

Romanian E-mobility Index REI 2 (Second edition)

Accelerated growth – New electric
vehicles triple in number

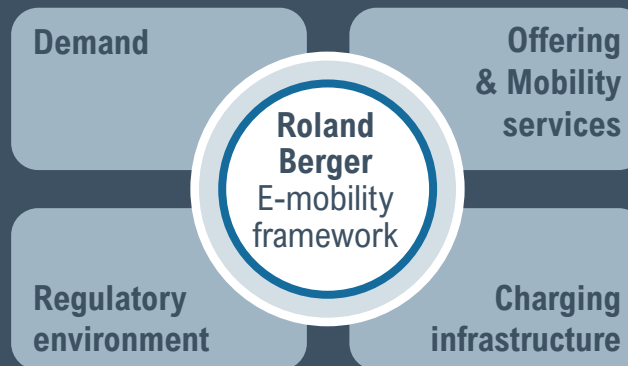
Civinet Conference, 15 May 2020

What is the **Romanian E-mobility Index**?

The Romanian E-mobility Index (REI) is a biannual **Roland Berger analysis of the main E-mobility drivers** within the Romanian market. It is addressed to stakeholders & decision makers across several key industries (e.g. energy, automotive, retail, financial services, transportation, hospitality, real estate), as well as public authorities. REI includes figures & analyses grouped into four dimensions illustrated below.

Do people want electric vehicles and to what extent?

What are the regulatory conditions, in terms of both incentives for xEVs and constraints for internal combustion engines?



How developed is the local car offering and what mobility services can be accessed as an alternative?

How developed is the infrastructure for electric vehicles and what is the geographical/ sectorial spread?

Electric motor powertrains included in the study's analyses (mentioned together as xEVs)

EVs (full electric vehicles)

Powertrain is fully electric and vehicle does not have an internal combustion engine; Lower range than Plug-in hybrids, limited by the battery pack capacity

PHEVs (Plug-in hybrids)

The e-motor uses batteries that can be recharged by connecting to an external power source; Internal combustion engine is started in case of increased acceleration or higher speeds

Second half of 2019 shows a strong increase in demand for electric-powered vehicles

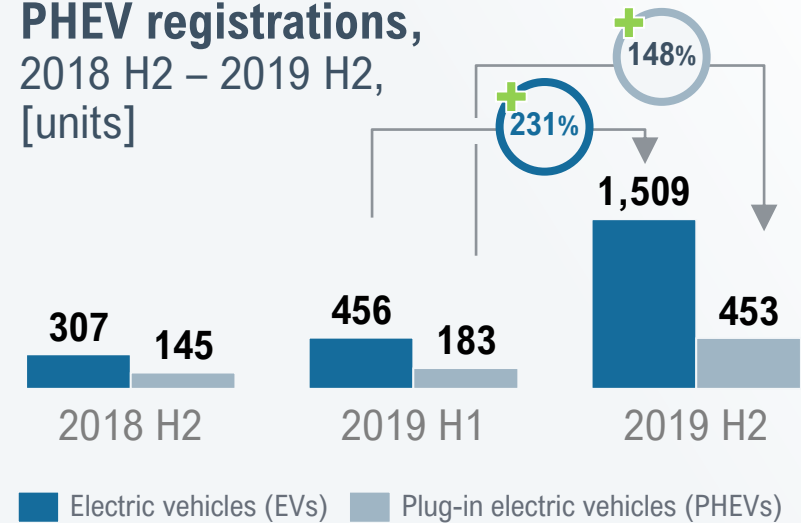
Demand growth for electric powered vehicles has accelerated in 2019 H2 – in total **~1,960 units were registered** in the respective period, up by 210% compared to 2019 H1

Demand for EVs is boosted by

- > Clear cost advantages of EVs vs. internal combustion engine (ICE) vehicles
- > Significant incentives for EVs/ PHEVs
- > Gradual increase of the charging infrastructure especially in condensed urban areas
- > Environmental awareness of the consumers

The share of EVs and PHEVs has increased from ~0.9% in the first half of 2019 to **~2.2%** in the second half (out of total new vehicle registrations)

Evolution of new EV & PHEV registrations, 2018 H2 – 2019 H2, [units]



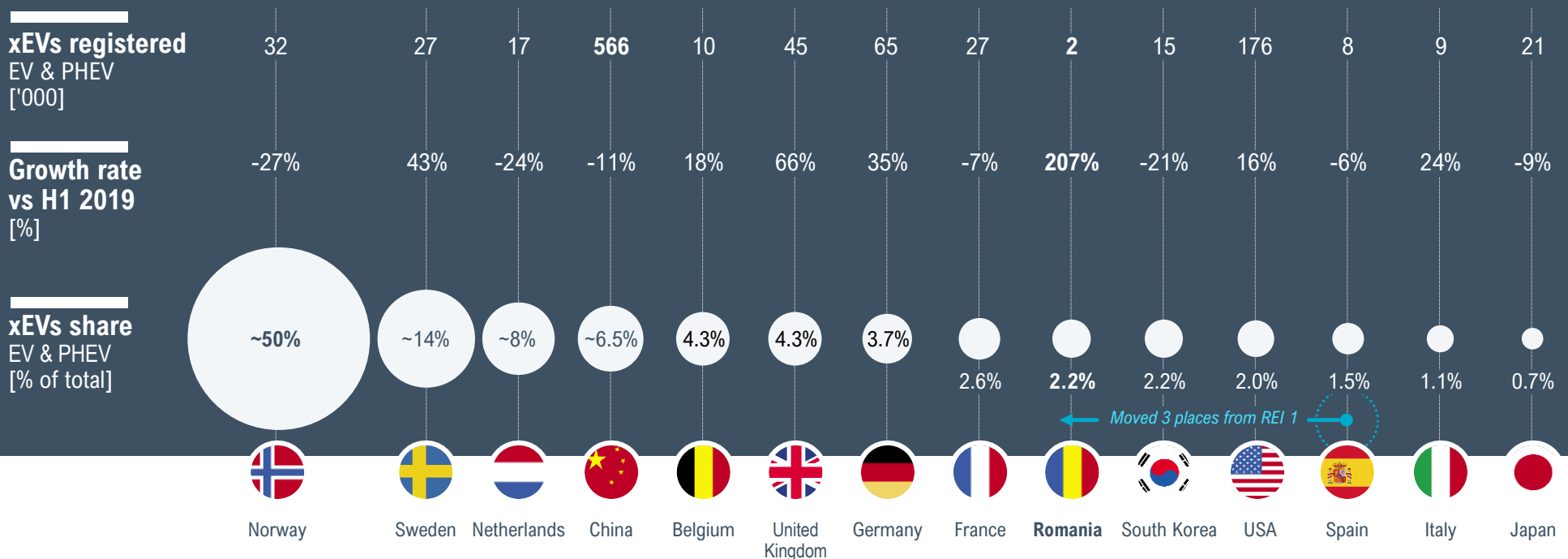
2.2%

Share of EVs & PHEVs out of total new car registrations in 2019 H2

Accelerated growth rate pushes Romanian share of EVs/ PHEVs above levels in South Korea, the USA or Japan

Romania has registered an impressive **growth rate of ~210% for new xEV registrations** out of total new car registrations (when compared to the first half of 2019), significantly above other major markets in scope. At an international level, Norway leads in terms of xEV sales share with ~50%, while China remains the undisputed leader for sales volumes, with over 566,000 vehicles.

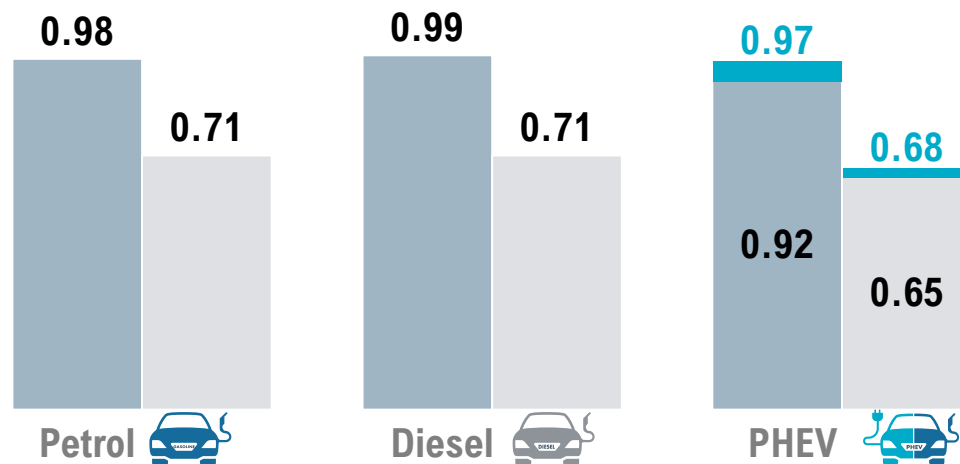
EV & PHEV registrations, H2 2019



Mid-size executive sedan PHEVs are more cost efficient than their ICE counterparts

Total Cost of Ownership (TCO) in Romania for a mid-size executive sedan with ICE & PHEV powertrains¹⁾

Average cost per kilometer [EUR/ km], 5 years of vehicle usage

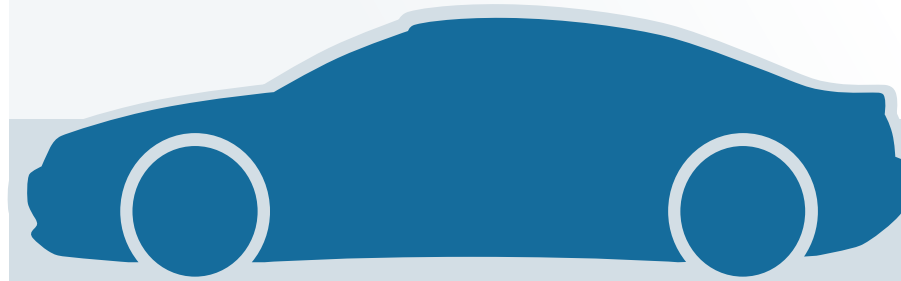


Annual mileage

■ 10,000 km ■ 15,000 km ■ Additional costs in case of no subsidies

1) Same car brand & model considered when comparing different powertrains
2) Further TCO comparisons to be revealed in future editions

REI 2 TCO comparison: Mid-size executive sedan



Buying a **PHEV in Romania** is **cost efficient** regardless of yearly mileage

Mid-size executive PHEV sedans do not require a certain number of kilometers to breakeven, irrespective of incentives.

PHEVs charge quicker than their EV counterparts and can run solely on the internal combustion engine, so customers do not suffer from "range anxiety".

EV/ PHEV offering remains a key development hurdle with less than 45 models available in Romania

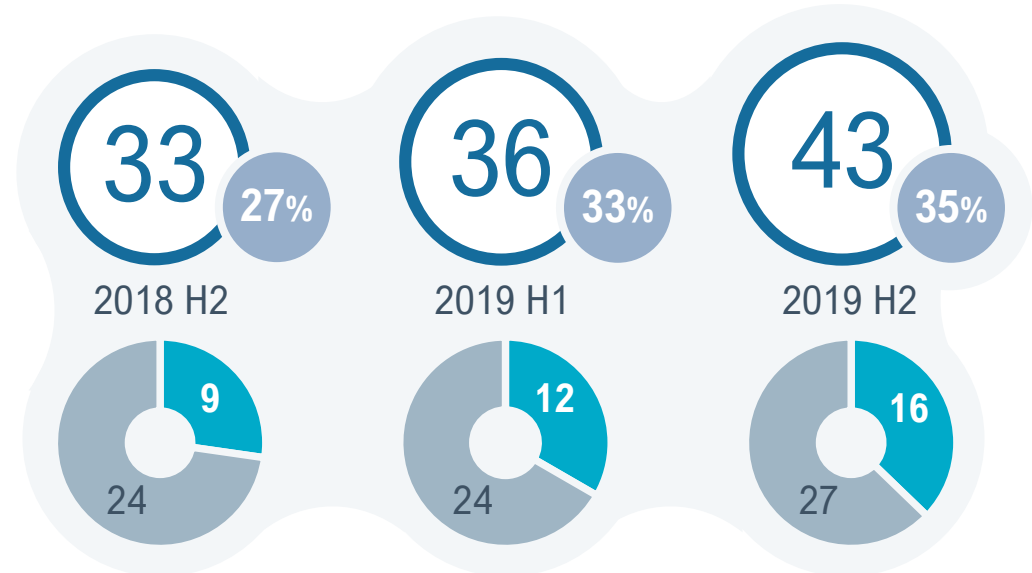
With **43 EV & PHEV models** available for purchase, the offering is still limited, accounting for only **~12% of the total number of car models** available on the Romanian market.

As manufacturers launch new EVs and hybridize their existing model range, this **trend is expected to accelerate over the next 6-12 months.**

EV/ PHEV models available¹⁾ & EV share in total EV/ PHEV models, [# of models, %]

Split of xEV models between pure EVs and PHEVs [# of models]

■ EVs ■ PHEVs



An important constraint is the **low number of models & body styles per car brand**, leading to limited options in case of high brand affinity. Most EVs and PHEVs are hatchbacks, sedans and SUVs, while the offering for station wagons, MPVs or coupes/ cabrios is almost inexistent.

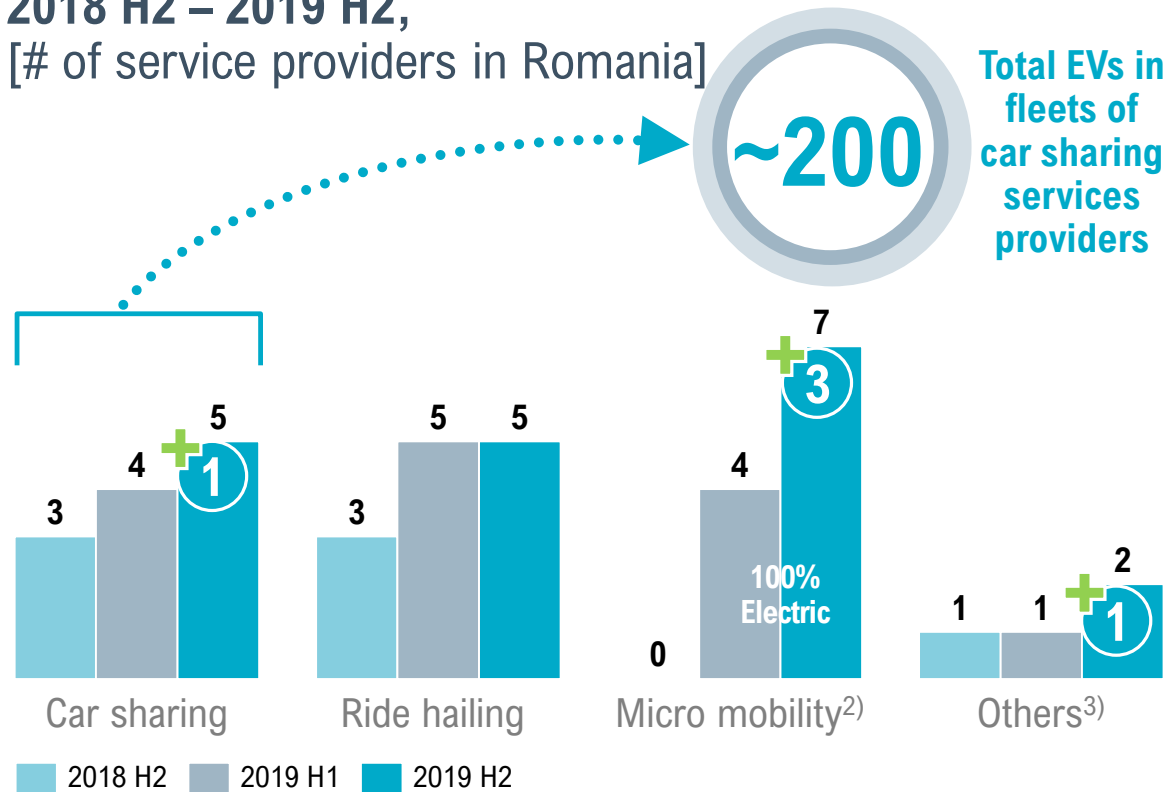
3 Highest number of EV models from a brand

8 Highest number of EV & PHEV models from a brand

1) Values at the end of the analyzed period

Increasing appeal for mobility services, with micro mobility further pulling away in 2019 H2

Evolution of alternative mobility services providers¹⁾, 2018 H2 – 2019 H2, [# of service providers in Romania]



3 new providers offering scooters and bicycles have started operating in Bucharest during the second half of 2019. As a result, the segment is becoming increasingly competitive.

The car sharing market is showing constant growth in terms of providers, with **one new player in 2019 H2** and at least another one expected in 2020 H1.

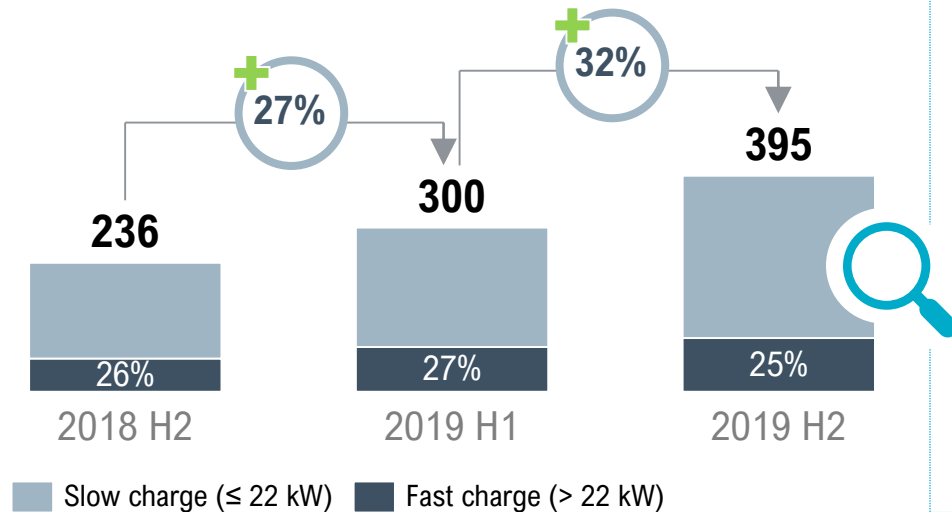
There is the potential for additional offerings from existing players and disruptors, such as **dedicated parking services and locations**.

Almost all alternative mobility services providers have operations in Bucharest, with Cluj Napoca, Iasi and Timisoara generally targeted as the next hubs for expansion.

1) Including only vehicles with own propulsion system
 2) Vehicles for urban use with mass below 500 kg, including electric scooters, bikes or unicycles
 3) Includes ride sharing, peer-to-peer renting and other mobility services

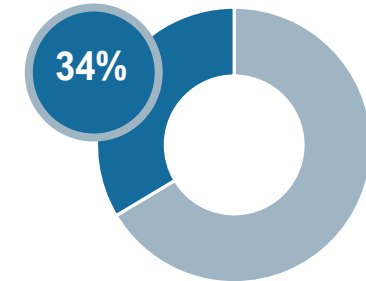
~400 publicly available charging stations, but only ~25% capable of fast charging

Evolution of charging infrastructure in Romania, 2018 H2 – 2019 H2 [#]

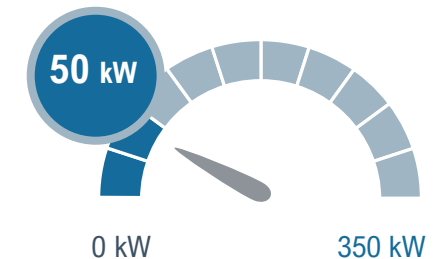


Share of multi point stations (>2 chargers), 2019 H2

■ Single/ dual point ■ Multi point



Maximum installed charging power, 2019 H2



At the end of 2019, the national charging infrastructure consisted of **~400 stations** and was increasing at a steady rate of ~30% every 6 months. The number is still significantly below the national 2020 target of 6,000 stations¹⁾.

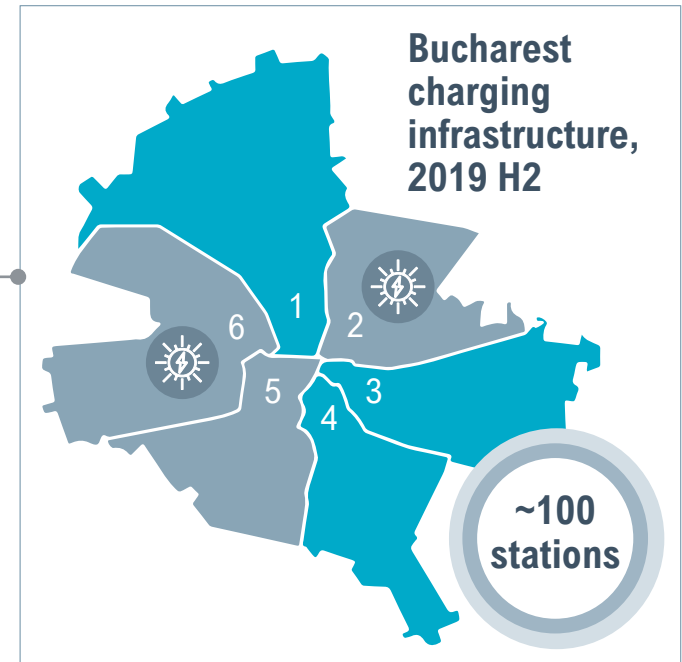
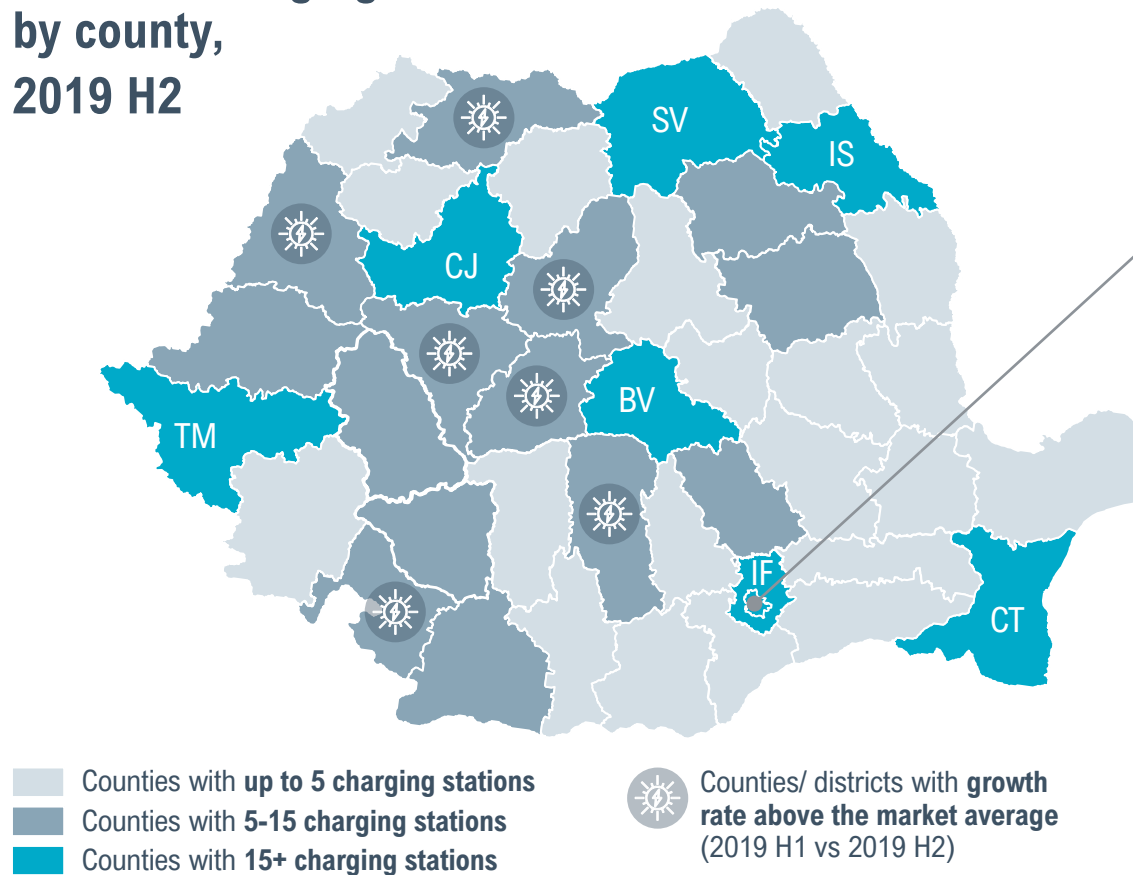
Charging capacities still favor slow charge with a maximum installed power of 50 kW. Only **~25% of stations are currently capable of charging at powers above 22 kW**. The low share of multi point stations (34%, ~5 p.p. lower in comparison to 2019 H1) can create inconveniences, considering the higher average duration for charging when compared to a traditional fueling station, especially if the chargers do not allow for reserved bookings²⁾.

1) Communicated by the Environment Ministry

2) However, "checking in" at chargers can be performed via 3rd party apps

Majority of public stations within Western Romania, but ~25% of stations still located in Bucharest

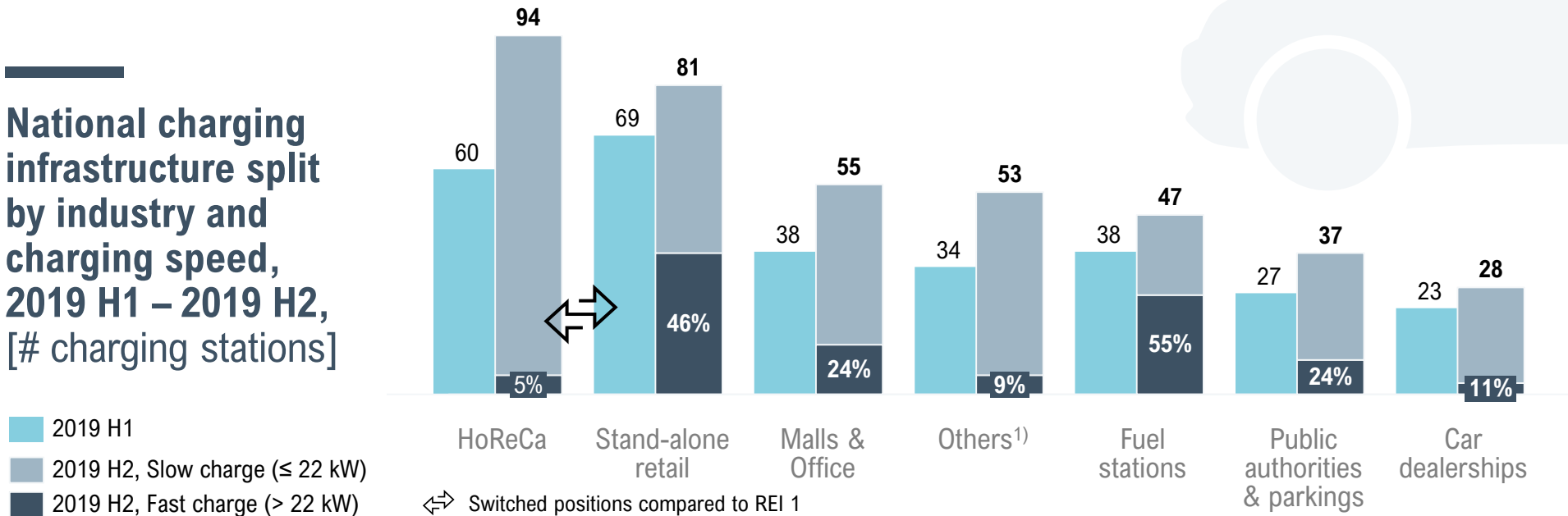
National charging infrastructure by county, 2019 H2



Charging infrastructure development initially occurs within major cities – e.g. **Bucharest, currently hosting ~25% of national charging stations**, Iasi, Timisoara, Brasov, Cluj-Napoca, Suceava and Constanta. However, counties with slightly smaller cities such as Arges, Sibiu or Bihor are exhibiting high growth rates.

HoReCa replaces stand-alone retailers as the leader for overall number of locations

National charging infrastructure split by industry and charging speed, 2019 H1 – 2019 H2, [# charging stations]



The highest number of charging stations are operated by **HoReCa players and stand-alone retailers**.

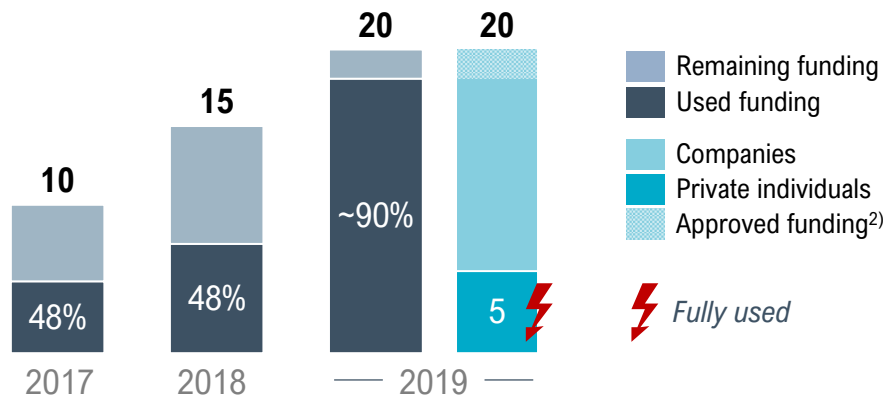
Fuel station operators have a slightly higher preference towards fast chargers, in an effort to maintain similar refueling speeds to fuels, thus meeting customer expectations.

Differences can be observed in terms of operating models – fuel stations and stand-alone retailers have adopted a mixed payment model, some offering charging at a cost, while others still offering free charging. HoReCa seems more inclined to offer free charging for their customers.

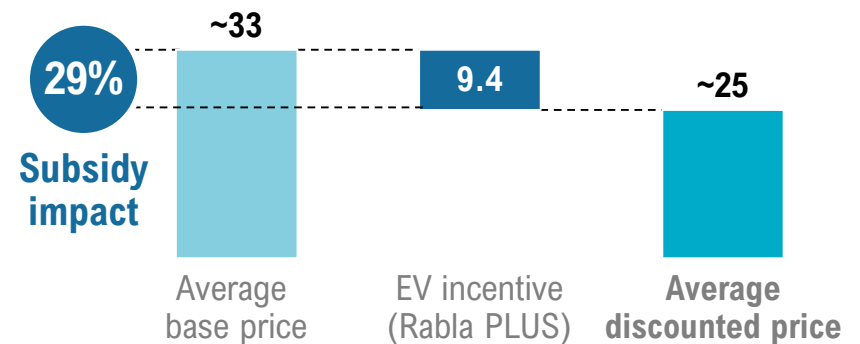
1) E.g. education & health facilities, touristic areas, entertainment centers etc.

2019 subsidy funding close to 100% use – Increased 2020 funding expected

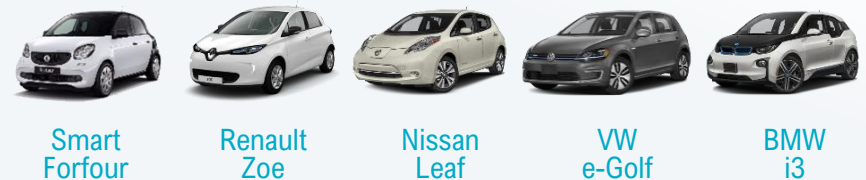
Evolution of total available funding through the government incentive scheme, 2017 – 2019, [EUR m]



Share of government incentives out of average price of selected compact EV models¹⁾, 2019 H2 [% , EUR k]



Compact EV models selected for analysis



2019 absorption rate of the funding was significantly higher in comparison with previous years, with additional allocation awarded for both funding pools (private individuals & companies).

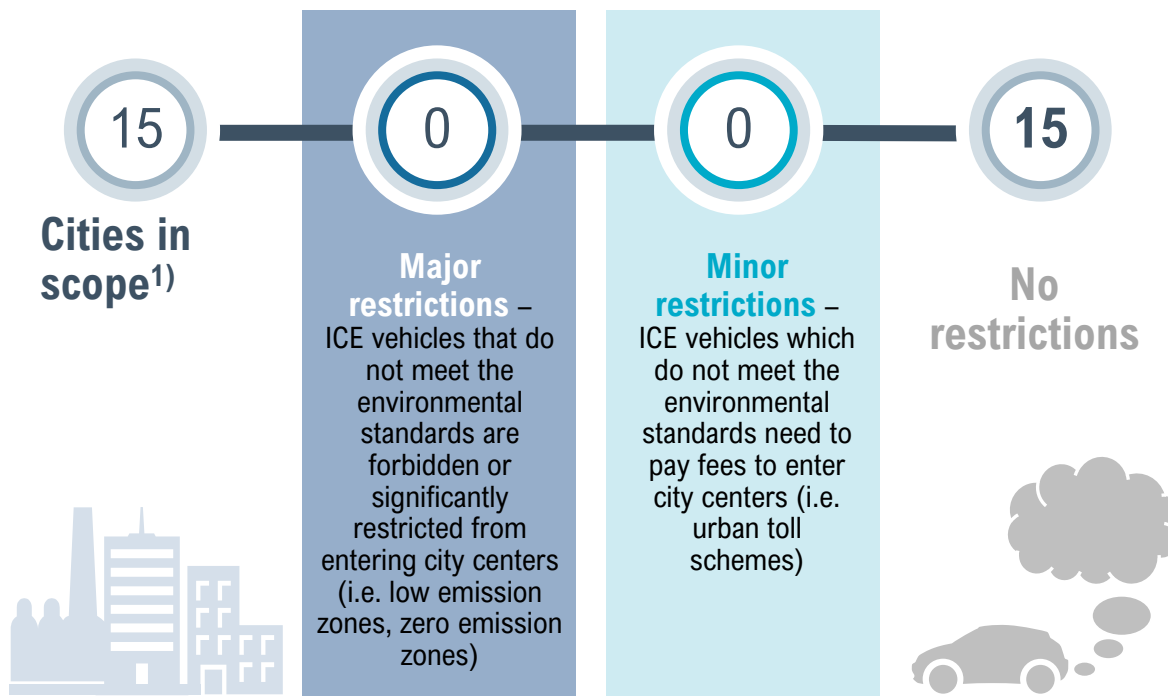
Even with additional funding, the private **funding pool was fully used by mid-November**, whilst the companies' pool expects close to 100% utilization once the funding reimbursement backlog is cleared. Hence, the 2020 subsidy funding needs increasing to accommodate for the rapid sales growth of xEVs. Otherwise, there is the **risk of capping the growth of this vehicle segment**.

1) Selection based on registration figures for end of 2019 and expected future availability

2) Allocated funds expected to be lower than approved funds due to a portion of individuals/ entities opting to drop out, no longer placing the approved vehicle order

No major Romanian city has ICE restrictions in place following the removal of the Oxygen tax

Regulatory restrictions for internal combustion engines in the largest urban areas in Romania



Various vehicle restrictions have been introduced across Europe with the aim of tackling air pollution in urban areas, some of the examples including:

Low emission zones – area based restrictions for highly polluting ICE vehicles

Zero emission zones – area based restrictions allowing entrance only for battery electric and hydrogen fuel cell vehicles

Emergency air pollution schemes – temporary restrictions on ICE vehicles due to predicted air pollution or after a prolonged period of high pollution

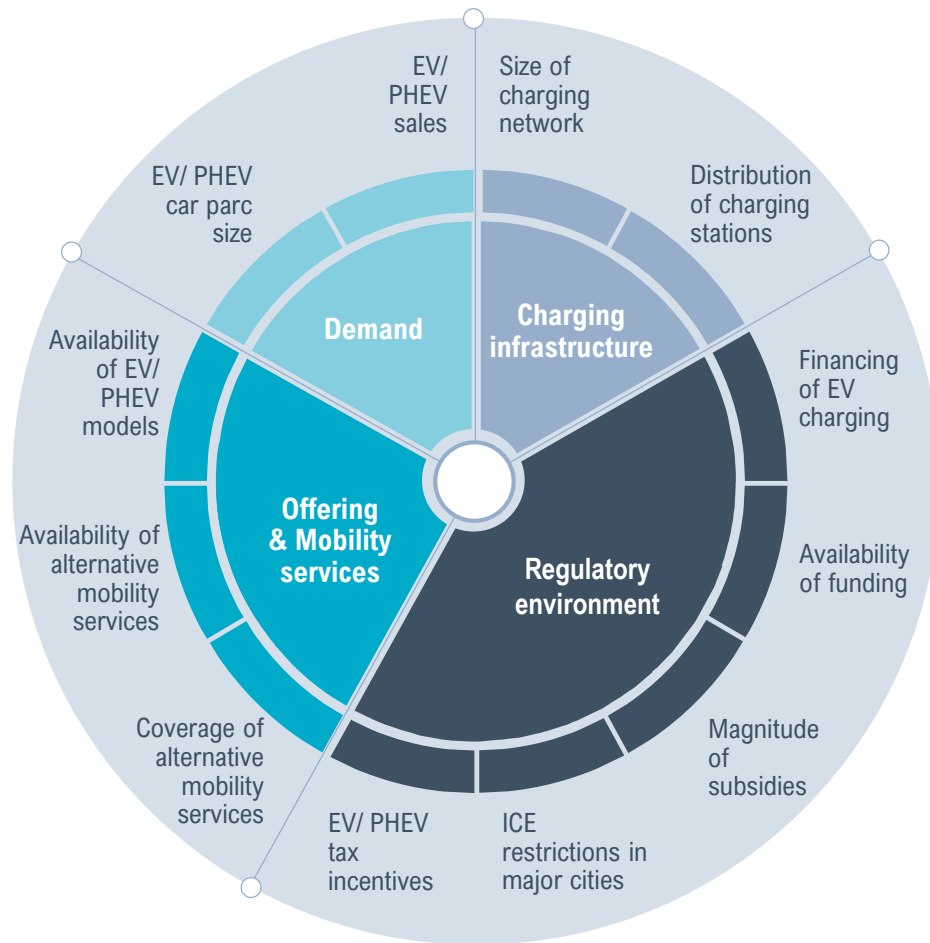
Urban toll schemes – payment for entrance in congested streets, bridges or specific city areas

In Romania, the temporary-introduced Oxygen tax in Bucharest has been removed. Despite the clear European trend, **there are no plans to introduce restrictions on highly-polluting vehicles across major Romanian cities.**

1) Romanian cities considered – Bucharest, Cluj-Napoca, Timisoara, Iasi, Constanta, Craiova, Brasov, Galati, Ploiesti, Oradea, Braila, Arad, Pitesti, Sibiu and Targu Mures

REI 2 stands at **33** at the end of 2019 H2

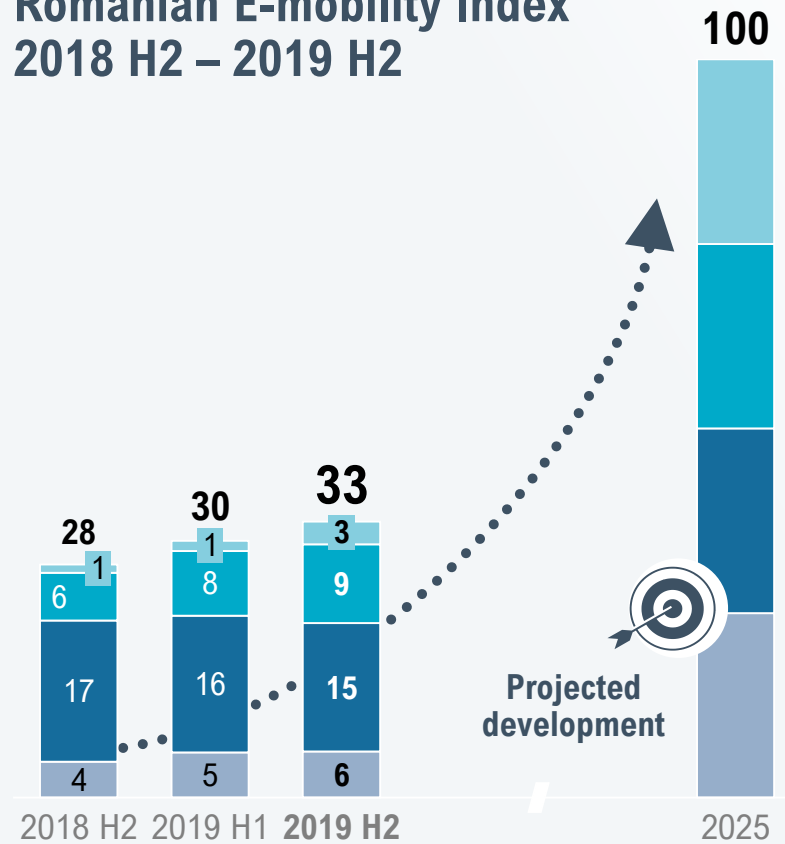
Key dimensions of the Romanian E-mobility Index calculation



+3 points vs 2019 H1



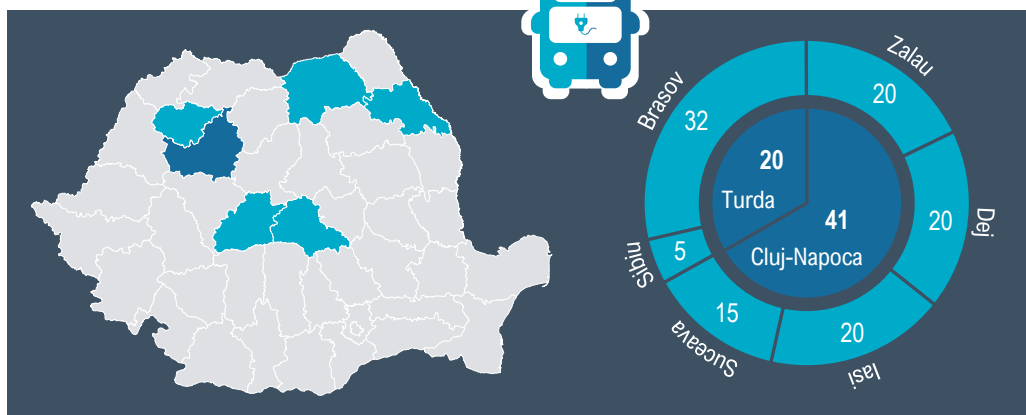
Romanian E-mobility Index 2018 H2 – 2019 H2



■ Demand ■ Regulatory environment
■ Offering & Mobility services ■ Charging infrastructure

Special topic – The perfect use case displayed by electric buses

Electric buses by counties and cities in Romania, end of 2019 H2



■ Counties with cities currently operating electric buses
■ Counties with cities expecting delivery of electric buses in 2020

Cluj county leads the way in terms of electric bus (e-bus) adoption, with the city of Cluj-Napoca operating 41 e-buses¹⁾, followed by Turda with its entire fleet comprised from 20 e-buses. Another city in the Cluj county, Dej, expects its first operational e-buses in May 2020. Other cities (e.g. Brasov, Zalau, Sibiu, Iasi and Suceava) expect e-bus fleets in 2020.

The Southern part of Romania is laggard in terms of adoption, with limited plans for e-buses in the following period.

Status quo

At the end of 2019, **40% of buses in Romania were over 20 years' old**, leading to increased fuel consumption, higher maintenance costs and pollution. Furthermore, buses operate at low speeds where emissions are the most intense.

Ideal use case for the electric bus

Modernization of public transportation can be performed via the introduction of e-buses in cities, with large cities being a prime candidates due to their high traffic and favorable topography (relatively flat terrain).

The average speed for buses in Bucharest is between 10-15 km/h, while speed limits do not exceed 70 km/h even in suburban areas. As a result, **e-bus would operate in optimum conditions, as lower speeds lead to less energy consumption.**

The acquisition of e-buses and charging infrastructure is financed through MLPDA²⁾ programs, which are supported by non-reimbursable EU and Swiss funding schemes. As a result of this expenditure saving, there is a **clear TCO advantage for e-buses** vs. ICE counterparts, as the latter do not receive the same level of funding.

Promising adoption rate for electric buses

Romanian authorities actively pursue e-bus adoption for public transport fleets. Cities in 34 out of 42 counties have either purchased e-buses or been engaged in obtaining funding and organizing bids to purchase them.

The share of e-bus registrations out of total bus registrations is **4.7% for 2019 H2**, higher than the 2.2% for electric cars, showing a stronger adoption pattern.

1) Data from September 2019

2) Ministry of Public Works, Development & Administration





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