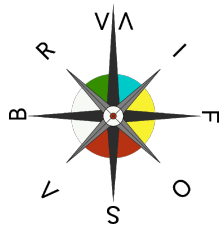


# Electric smart mobility and digitalization for Cluj Metropolitan Area

STARDUST Project

ASOCIATIA DE DEZVOLTARE INTERCOMUNITARA  
**ZIMIC**  
ZONA METROPOLITANA CLUJ



Codrut PAPINA  
Melania BLIDAR



# STARDUST project



Light-House Cities: Pamplona, Tampere and Trento

Follower Cities: **Cluj – Napoca**, Derry, Kozani and Litomerice

## Energy

**Retrofitting and innovative heating and cooling systems** will be introduced to already existing buildings and districts to increase their energy efficiency while providing comfort to local residents.

## Mobility

**Electric vehicles** and their **charging stations** will be developed and installed in these cities to reduce the carbon emissions predominant in cities. Different types of **incentives** will be introduced to these cities in order to encourage citizens in using electric vehicles.

## ICT

ICT smart city platform, the open access strategy, data centres and infrastructures, and **user-driven and demand-oriented city infrastructures** will be introduced to reduce greenhouse emissions and to **promote social innovation** and co-creation of ideas between stakeholders.

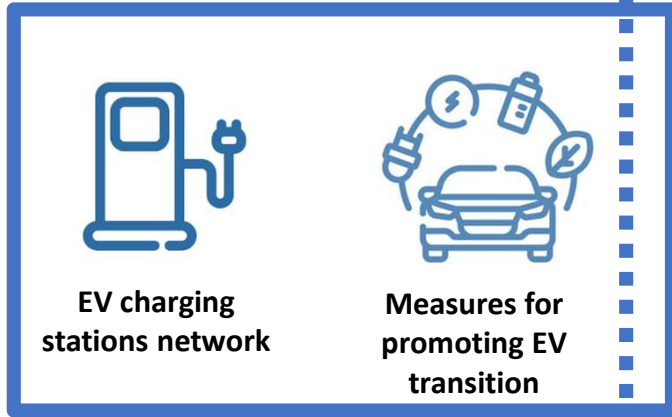
## Engaging with citizens to improve urban life

Technical solutions can only do so much to improve the cities' well-being. Indeed, a growing need for **more inclusive public administrations by means of incorporating citizens** is needed to re-vitalize their

# Cluj (MA) as Follower City

## Three Dimensions of Electric Smart Mobility / STARDUST journey

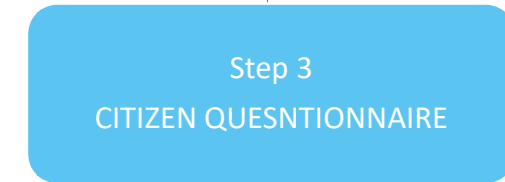
High priority for Cluj-Napoca MA



Additional solutions



EV Car Sharing Models



### SUMP (PMUD):

- 9.4.3.2 Extension of the network of electric charging stations in Cluj-Napoca (2.25MEUR)
- 9.4.3.2 Development of a network of electric charging stations in the communes of ZMC (1.8MEUR)
- 9.4.3.1 Network of electro / micro-mobility HUBs in Cluj-Napoca - 20 stations (total of 3.5MEUR)
- 9.5.1-13 Construction of parking / residential car parks (total of 41MEUR)

### POR NV

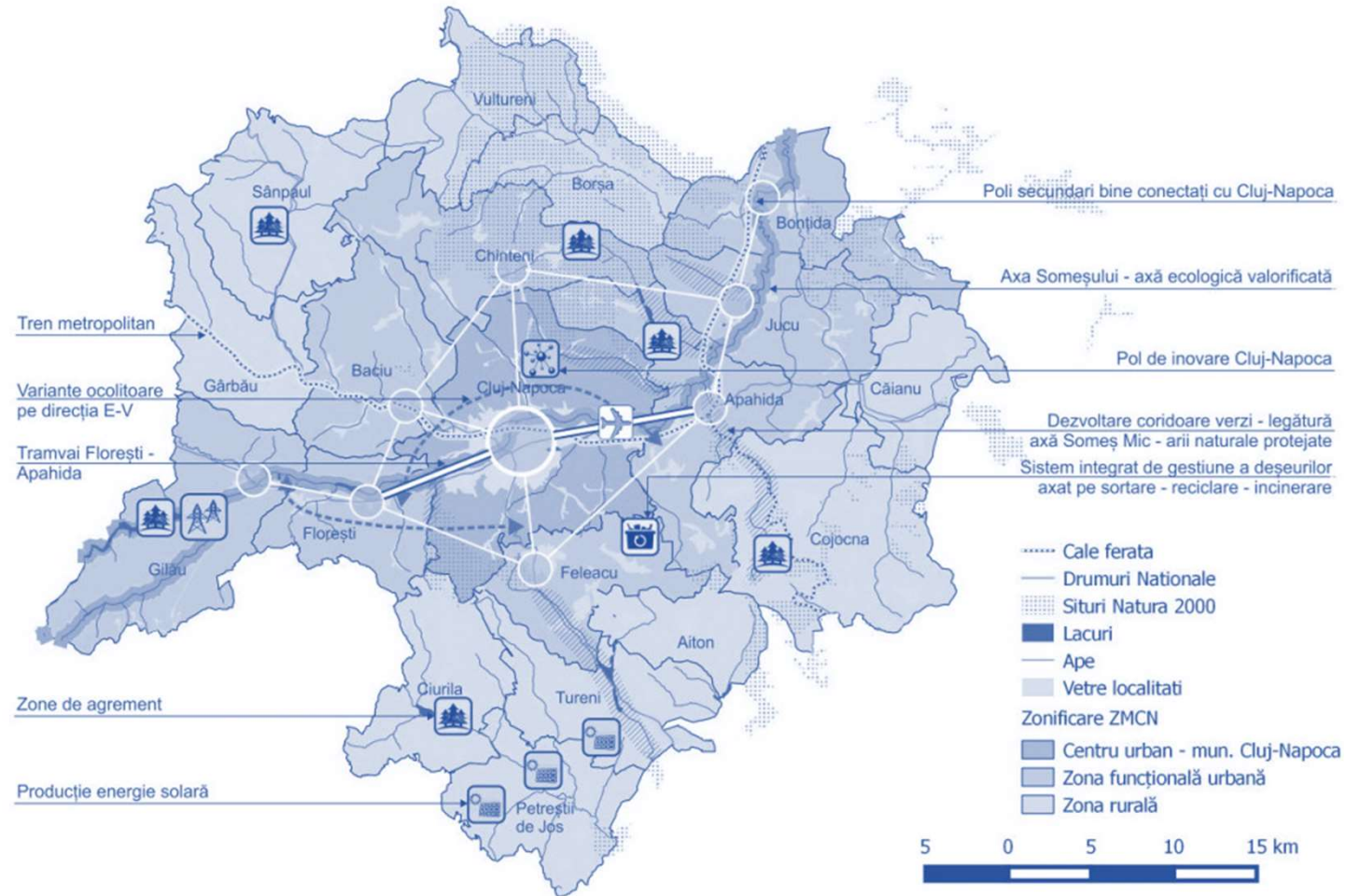
- Clean urban transportation infrastructure – 161 MEUR
- Digitalization of urban transportation – 67ME
- Infrastructure for “alternative fuel” 5.5ME
- Main target groups are Functional Urban Areas



# Metropolitan area

## Network of settlements

- Cluj-Napoca is the urban center for the other 18 settlements in the Metropolitan Area.
- Analyzing the urban-extra-urban relationship in the Metropolitan Area, one can observe a relatively **homogeneous distribution** of settlements in the territory, located mainly along European, national and county roads.
- The main development corridor (E-V axis of Someș) crosses an important surface of built environment (generating congestions)
- EV Network at metropolitan level has to be properly planned regarding relevant territorial connections.



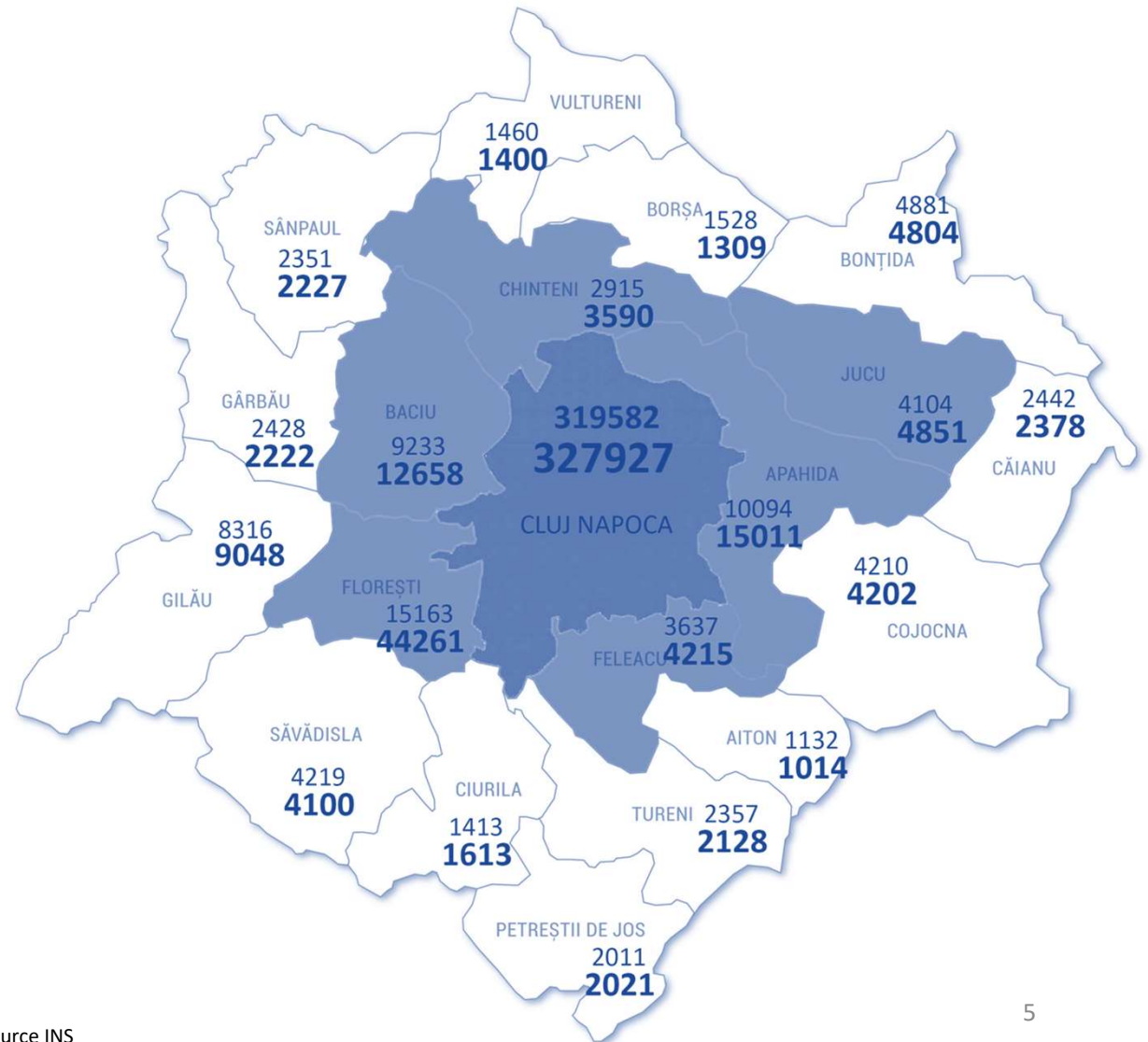
# Metropolitan area

## Demographic indicators

- 11.2% Metropolitan Area - Total increase of population (2011-2021)
- National level population decreased by 1,74% (2011-2021)
- The surrounding settlements are considered an attractive option for residence – keeping a good connection with the urban center.

These are clear indicators of peri-urban development. In the last 10 years, Cluj-Napoca enriched and consolidated the polarization level at the county level and beyond, becoming the second most developed urban center of Romania.

Between 2014 and 2017, the nominal GDP of Cluj County increased by 44%, compared to an increase of 28% nationally and 31% in the Bucharest-Ilfov region.



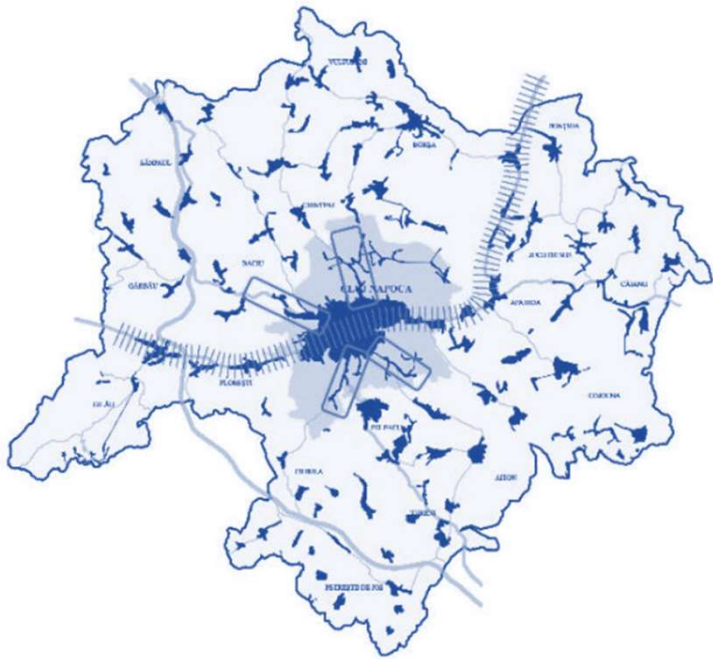


# Metropolitan area

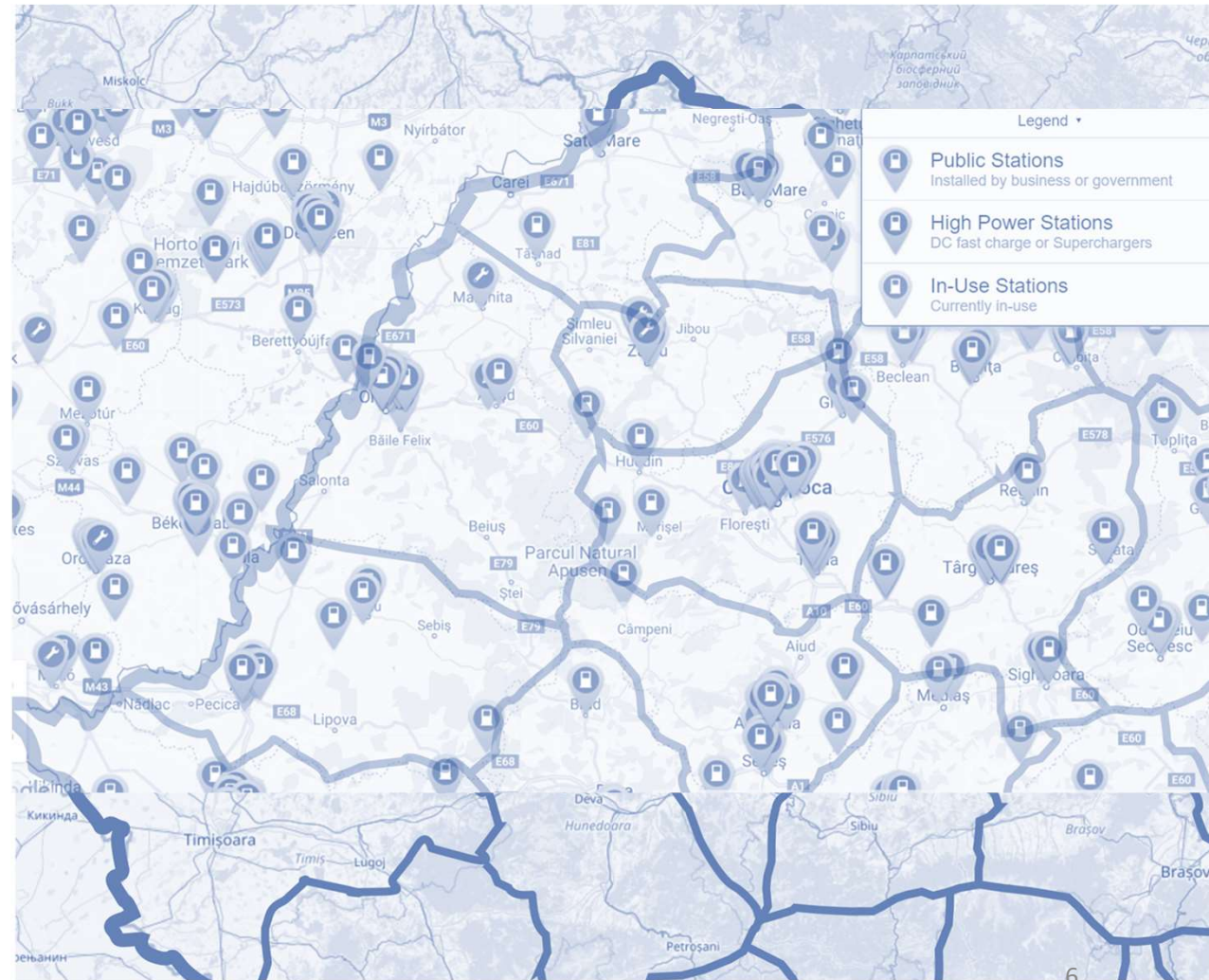
## Territorial mobility trends

Commuting from the rural area towards the city center is creating traffic jams and pollution.

Having a comprehensive EV policy at the metropolitan level can contribute to better environmental conditions.



Isochrone 30,60,90 min

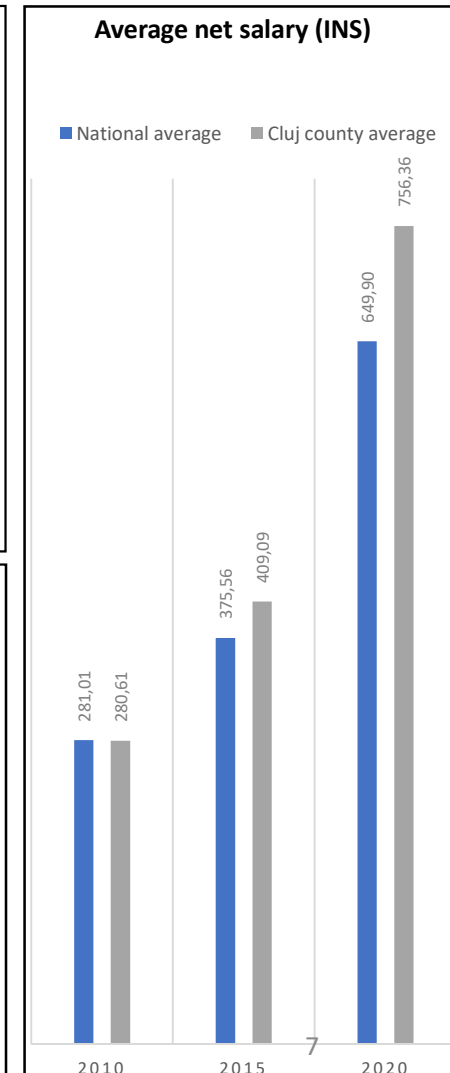
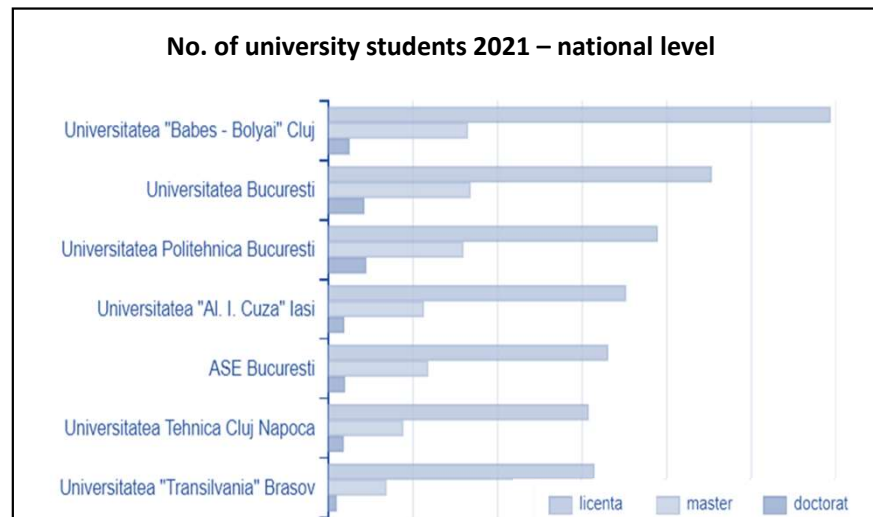
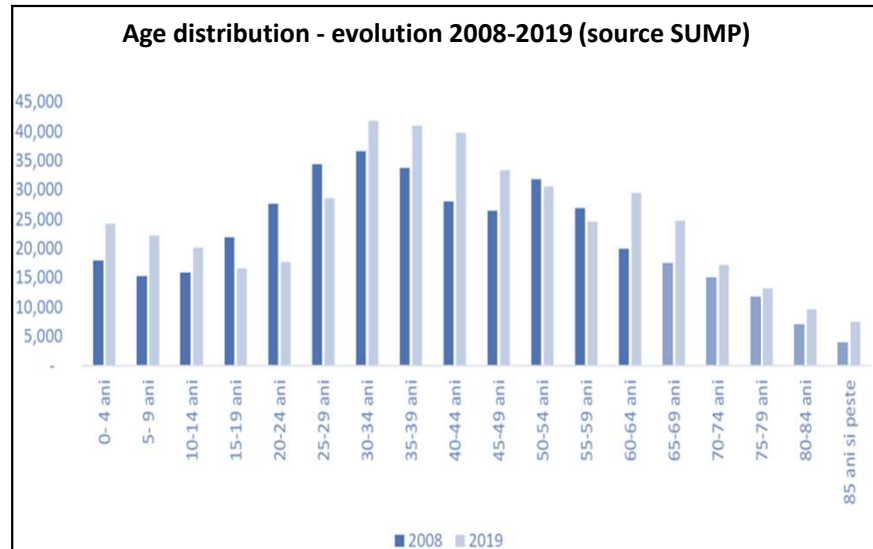


Source <https://www.iso4app.net> and [www.plugshare.com](http://www.plugshare.com)

# Metropolitan area

## Additional information

- Age distribution analyses shows that Metropolitan area (and Cluj-Napoca especially) is considered a desired place for young families.
- Cluj-Napoca is characterized as one of the best places for young professionals to start and develop a career.
- Cluj-Napoca city is an important University HUB and IT cluster, having similar numbers of students as capital Bucharest, but in relation to overall population, Cluj has the highest number of students/1000 inh.
- In Cluj county the average net salary per month in 2020 is 756 euro, 16% more than the national average.

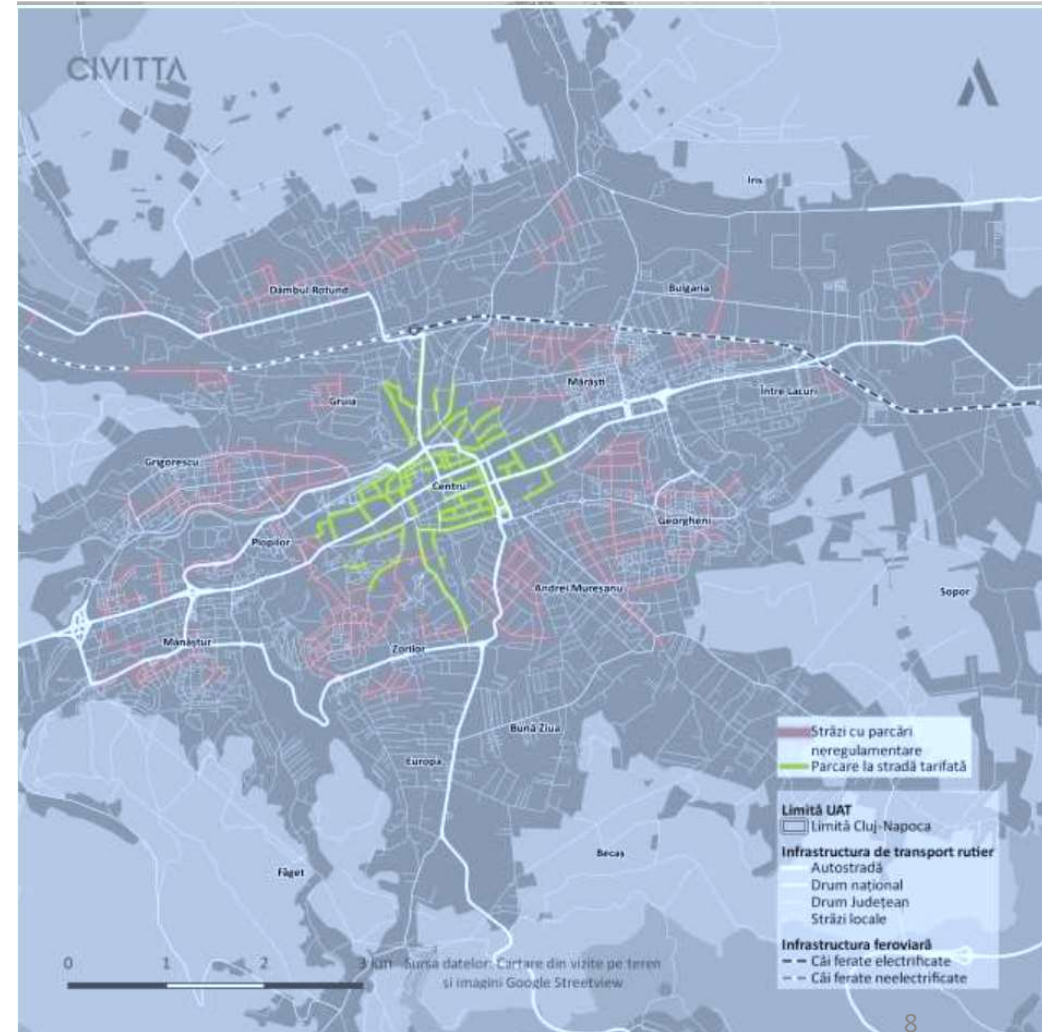


# City level

## Parking situation

- Parking lots distribution must be improved.
- Parking lots represent potential drivers for locating EV charging spots.
- *Currently, 52% of the means of transport within the municipality of Cluj-Napoca are electric (tram, trolleybus or electric bus). Thus, the city of Cluj-Napoca is the leader at national level, among the big cities (over 200,000 inhabitants) in terms of electrification of the public transport fleet.*
- In Romania the average is **400 cars / 1000 inh** – automobility dependency is still high
- At the national level there is a rapid increase in the number of electric vehicles: in 2018 there were a total of 710, and in 2020 a total of 3134.

Parking situation (source SUMP)



Source SUMP / Civitta

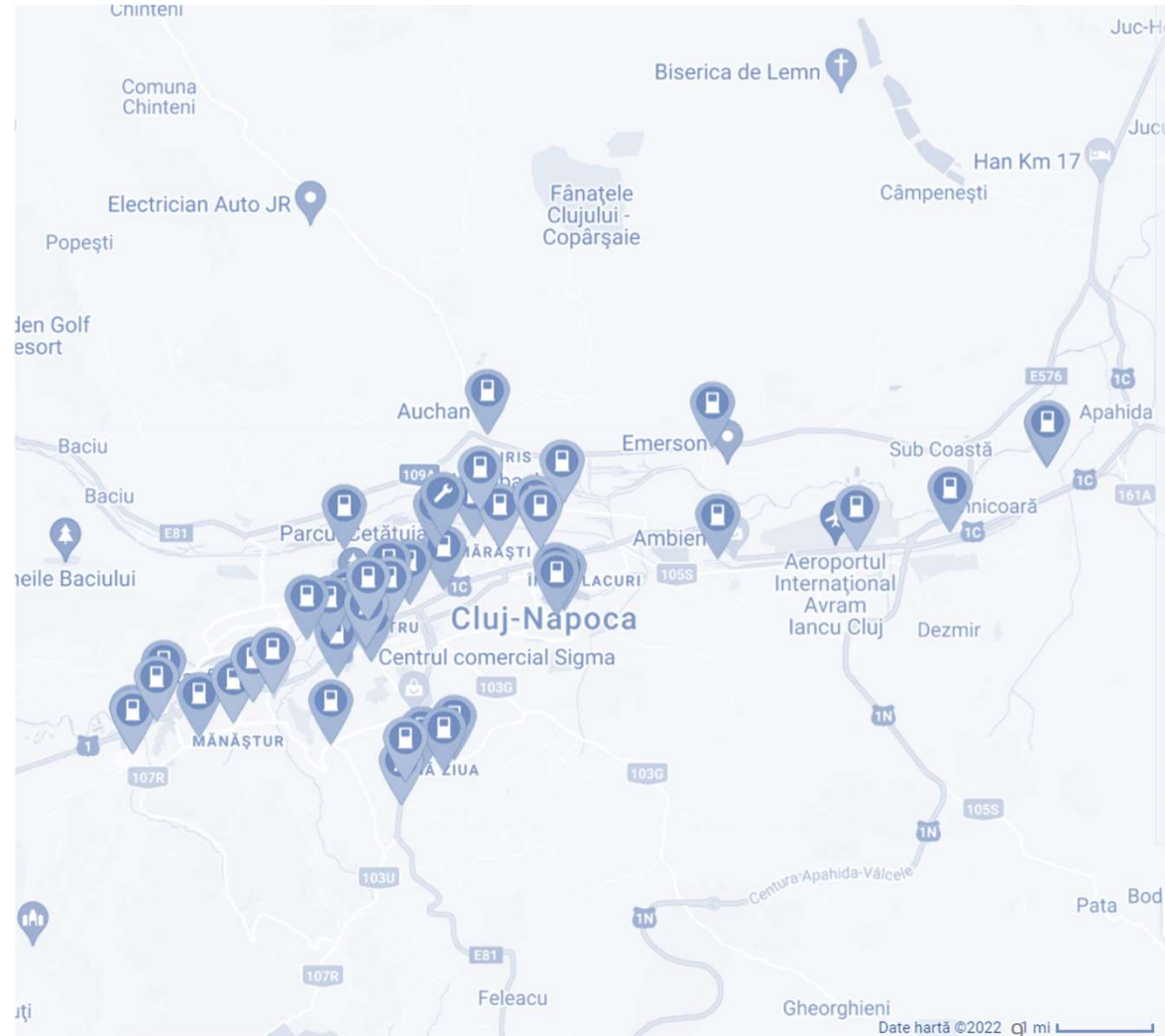


# City level

## Charging stations situation

- There are a total of **41 EV charging stations** in Cluj-Napoca area, behind Constanța (45), Timișoara (47) and Bucharest (200).
- *There is a need for the extension of the charging stations network, especially in the case of collective housing districts. (source SUMP).*
- In 2020 the **municipality issued 31 taxi licenses** for electric cars only (*Municipality of Cluj-Napoca, HCL 737/2019*).
- An important number of cars in the uber fleet (or similar services) are electric.
- Electric mobility is encouraged at national level and at local level.
- **The situation with residential charging station is unknown**, but according to a **local company (PROMELEK)**, in 2021 they have installed more than **200 stations (public and residential) – national level.**

EV charging spots map (source [www.plugshare.com](http://www.plugshare.com))



Source <https://transilvaniareporter.ro/>

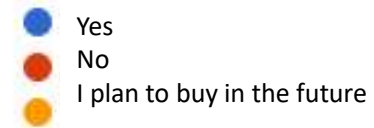
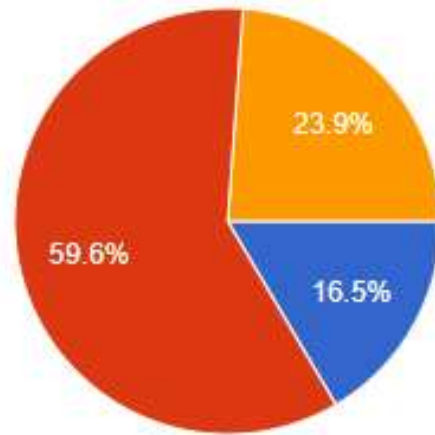
# Capacity-Building Workshop

# Citizen questionnaire results

## EV network

DO YOU HAVE AN ELECTRIC CAR?

218 responses



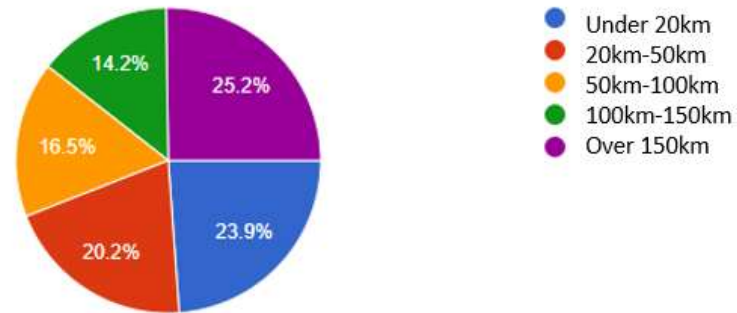


# Citizen questionnaire results

## EV network

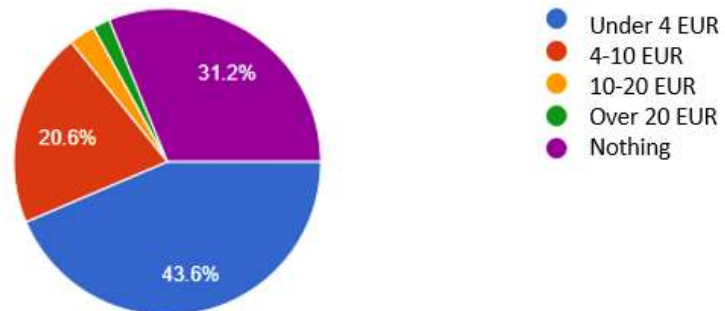
On average, how many km do you drive each week?

218 responses



How much do you spend per week on parking in specially designed areas?

218 responses

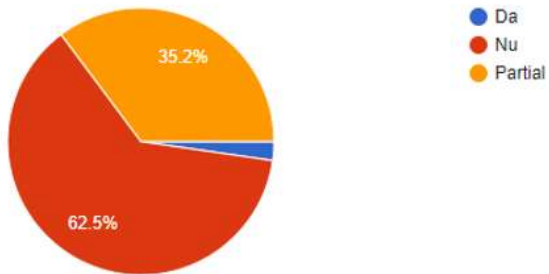


# Citizen questionnaire results

## EV network

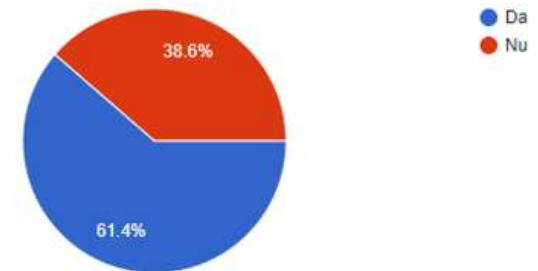
Do you think the existing charging network is sufficient for your needs? (For example: do you easily find an available station / the charging time is fast enough / the related facilities are well thought out - for example place and parking fee)?

88 responses



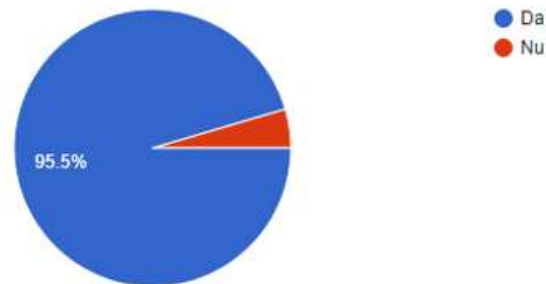
Do you find payment applications for the various charging networks easy to use?

88 responses



Do you consider it appropriate to create an integrated municipal / county (even national) platform? A single platform for all services and application that shows in real time the situation of occupation of charging stations

88 responses

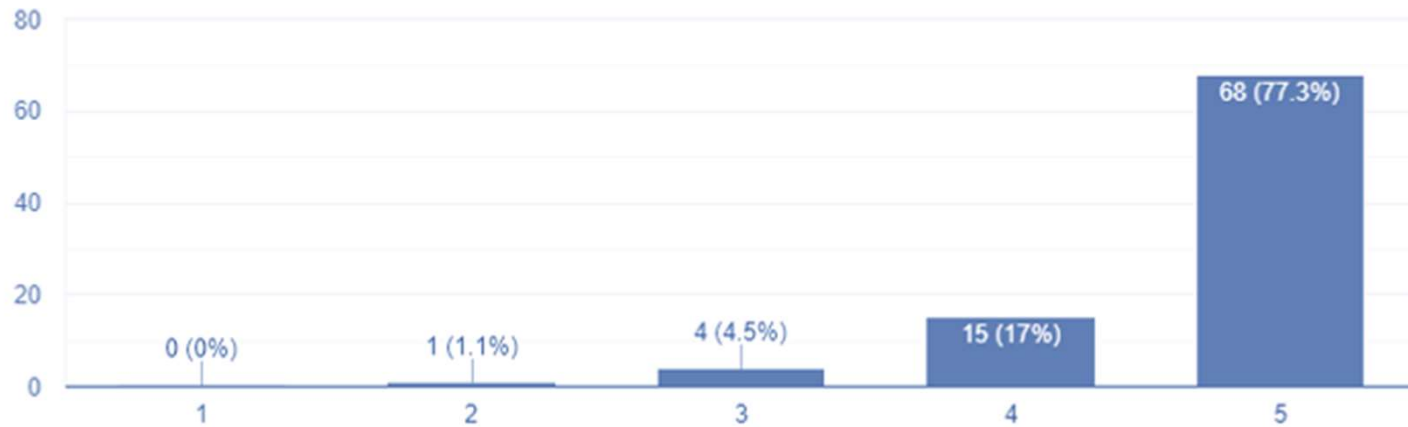


# Citizen questionnaire results

## EV network

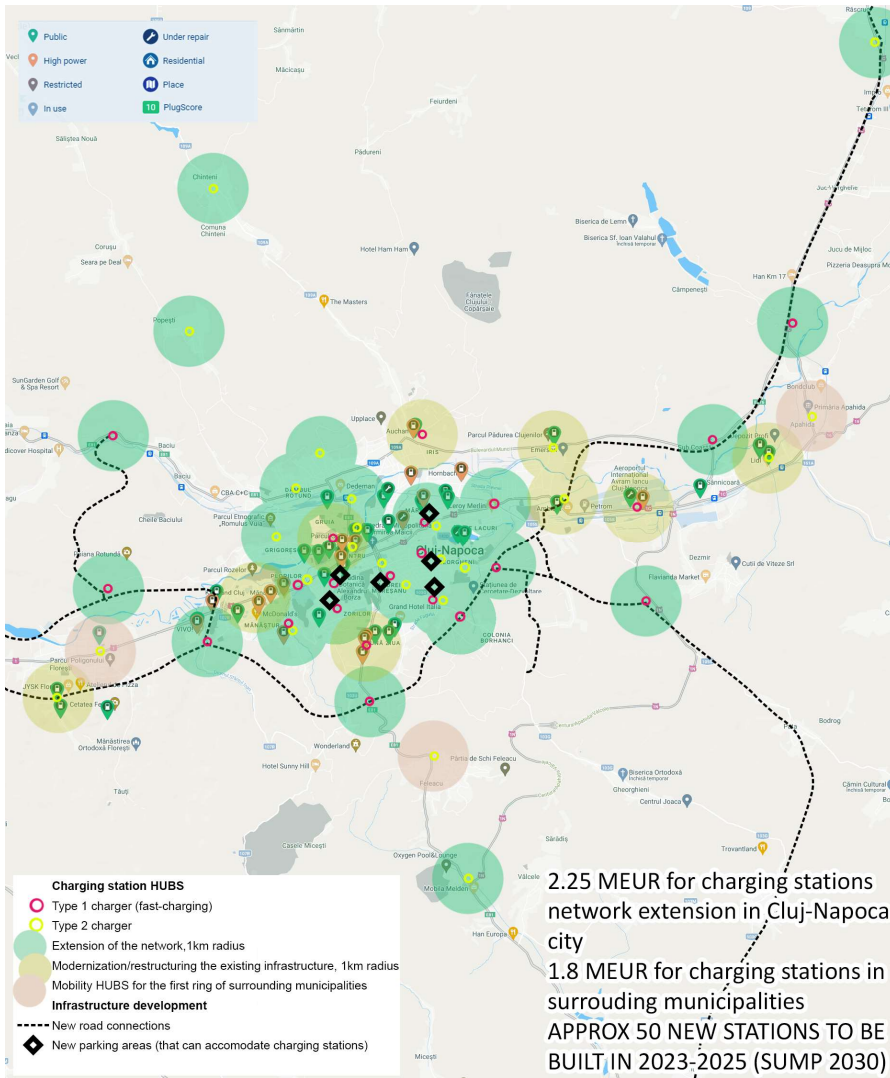
### Stations in the parking lots of shopping areas

88 responses





# Dimension 1 EV Network – key guidelines



## GENERAL RECOMMENDATIONS

- Create investment synergies with the strategic extension of parking facilities for collective housing units
- Establish new negotiations/regulations/collaboration with relevant urban facilities actors: commercial areas, public institutions, office buildings. Leveraging on the existing parking areas to build charging stations for short-medium time use.
- Strategic charging facilities for residential areas (small scale for short-term use)

**Fast charging criteria:** Major infrastructure network. New fast charging stations in the peripheral parts of the city, in relation with road infrastructure important nodes, and in relation to new road extensions (south ring road extension)

**Semi-Fast charging criteria:** distance to the distribution network, population density, close to points of interests, close to busier streets, close to transport stations, accessible areas, relevance of the location with main mobility nodes, potential urban impact.

**New urban dynamic:** When planning the spatial network, is important to take into consideration the flows generated, routes of the user being potentially steered to key areas of the city to avoid congestions.

# Dimension 1 EV Network – key guidelines

## ADMINISTRATIVE/ STRATEGIC PROCEDURES

### Phase 1 – Metro-level coherence

**Extension of the network at metropolitan level**, solving part of the commuting mobility problems, encouraging part of residents of ZMC to make the transition to EV. For this phase, governmental resources are key.

### Phase 2 – Densify the network strategically

Extension of the network at city level within public space. Following the example of Pamplona and expertise of STARDUST team, there are 2 options for administrative procedures, also applicable for Cluj-Napoca situation: **(1) Tender procedure** – concession of the public domain; **(2) Contract management** – conventional process of hiring a third party, where the main actor (the municipalities involved) designs the interventions.

### Phase 1 – Rely on third parties for organic development

Extension of the network **exploiting** relevant main actors, administrators of **important urban facilities**. the potential drivers for new chargers have to be arranged in an integrated way considering the city level context (road network), metropolitan level (commuting), mobility behaviours, traffic challenges, and urban planning decisions.

## ECONOMIC PROCEDURES

Use of charging stations is differentiated in relation to time of day:

- (1) during day: fast-charging maximum time use - 1 hour, semi-fast charging maximum time use – 4 hours,
- (2) during night: no limit. Similarly, the prices of the energy can fluctuate depending on the time of day, energy prices, amount of conventional energy sourced, and amount of RES of the local infrastructure (solar panels – see FOTOLINIERA example from Pamplona).

In order to ensure a proper use of the charging facilities, penalties have to be established: fees for exceeding the parking limit, minimum price per charge

### Slow chargers economic evaluation

Can be plugged directly into a standard 120V household or workplace outlet and add about 7-9 km of range per hour charged.

- Instalation costs - **6.095 EUR**
- Annual operation costs - **566 EUR**

### Semi-fast chargers economic evaluation

They use a 240 Volt outlet and add about 30 km of range per hour charged.

- Instalation costs - **10.713 EUR**
- Annual operation costs - **2.180 EUR**

### Fast chargers economic evaluation

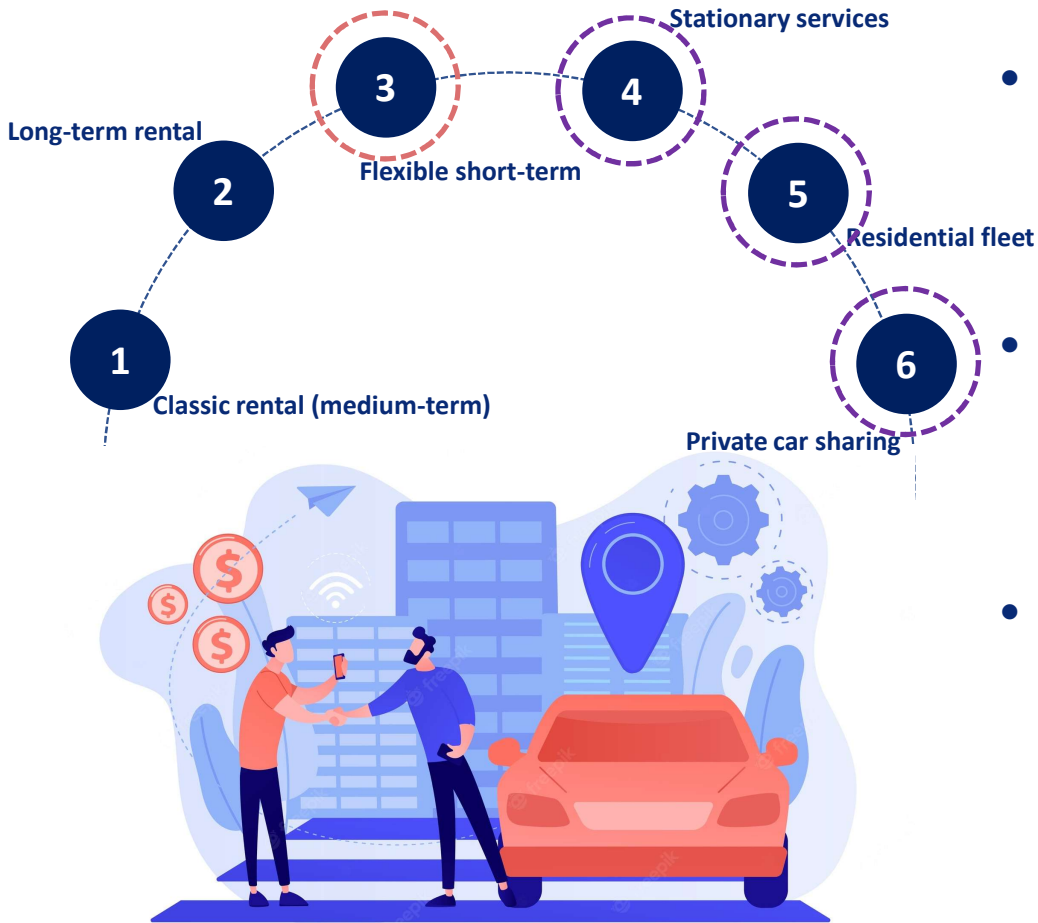
They use a 480 Volt system and can add up to 250 km of range per hour charged. In many cases, you can charge an EV's battery to 80% in 30 minutes

- Instalation costs - **32.970 EUR**
- Annual operation costs - **5.370 EUR**

# Dimension 2 EV Car Sharing – key guidelines

## KEY CONSIDERATIONS

- **Everything electrified.** At the moment EV cars still present a premium price in contrast to traditional thermal engine cars. For the Cluj-Napoca area, is important to first raise awareness about the benefits and impact of EV car-sharing, and then work with target groups - end-users to benefit from the services (especially collective housing residents).
- **Spikes in energy prices:** Prices of traditional fuel are increasing. Shared electric vehicles have the advantage of lower costs than a acquiring a new vehicle. Having smart chargers for recharging the fleets is an important aspect – the technology allows the batteries of the station to recharge when energy prices are low (example during night-time).
- **Data based rapid service development:** Cities can achieve faster and more efficient carbon neutrality and sustainable development goals, in terms of mobility and emissions, if they concentrate their actions for deploying a well-developed car-sharing services (through their own resources or through collaborations with private environment). Transition to EV in the case of privately owned vehicles takes longer time and it is not a reliable and efficient policy on its own (thus private car-dependency has to be discouraged). **Ethical use of data is important!**





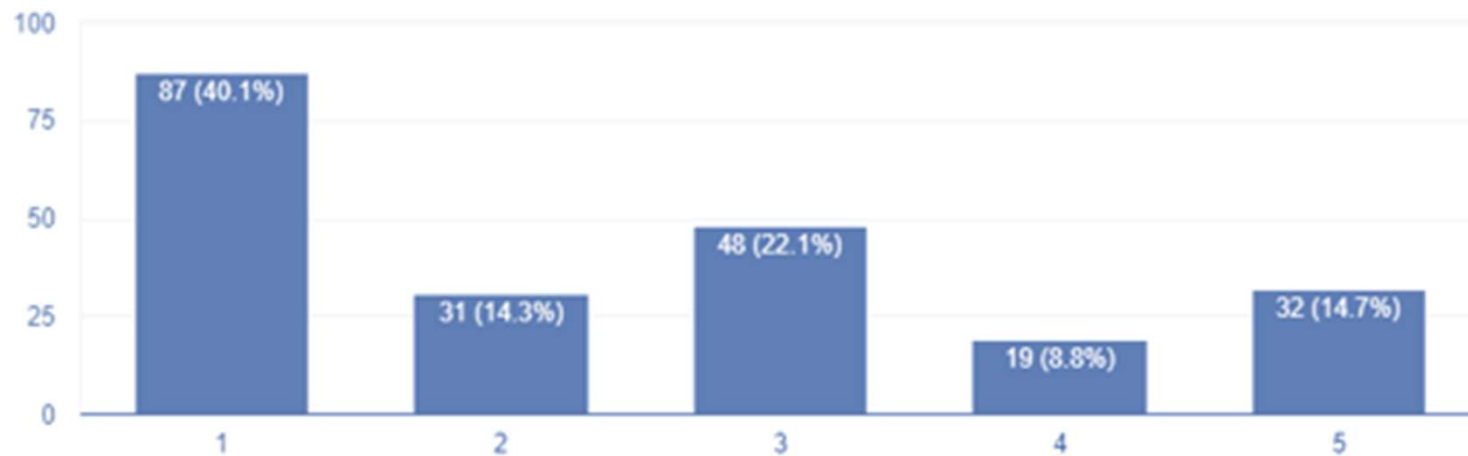
# Citizen questionnaire results

## EV car sharing

Compared to your needs, how advantageous do you consider the following electric car-sharing models?

Model 6 Citizens of the Cluj-Napoca area can make their own car available for short-term rental, through a mobile application.

217 responses



# Dimension 3 Incentive measures – key guidelines

## Phase 1 – Management model for initial roll out

- Implement a mobility card that
- Promote electric car-rental;
- Free charge at all public stations (in order to increase the number of users);
- Subsidies/incentives for purchase of EV (already present in Romania) and for installing charging stations
- Advantages in municipal taxes;

## Phase 2 – Potentialities and opportunities

- Provision of charging points on public roads;
- Facilities for installing charging points in underground parking;
- Electrification of municipal fleet (for example police cars);
- Personalised web/mobile application for a better user experience;

## Phase 3 – Other measures to promote EV transition

- Free parking on public roads for pure electric vehicles
- Different rates for residents and other users;
- Different payment conditions (according to: type of charger used (level 2 or 3); applying penalties for excess of time; parking limit; minimum charge);
- Adjust the infrastructure way of functioning according to different situations

*Countries like Denmark, Sweden, Iceland, Netherlands, Slovenia, Ireland are targeting to ban use of gas and diesel cars by 2030. This measure is slowly supported also by Romanian government, through funds and incentives deployed through the National Plan for Recovery and Resilience.*

**Awareness Raising Campaigns** – showcasing the benefits and impact that electric mobility holds (with emphasis on the important role of public transportation and sharing mobility services);

### SUSTAINABLE EV TRANSITION

**Incentives Measures for Encouraging the EV Transition.** Incentives measures are efficient if properly market/disseminated!

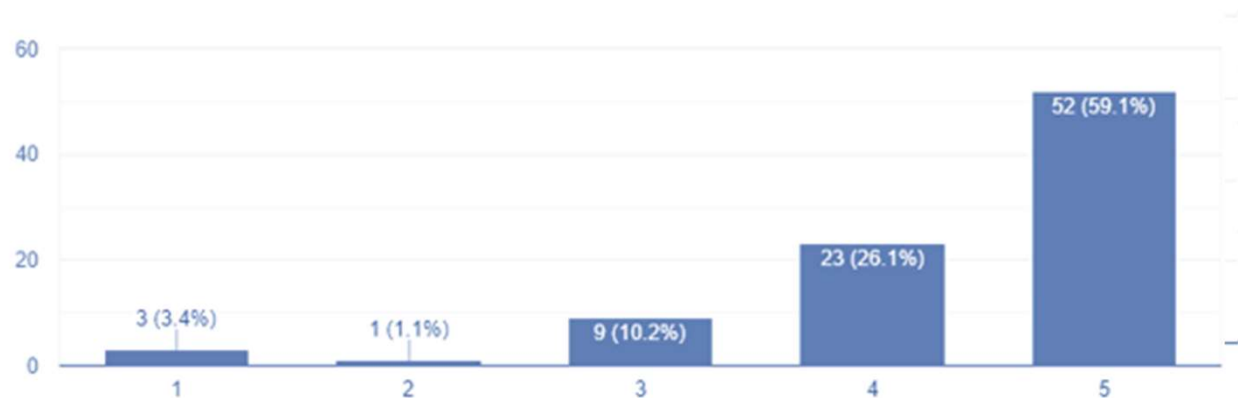
# Citizen questionnaire results

## Incentive measures

On a scale of 1 to 5 (1 - not at all motivating, 5 - very motivating), which of the following measures and aspects do you consider would motivate you to make the transition to the electric car:

Different / adaptable charging costs depending on the time of day you charge (eg low evening / night costs, or smart charging systems that provide energy from local renewable sources for low costs)

88 responses



# Citizen questionnaire results

## Incentive measures

	There are not enough charging stations in the neighborhoods	non-functional. Also,
	Reliability of stations and their low number	that still exist.
F	Too many applications	
S	1. Stocks and production of electric cars are not enough. 2. Almost every station needs its application.	
E		
P		
C	No small charging stations. With the increase of Dacia Spring, the existing charging stations can no longer cope.	tions of owners of base current, and ial parking lot.
N	Looking at the macro level, the biggest problem is the compatibility of charging systems (each car has its own system, many charging station providers have their own system). Another problem is the lack of a common protocol regarding charging stations (common interface / application, connection / charging systems, charging power, payment systems).	(solar panels for
C	Several functional charging stations were occupied by other cars just because when looking for a parking space the place for the electric car was free and the others were occupied.	es occupied by
	thus encouraging those who frequently transit the city to purchase an electric car without barriers related to autonomy.	