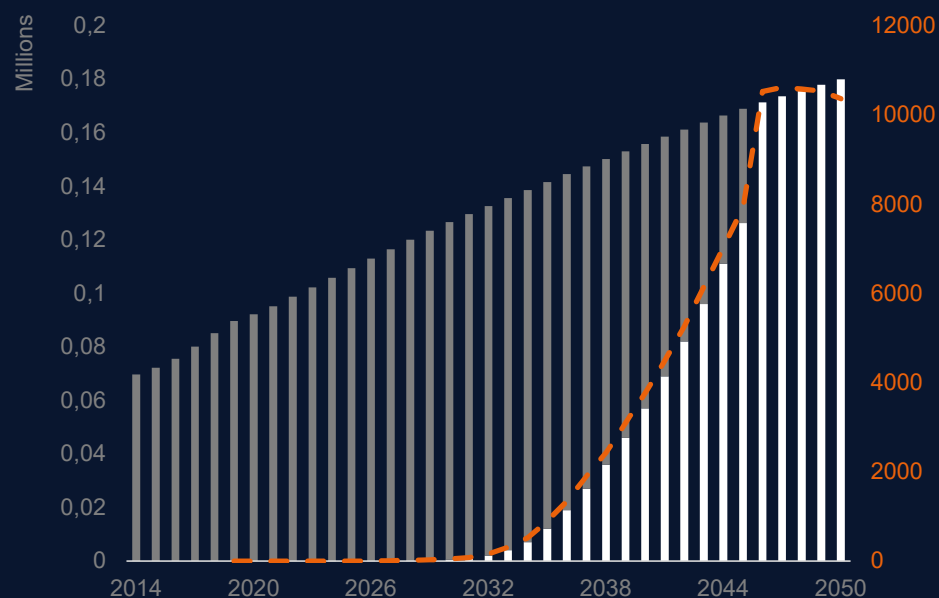
- ETD set the minimum levels of taxation (in EUR/GJ) applicable per fuel including fuel for transport, heat and electricity

## Demand



## Growth forecast of electrified heavy duty vehicles

with projected energy consumption for charging



■ skupno število običajno gnanih tovornjakov (bencin, dizel, hibridi, plin...)

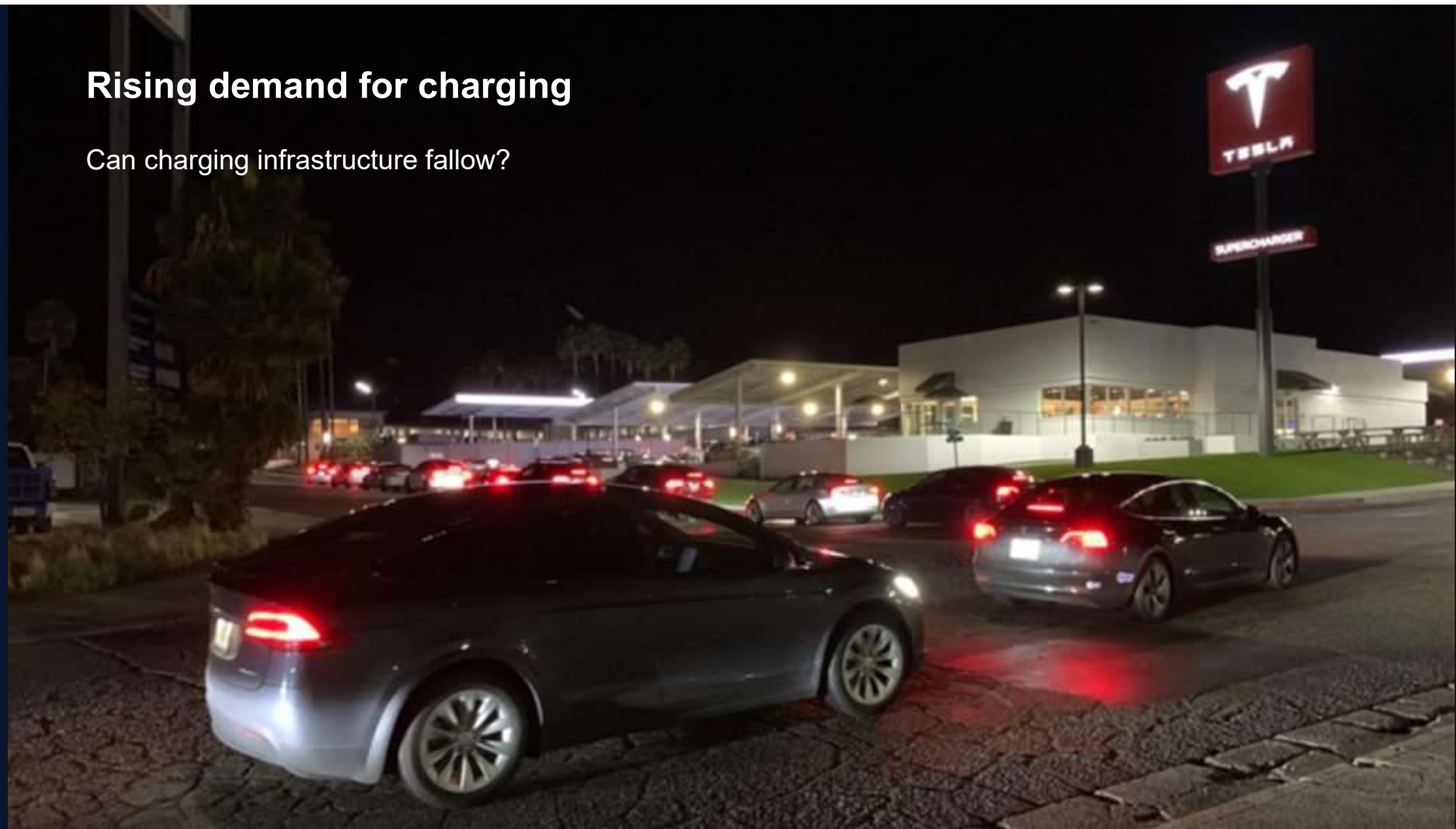
■ skupno število vseh električnih tovornjakov

— milijon kWh / leto

vir: IGEA, 2022

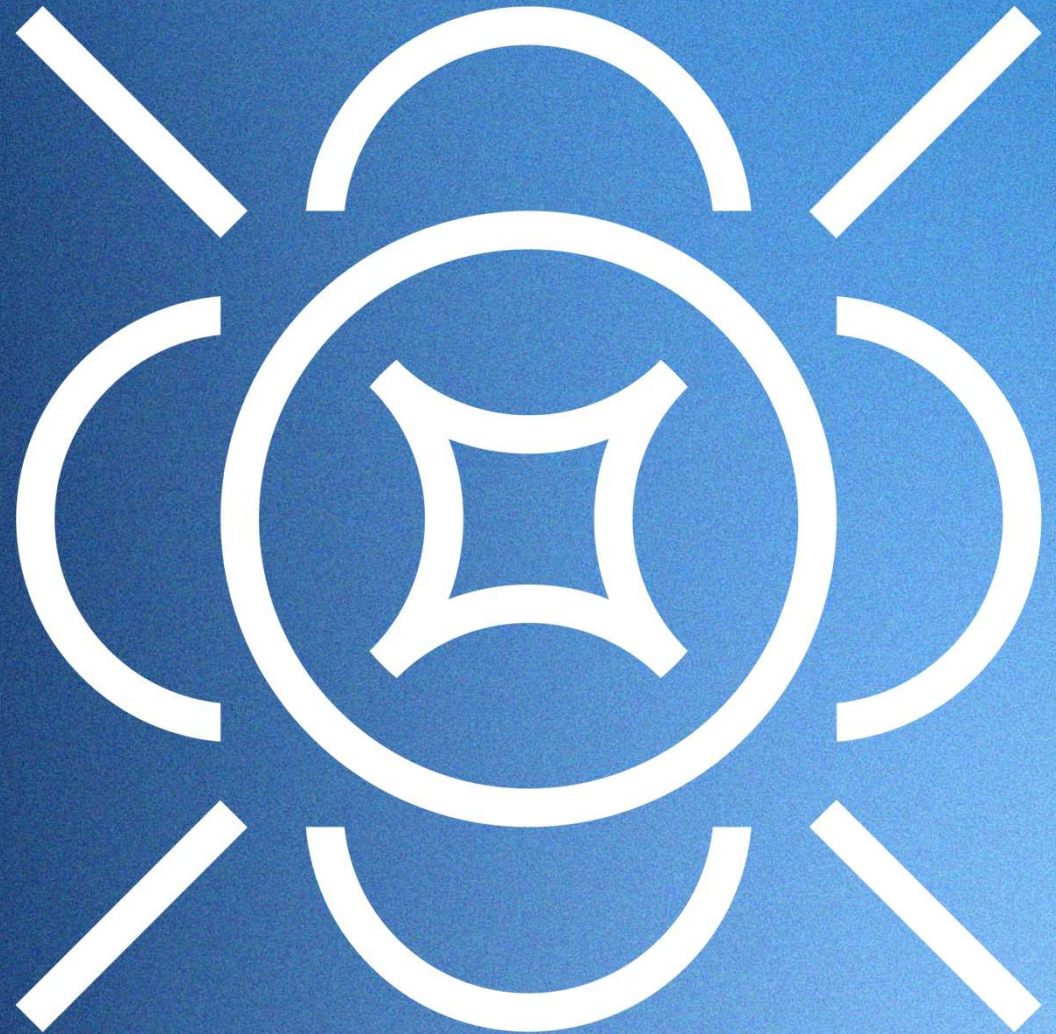
## Rising demand for charging

Can charging infrastructure follow?





# The concept of developing high-capacity charging parks



# Legislation



REPUBLIKA SLOVENIJA  
eUPRAVA

Vsebine

Domov > E-demokracija > Predlogi predpisov > Zakon o infrastrukturi za alternativna goriva in spodbujanju prehoda na alte...

### PREDLOG PREDPISA

## ZAKON O INFRASTRUKTURI ZA ALTERNATIVNA GORIVA IN SPODBUJANJU PREHODA NA ALTERNATIVNA GORIVA V PROMETU

**V MEDRESORSKO USKLAJEVANJE IN NA SVZ**  
29.11.2022  
(pred približno 6 meseci)

VRSTA PREDPISA  
Predlog

EVIDENCA VLADNEGA AKTA  
2022-2430-0082

PREDLAGATELJ  
Ministrstvo za infrastrukturo

#### PREDLOG

- osnutek\_ZIAG 229.4 kB
- osnutek\_ZIAG 121 kB
- obrazložitev\_ZIAG 129.8 kB
- obrazložitev\_ZIAG 44 kB

#### ARHIV PREDLOGOV PREDPISA

- ZAKON O INFRASTRUKTURI ZA ALTERNATIVNA GORIVA IN SPODBUJANJU PREHODA NA ALTERNATIVNA GORIVA V PROMETU
- Informacija o predpisu

#### ZAKONODAJA

EVROPSKI PREDPISI

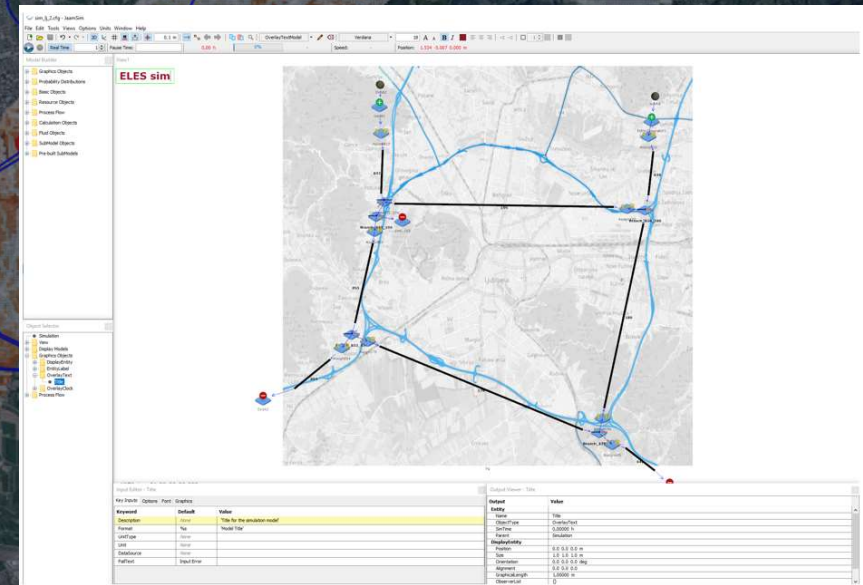
- Direktiva 2014/94/EU Evropskega parlamenta in Sveta z dne 22. oktobra 2014 o vzpostavitvi infrastrukture za alternativna goriva (32014L0094)



***Adoption of the Act on Infrastructure for Alternative Fuels and the Promotion of the Transition to Alternative Fuels in Transport***

# Analysis of needs and impacts on stakeholders

Digital twin of the electro-transport system



## Daily highway traffic profile

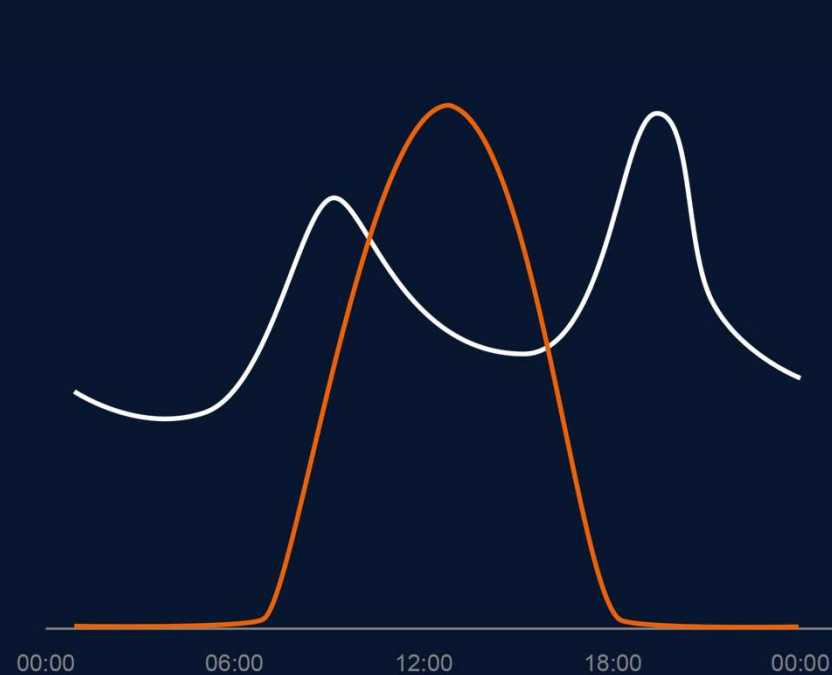
All vehicles  
Heavy duty vehicles



Source: Robert Rijavec; Karakterizacija prometnih tokov slovenskih avtocest za potrebe sistema nadzora in vodenja prometa

## Daily electricity profile

Electricity consumption  
Photovoltaic production



Source: ELES



# Charging energy cost

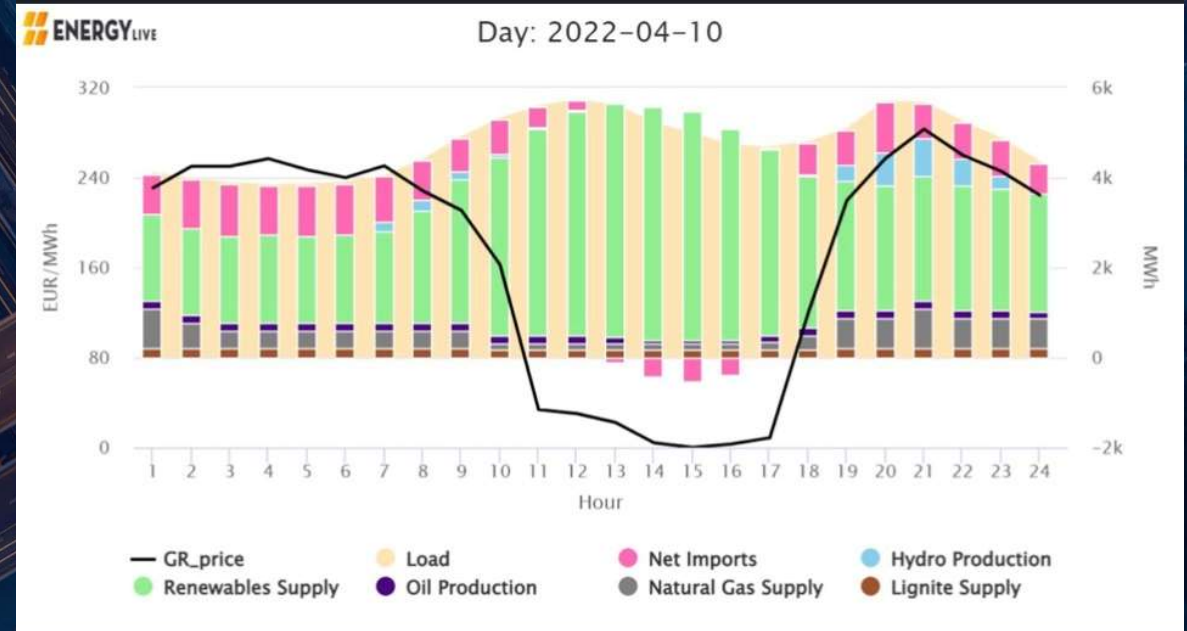
What will be the optimal charging times?

Energy prices

Grid usage fees

Cost of connection

Dynamic pricing

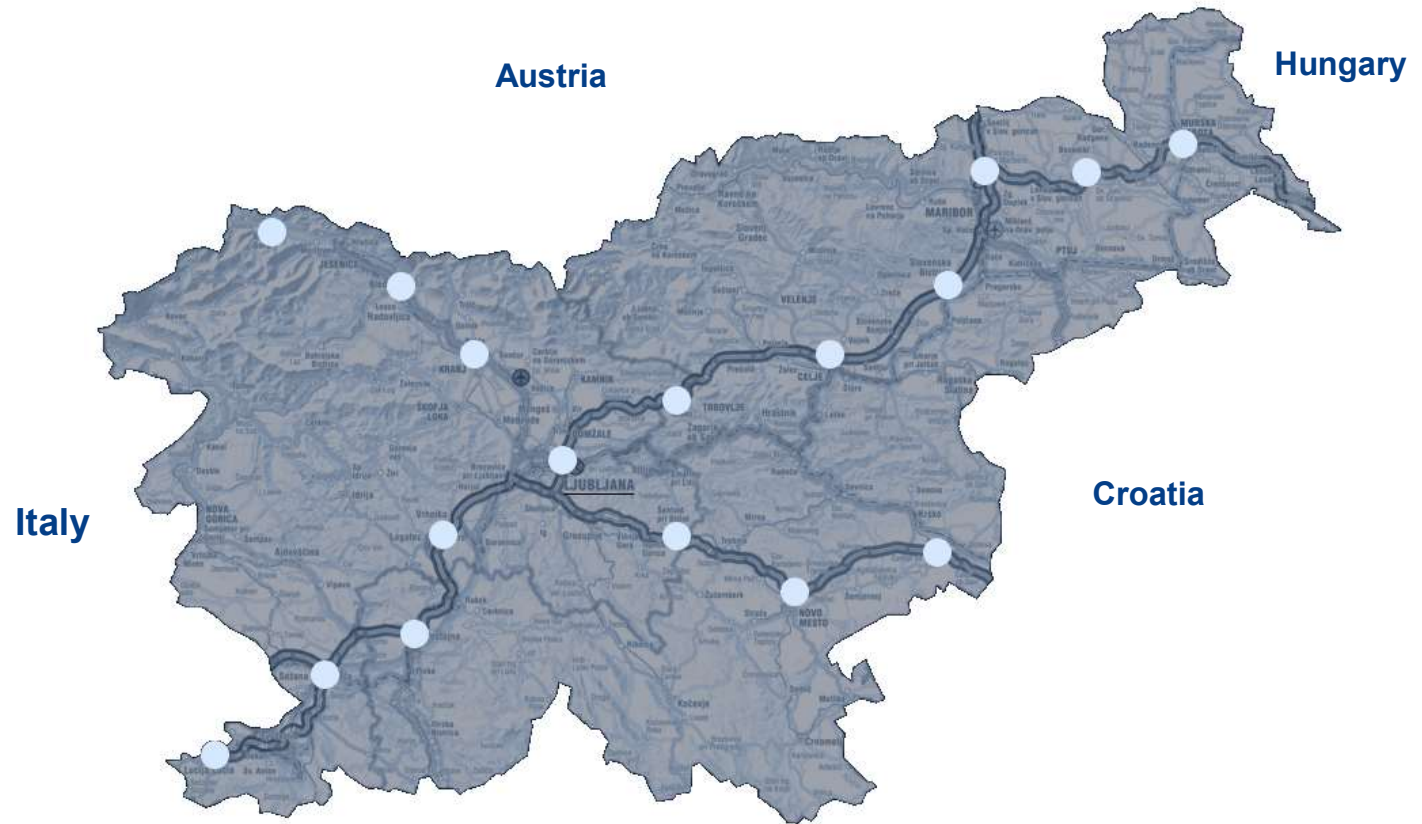
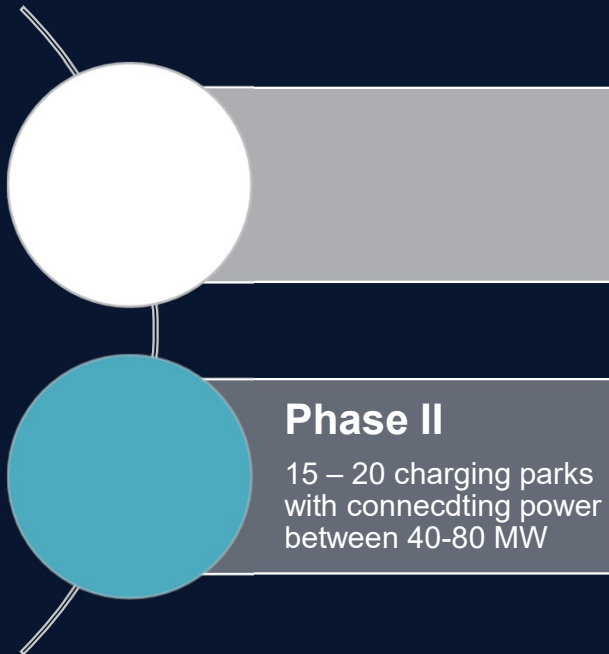


# Infrastructure

Phase I  
Existing rest stations



# Infrastructure



# Charging park



# Charging park

1

Location in the immediate vicinity of the highway and high-voltage power infrastructure (110kV)

AVAILABILITY,  
CONCENTRATION

2

Fast charging of buses, vans, trucks, transit and personal transport at an **optimal price**

RELIABILITY

3

A user-friendly, sustainably designed and time-optimized stop on the way

COMFORT

4

The possibility of connecting a large number of ultra-fast charging stations

SCALABILITY

5

Hosting several different charging point operators in one location - **competitiveness**

EQUALITY

# GreenSwitch

## Smart Grids Project



Co-financed by the Connecting Europe  
Facility of the European Union



GreenSwitch

## Expected impacts



Increased controllability  
of the transmission grid



Increased hosting capacity  
of the existing network.

**10%**

lower peak demand  
using flexibility sources.

**10 GWh**

heat production from  
at least 20 power transformers  
per year.



Better utilization of existing  
MV/LV transformers.



Grid connection for heavy duty  
and fast charging stations.

GreenSwitch

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## Charging park NOVO MESTO

- ❖ Common interest of the state and the municipality – reduced spatial planning time
- ❖ Dual purpose (protection and security + charging station)
- ❖ Estimated start of operation in 2027
- ❖ Obtaining EU grants for construction within the GreenSwitch project



## Charging park NOVO MESTO

- ❖ Direct proximity to energy infrastructure. Transmission loop-in loop-out connection (3), short underground cable connection (2) transformer station (1)
- ❖ Estimated connected power of 60 MW
- ❖ Direct proximity to the highway with an nearby existing exit in both directions
- ❖ Construction of a charging park in cooperation with the Municipality of Novo mesto
- ❖ The park area of 14,000 m<sup>2</sup> is owned by the municipality



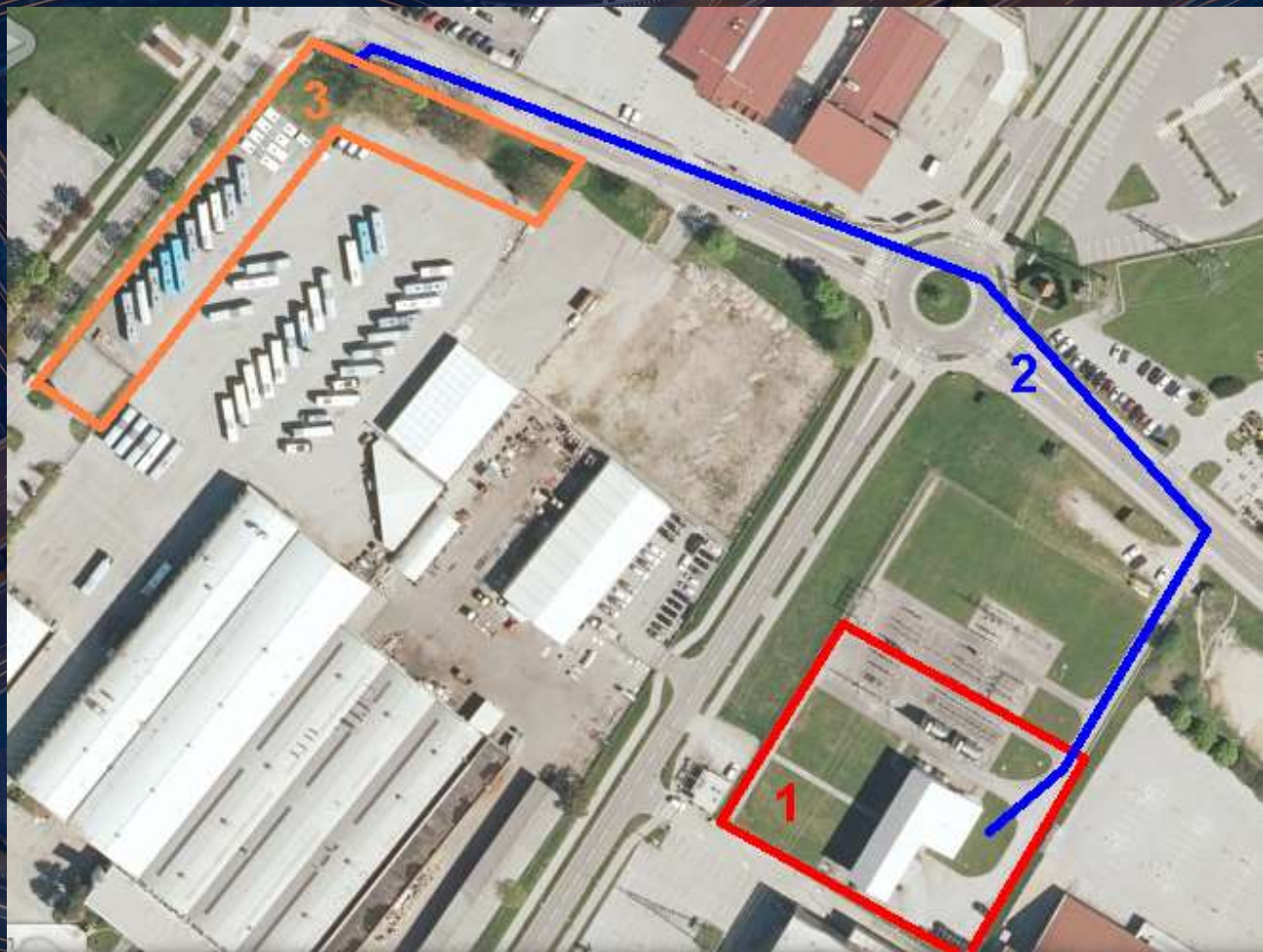
## Charging park KLANJ

- ❖ Construction already started
- ❖ Estimated start of operation in 2025
- ❖ Obtaining EU grants for construction within the GreenSwitch project



## Charging park KRANJ

- ❖ Direct proximity of existing power infrastructure.  
Upgrade of the existing substation (1),  
underground cable connection (2)  
charging park location (3)
- ❖ Connection power 20 MW
- ❖ Proximity to the highway with an existing exit in both directions
- ❖ Construction of a charging park in cooperation with the public bus company Arriva, Elektro Gorenjska (DSO) and the Municipality of Kranj





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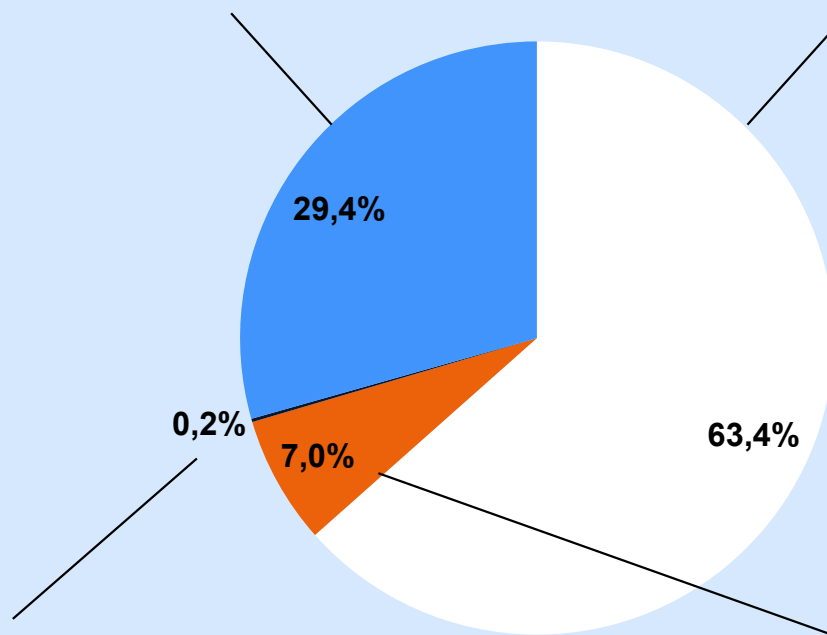
## Charging park Cost split

Acquisition of the necessary land in a suitable location (15000 m<sup>2</sup>–20000 m<sup>2</sup>)

Local power infrastructure (GIS substation, loop connection...)

Location arrangement (communal arrangement)

Auxiliary services building



Concluding statement



**INFRASTRUCTURE UPGRADE TIMELINE IS MUCH LONGER COMPARED TO EV MARKET GROWTH**

**LONG TERM PLANNING IS A KEY**

