

# Romanian E-mobility Index REI 3 (Third edition)

Halved electric vehicle sales, but  
increased car model offering

**Special topic** – The real environmental  
friendliness of electric vehicles in Romania

Bucharest, October 2020

# Executive summary

Roland Berger presents the **third edition of the Romanian E-mobility Index (REI)**, a bi-annual report covering the developments of the e-mobility ecosystem on the local market. Conclusions are based on the results of our proprietary **E-mobility framework, with 4 main dimensions** (demand, offering & mobility services, regulatory environment and charging infrastructure).

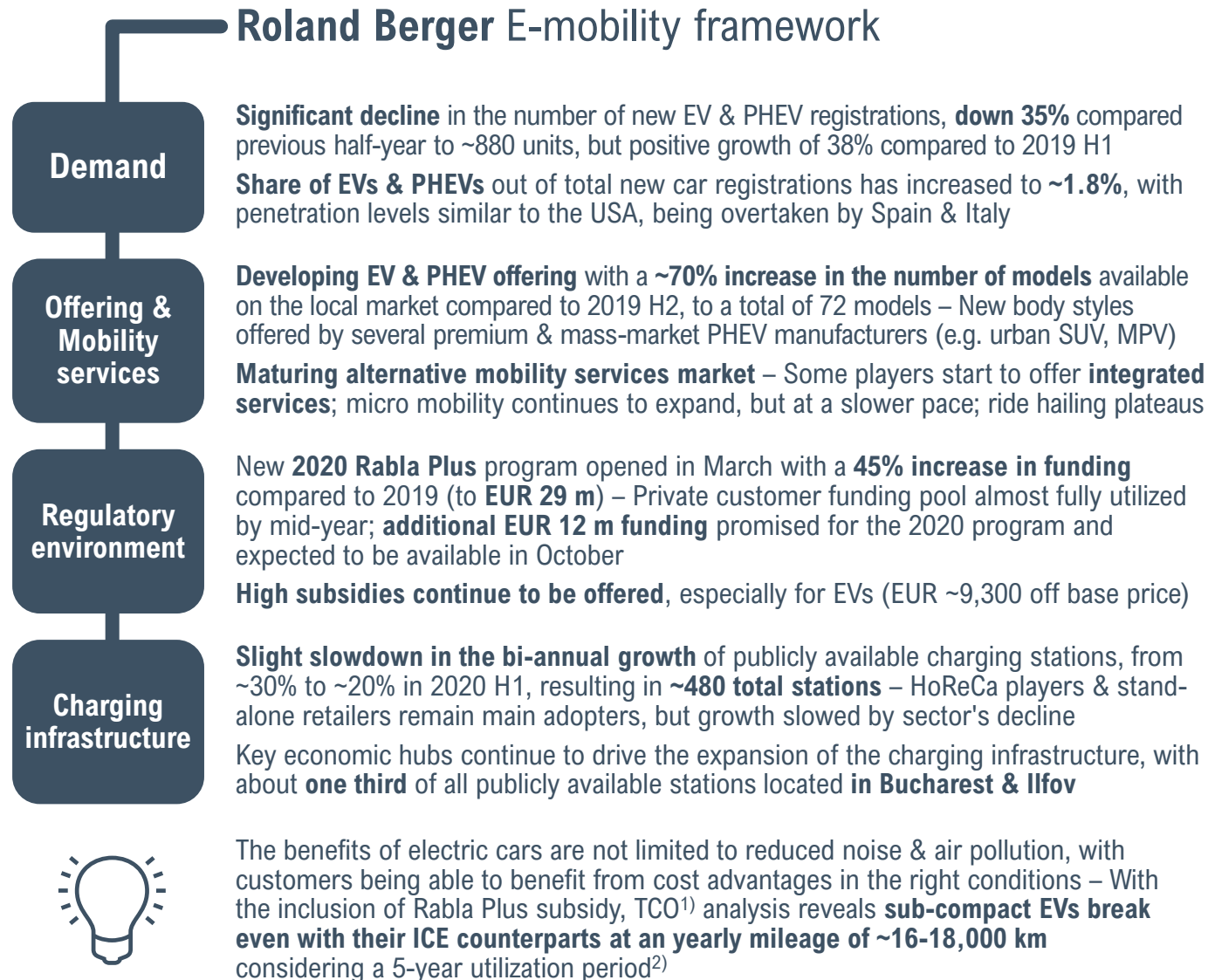
2020 H1 index stands at **38** points (out of a maximum possible 100), ~5 points above the score of the second edition in 2019 H2.



Each issue of the Romanian E-mobility Index includes a **special topic**

REI 3 focuses on understanding the **real carbon footprint of EVs**, from vehicle manufacturing to end-of-life recycling.

The environmental friendliness of EVs depends on the "greenness" of the electricity powering them – **Compact EVs utilized in Romania** contribute to **~40% less CO<sub>2</sub>eq.** gases released into the atmosphere compared to their ICE equivalent.



1) Total Cost of Ownership

2) Further TCO comparisons to be presented in future editions

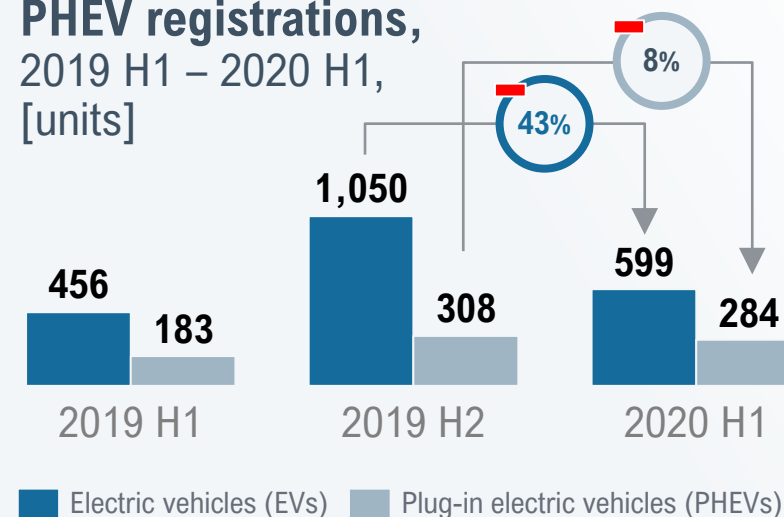
# Electric-powered vehicle sales lose momentum as a result of the COVID-19 pandemic

The accelerated growth experienced by the sales of electric-powered vehicles in the recent period was halted in 2020 H1, with **~880 new units registered** in the respective period, **down by 35%** compared to the previous semester. Registrations of electric vehicles (EVs) have been the most impacted, almost halving in number. However, **year-on-year registrations show positive growth**, in contrast with the Romanian market for new cars which contracted by 31% compared to 2019 H1.

The **slowdown in demand** was **primarily caused by the COVID-19 pandemic** which generated a strong economic downturn, reducing consumer appetite for large personal investments such as passenger cars. Additionally, the **lockdown measures imposed from March to May limited the operations** of car dealerships, with social distancing and health concerns also causing reluctance among customers to conduct test drives. Secondly, the **Rabla PLUS subsidy scheme becomes effective in March-April each year**, limiting the support for xEV purchases in the first quarter of the year.

**Share of new EVs and PHEVs** out of total new vehicle registrations has increased **from 1.5%** in 2019 H2 **to 1.8%** in 2020 H1 as a result of a 45% reduction in the total number of new cars sold. Two in three xEVs registered the first half of the year have been new vehicles, compared to only one in five vehicles for the overall car market in Romania.

## Evolution of new EV & PHEV registrations, 2019 H1 – 2020 H1, [units]



1.8%

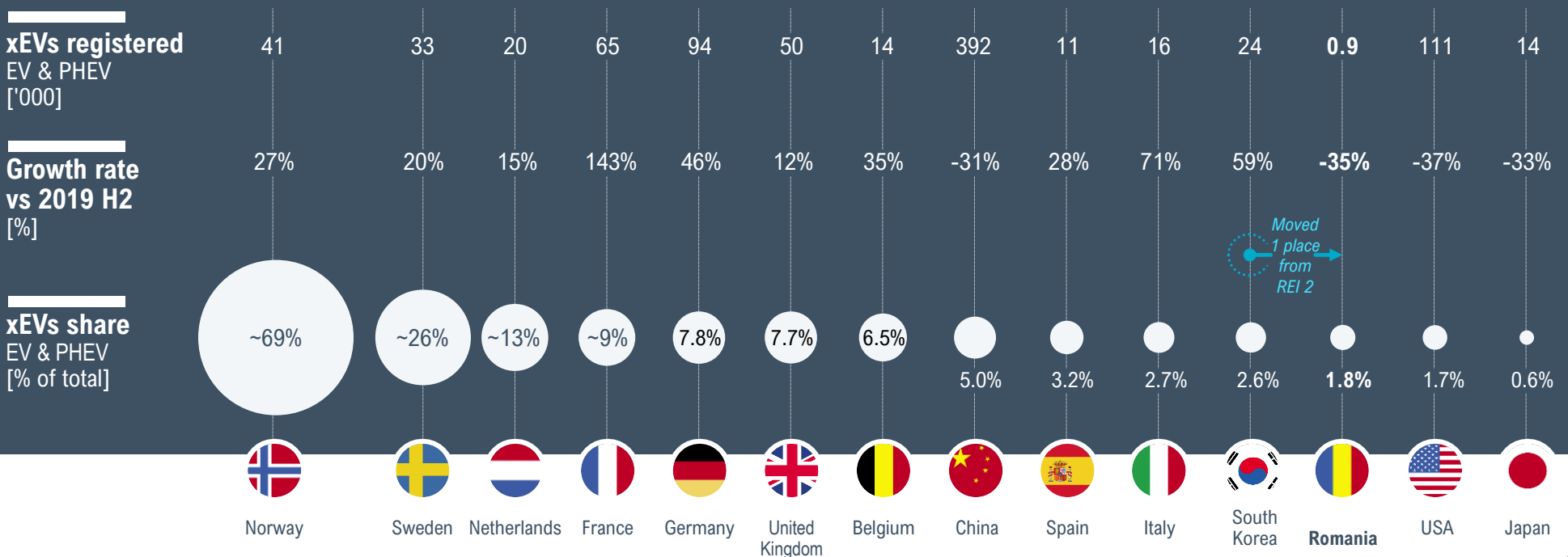
Share of EVs & PHEVs out of total new car registrations in 2020 H1

# Sales of EVs & PHEVs remained resilient in all major European countries, in contrast with the evolution in Romania

The strong decrease in new electric-powered vehicles registered in Romania in 2020 H1 did not follow the trend of most European countries, where sales of EVs and in particular PHEVs further increased their growth rates. This came at the expense of petrol and diesel cars, which were most affected by the economic situation caused by the pandemic (sales drop of 55% vs. 2019 H2 at EU-level). As a result, the **market share of EVs and PHEVs in the EU reached a record ~7%**.

At global level, sales were heavily impacted by fall in demand from China and the USA, with declines of more than 30% in both countries compared to 2019 H2.

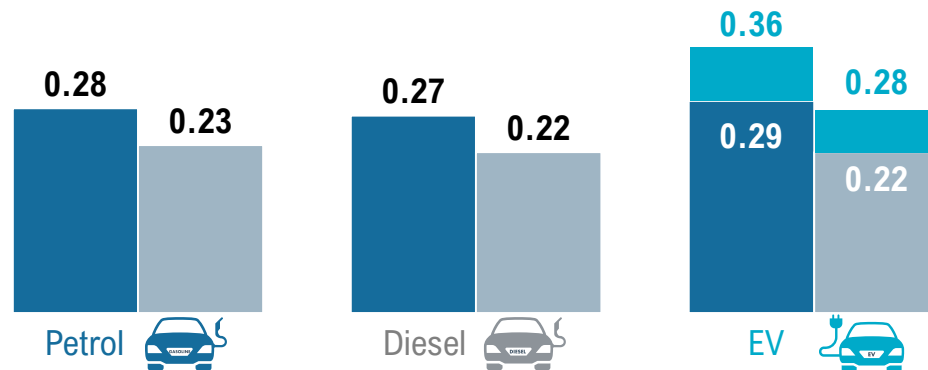
## EV & PHEV registrations, 2020 H1



# Small EVs reach breakeven point with ICE models at ~16-18,000 km yearly mileage

## Total Cost of Ownership (TCO) in Romania for a sub-compact car with ICE & EV powertrains<sup>1)</sup>

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



### Annual mileage

■ 15,000 km ■ 20,000 km ■ Additional costs in case of no subsidies

Sub-compact electric vehicles reach **breakeven point with their diesel counterparts at a yearly mileage of ~18,000 km** when accounting for the governmental subsidies (Rabla Plus). Although sub-compact EVs have a higher base price than their ICE equivalents, lower operational costs lead to **similar cost per kilometer to petrol variants at a yearly mileage of ~16,000 km.**

## REI 3 TCO comparison: Sub-compact car



### Buying a sub-compact EV in Romania is **cost efficient at higher yearly mileage**

Compared to compact cars which reach breakeven point at ~15,000 km per year, sub-compact EVs require higher yearly mileage to be cost efficient.

This is due to the **relative cost of the battery pack and associated technology** compared to the generally low base price of the vehicles. Without the governmental incentives, sub-compact cars would be over 70% more expensive than their internal combustion counterparts. As a result, they would lag behind their ICE equivalents in terms of average cost per kilometer.

1) Same car brand & model considered when comparing different powertrains

# Local EV & PHEV offering has shown strong development

The variety in the EV and PHEV offering available for the Romanian market has experienced a positive development in 2020 H1, with **72 models available by the end of June**, representing **~19%** of the total no. of models sold locally.

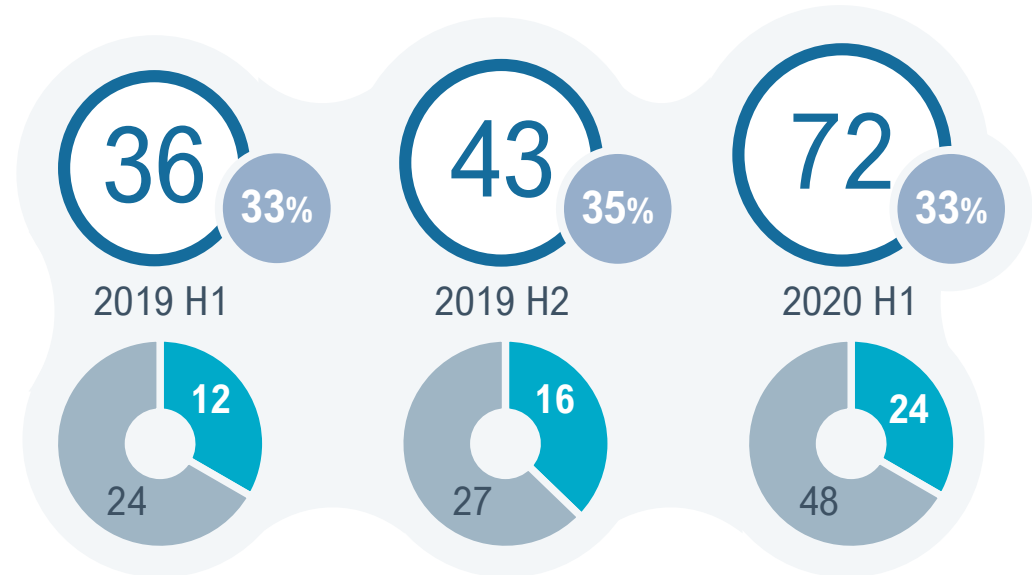
Manufacturers reacted to the strong growth of the market before the pandemic, with both premium & mass-market players expanding their ranges.

**PHEV models registered the highest increase**, due a strong tendency from manufacturers to hybridize their existing models.

**EV/ PHEV models available<sup>1)</sup> & EV share in total EV/ PHEV models, [# of models, %]**

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

■ EVs ■ PHEVs



Although the total number of electric-powered car models has registered strong growth in 2020 H1, the development of the pure EV segment for premium manufacturers remains slow, with 5 out of the 7 newly-released models belonging to mass-market producers. Instead, **premium manufacturers focus on their PHEV ranges**, offering 33 out of the 48 available PHEV models and expanding their offering of body styles to also include compact SUVs and MPVs. Two premium brands each offer 9 EV & PHEV models, the highest cumulated number on the market.

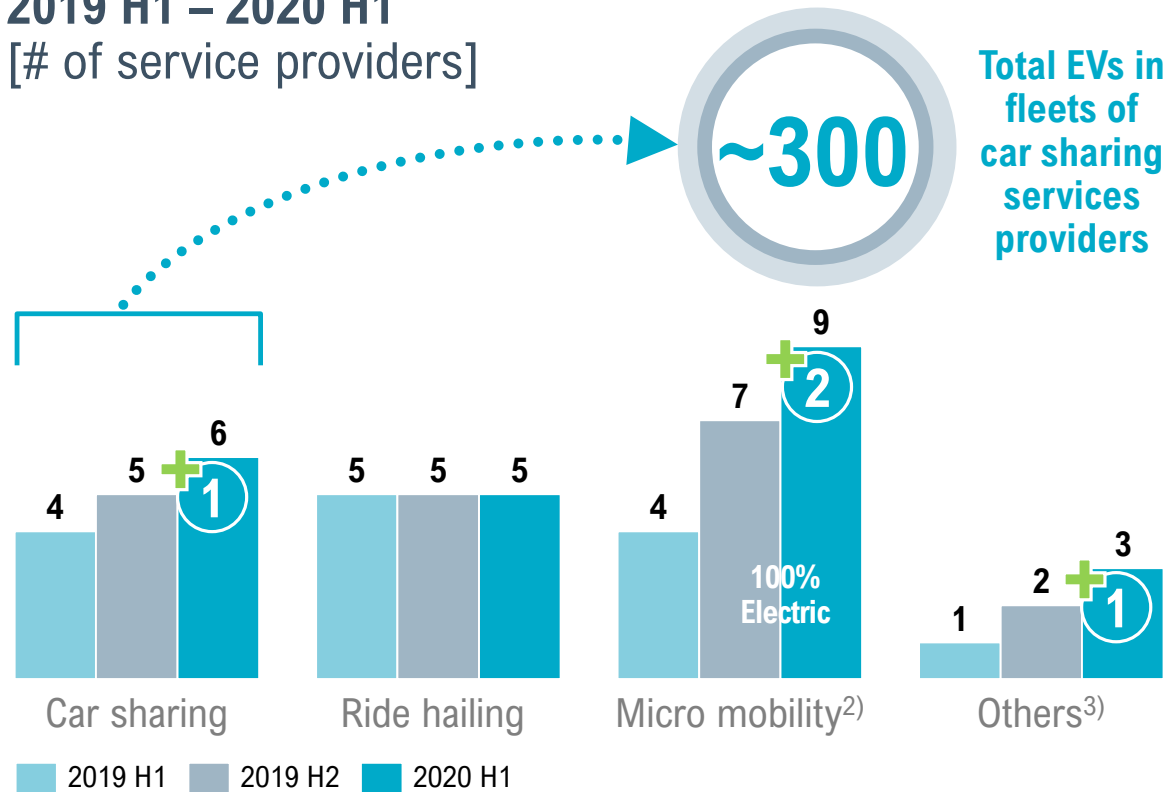
**3** Highest number of EV models from a brand

**9** Highest number of EV & PHEV models from a brand

1) Values at the end of the analyzed period

# The mobility services market is maturing – Players looking to offer integrated mobility solutions

## Evolution of alternative mobility services providers<sup>1)</sup>, 2019 H1 – 2020 H1 [# of service providers]



The offering of alternative mobility services continued to expand in 2020 H1, although a **consolidation trend** is visible in some segments due to the **local market reaching oversaturation** (e.g. ride hailing, electric scooter rental).

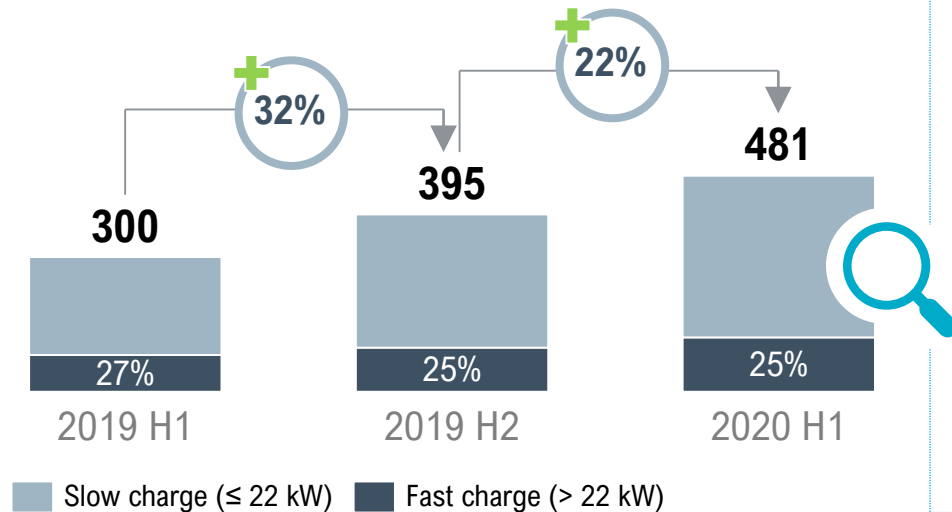
**Car sharing** services are growing at a steady but relatively slow pace, with **one new player** entering the market in 2020. The **total number of EVs** available in all fleets increased to **300**, from 200 at the end of 2019.

Alternative mobility players have also started to offer **integrated mobility solutions**, either through **strategic partnerships** or **organic development** of the portfolio. For example, some ride hailing providers now offer electric scooters belonging to other providers on their own app, whereas other ride hailing providers have chosen to launch their own service for electric scooter rental in Romania.

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

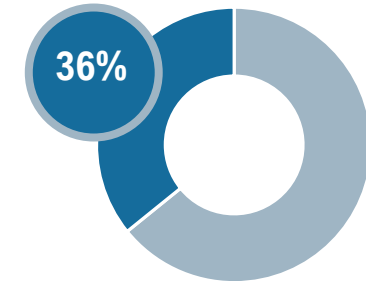
# The development of the charging infrastructure has slowed down

## Evolution of charging infrastructure in Romania, 2019 H1 – 2020 H1 [#]

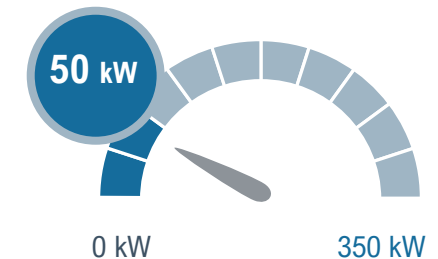


## Share of multi point stations (>2 chargers), 2020 H1

Single/ dual point ■ Multi point



## Maximum installed charging power, 2020 H1

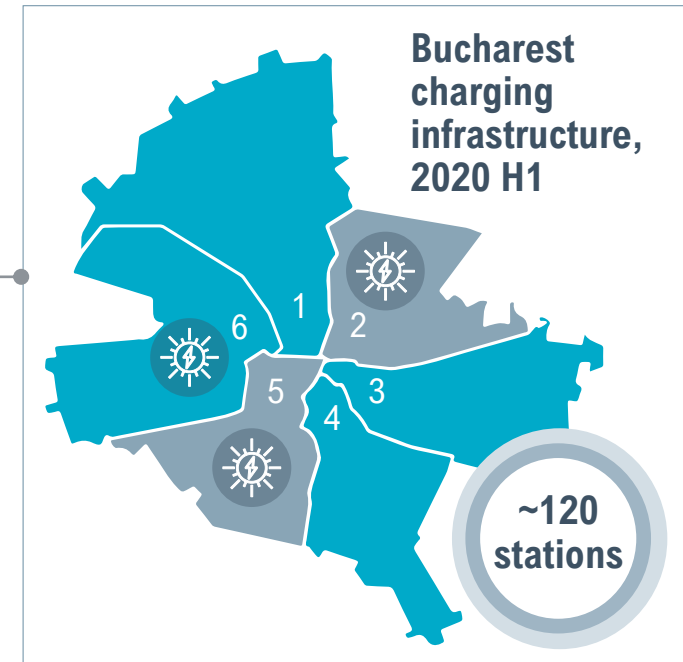
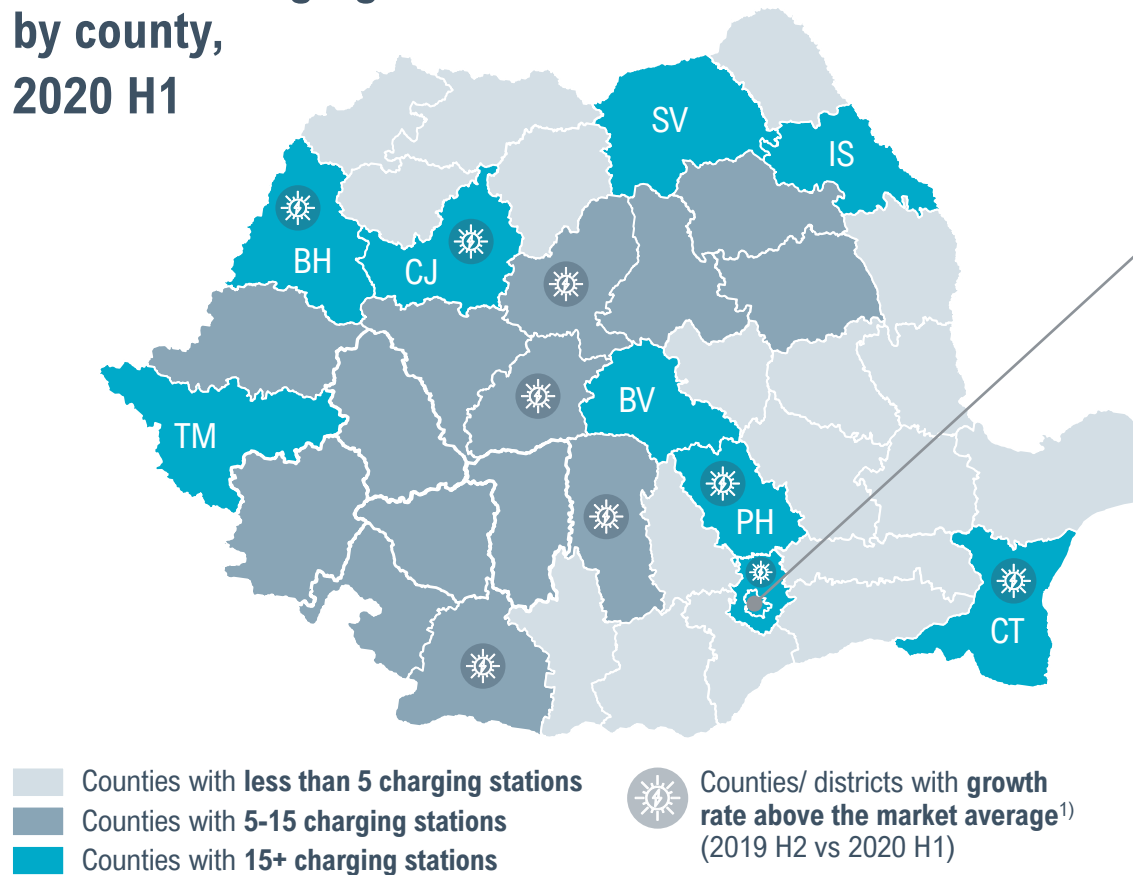


Charging infrastructure development decreased its pace in 2020 H1, due primarily to the economic downturn caused by the COVID-19 pandemic and the imposed national lockdown. However, the announcement of a **new EU-financed subsidy scheme worth EUR 53 m** for investments in charging stations with **grant applications commencing in 2020 H2** could also showcase a preference for interested parties to postpone investments until the start of the scheme.

As a result, at the end of 2020 H1, the **total number of installed charging stations reached ~480** reflecting a diminishing growth rate in comparison 2019 H2. Multi point stations grew slightly faster than single point ones, now accounting for 36% (vs. 34% in 2019 H2) while fast-charge stations (>22 kW power) remain relatively few, accounting for ~25% of total units.

# Major cities and Western counties continue to drive the development of the charging infrastructure

## National charging infrastructure by county, 2020 H1

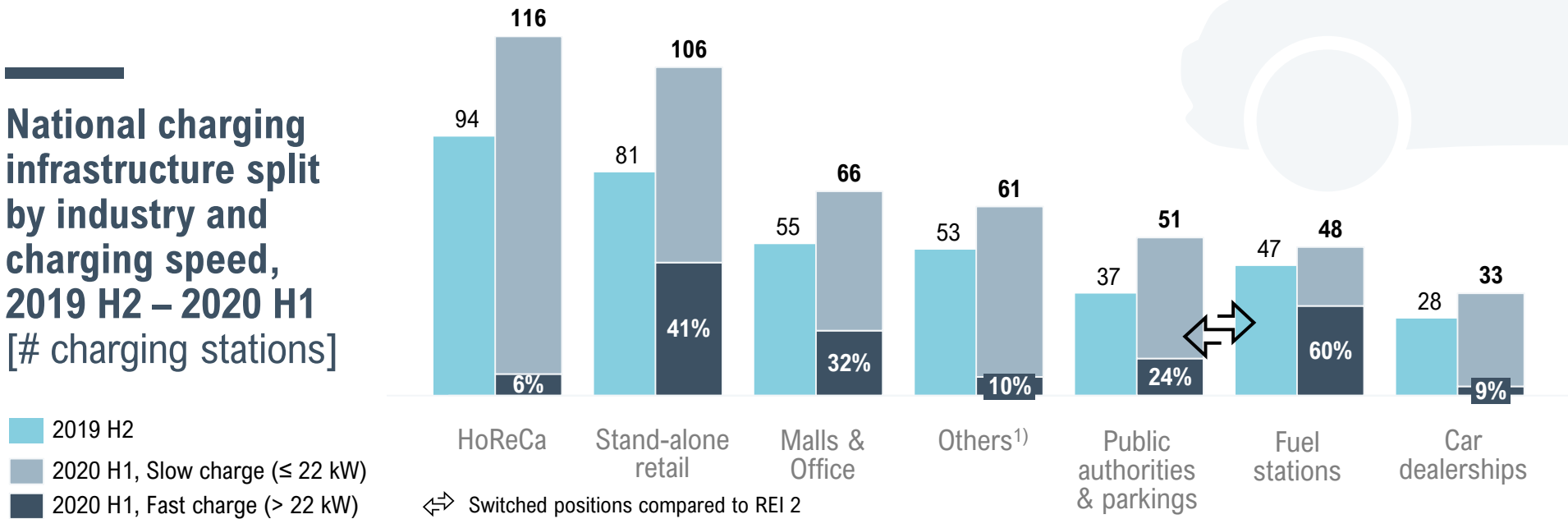


The expansion of the charging infrastructure continues to be **focused in Romania's key economic growth hubs** (e.g. Bucharest, Cluj, Timisoara, Brasov, Constanta, Oradea). A sizeable gap in terms of the number of stations installed is forming between the Western part of the country and the less economically-developed Eastern side.

1) For counties with 5 or more charging stations in previous semester

# Most charging stations available at HoReCa locations; Growth slowed by the sector's decline

**National charging infrastructure split by industry and charging speed, 2019 H2 – 2020 H1**  
 [# charging stations]



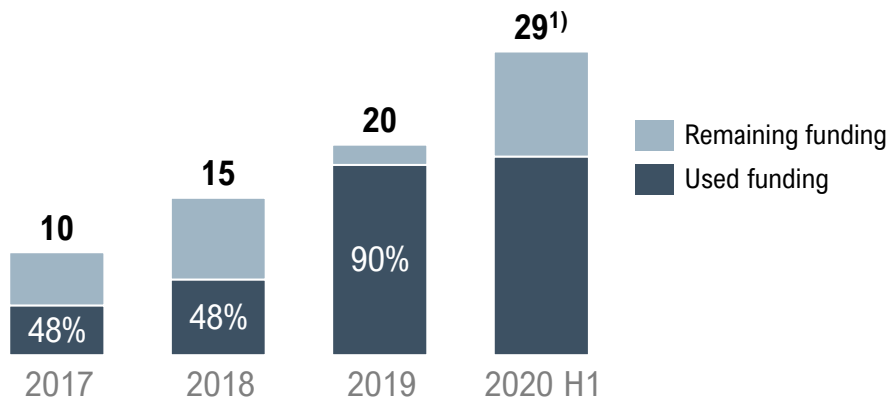
**HoReCa locations and stand-alone retailers continue to host the largest number of charging stations** (~46% of the total). However, the strong negative economic impact the COVID-19 pandemic has had on the HoReCa sector caused a slowing down of investments by players in the segment, with the number of stations operated by HoReCa players increasing by only 23% vs. H2 2019, compared to a 62% growth rate in H2 2019 vs. H1 2019.

**One of the fastest growing operator segments is represented by 'Public authorities & parkings'**, with municipalities looking to enact the various smart-city plans developed nationwide throughout 2018-2019. Therefore, municipalities now operate more charging stations than fuel providers, which are growing very slowly due to the focus on offering fast-charge infrastructure.

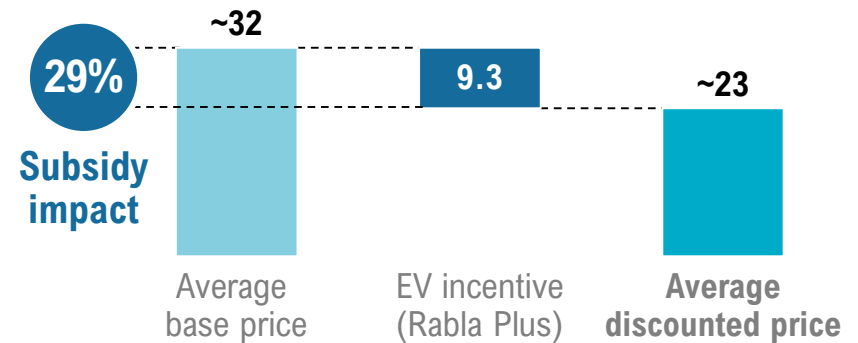
1) E.g. education & health facilities, touristic areas, entertainment centers, etc.

# 2020 fund allocation sets a new record for the scheme; High demand from private individuals

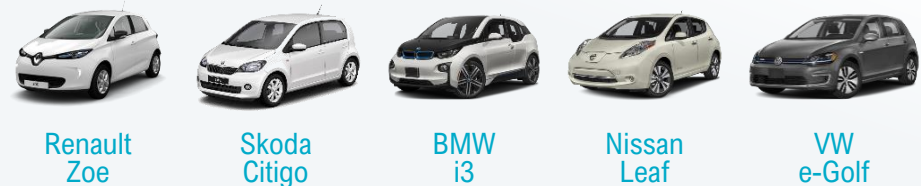
Evolution of total available funding through the government incentive scheme, 2017 – 2020 H1 [EUR m]



Share of government incentives out of average price of selected EV models<sup>2)</sup>, 2020 H1 [%, EUR k]



EV models selected for analysis

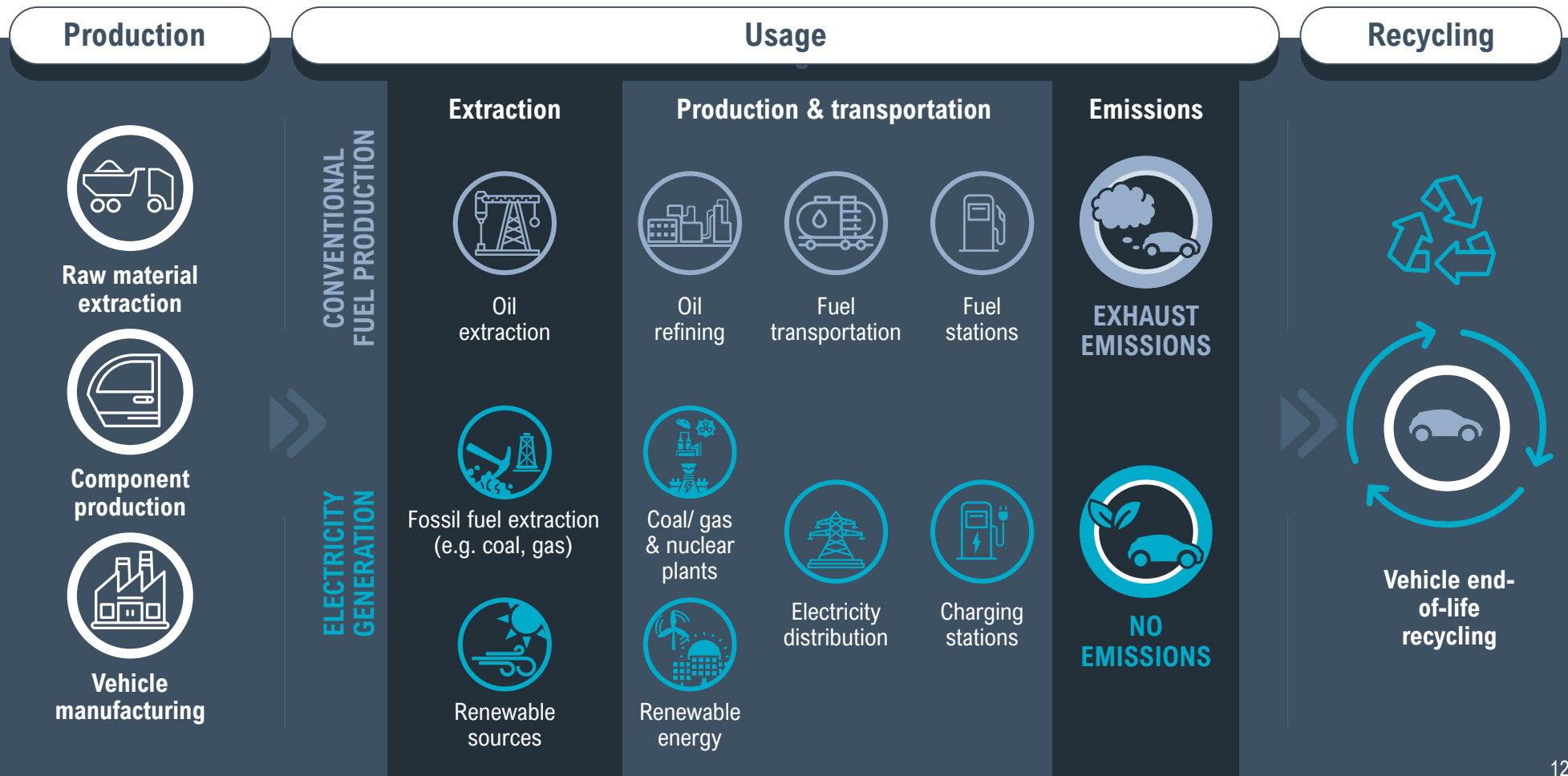


The total allocated sum for 2020 represents a new record for the government incentive scheme, with an increase of 45% to EUR 29 m vs. 2019. Though the new funding round started relatively slowly due to the limited activity of government agencies throughout March-May and the transition to a digital application process, **by mid-year, the funding pool for private individuals has almost been fully used**. Due to continued high demand, an extra allocation of ~EUR 12 m has been announced for the program, available starting October 2020.

1) Does not include the extra allocation of EUR 12 m, which will become available starting October 2020  
 2) Selection based on registration figures for 2020 H1 and expected future availability

# Special topic – The real environmental friendliness of electric vehicles

The amount of carbon generated by a vehicle in its lifetime is not only influenced by its **tailpipe emissions**, but also by its **manufacturing process** and especially by **the cleanness of fuel utilized to power it**.



# The success of electric vehicles in having low emissions depends on the electricity powering them

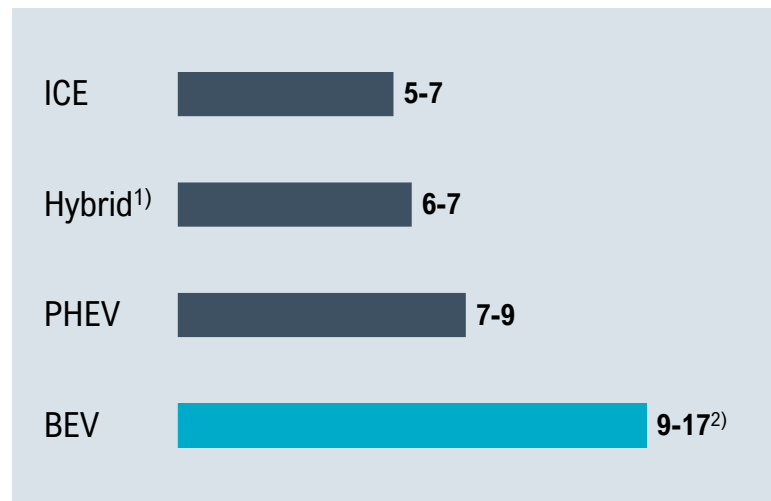
Two major variables contribute to the CO<sub>2</sub> equivalent emissions of electric vehicles – **Vehicle manufacturing** and the **energy source for electricity production**. Because electric vehicles are more carbon intensive during the production phase, their overall emissions' levels depend on the environmental friendliness of the electricity production method.

## Vehicle production



Depending on the type of energy utilized during manufacturing and the size & type of vehicle (e.g. ICE, Hybrid<sup>1)</sup>, PHEV or BEV), producing a vehicle can generate 5 to 17 tons of CO<sub>2</sub> equivalent emissions.

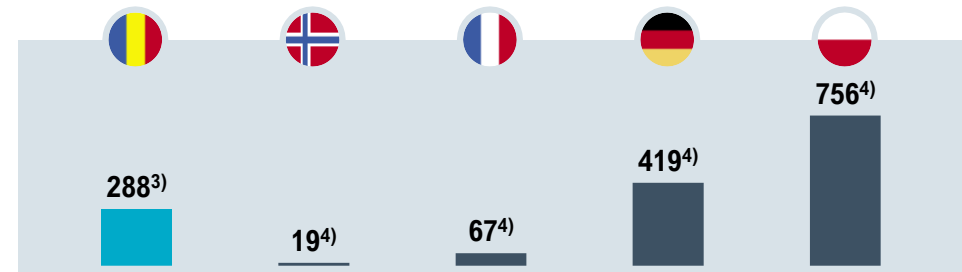
### Total average emissions during production [tonnes CO<sub>2</sub> eq.]



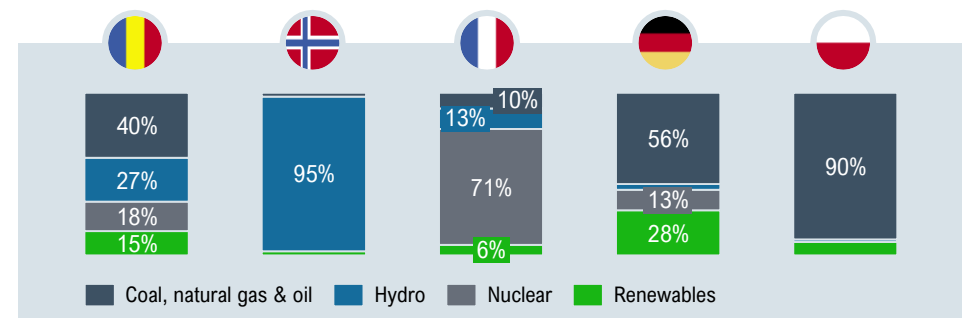
## Electricity production



### Emissions unit of electricity produced [g CO<sub>2</sub>eq./ kWh]



### Electricity generation by source [%]



1) Non-plug-in hybrid vehicle/ mild hybrid

2) Highly dependent on battery size

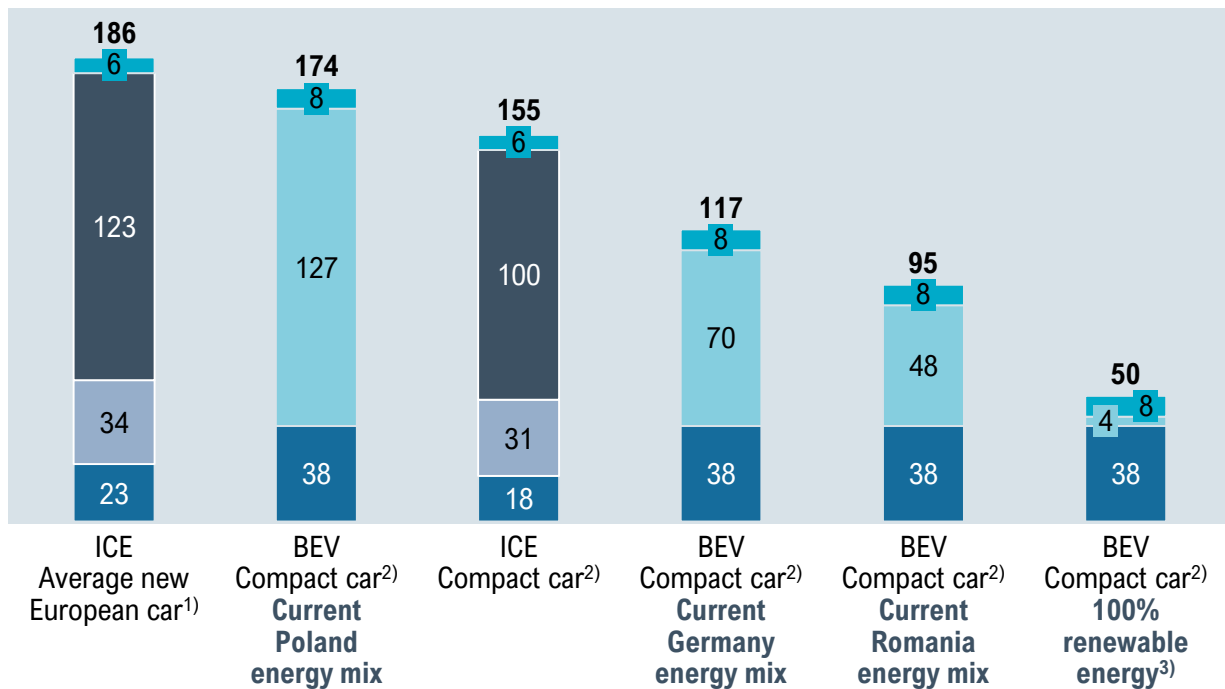
3) 2017-2019 average

4) 2017

# With more renewables in the power mix, electric cars become even "greener"

## Comparative vehicle emissions for 300,000 km vehicle lifetime [g CO<sub>2</sub>eq./ km]

■ End-of-life vehicle recycling    
 ■ Electricity production    
 ■ Vehicle production  
■ Engine emissions (tank-to-wheels)    
 ■ Fuel production (well-to-tank)



An electric vehicle has a **higher CO<sub>2</sub> equivalent footprint in its production stage** than an internal combustion vehicle, **mostly due to its battery**.

However, thanks to **Romania's energy mix with ~60% of energy production from hydro, nuclear, wind and solar sources<sup>4)</sup>**, this higher manufacturing emission footprint is offset by low electricity production emissions.

With the **current energy production mix<sup>4)</sup>**, an EV would indirectly emit 48 g CO<sub>2</sub> eq. per kilometer, as a result of the process required to produce electricity. An ideal scenario with **100% renewable energy production** would result in indirect emission figures of only 4 g CO<sub>2</sub> eq. per kilometer.

In comparison, **Germany's and Poland's electricity production** means are **more polluting**, leading to higher indirect emissions for EVs.

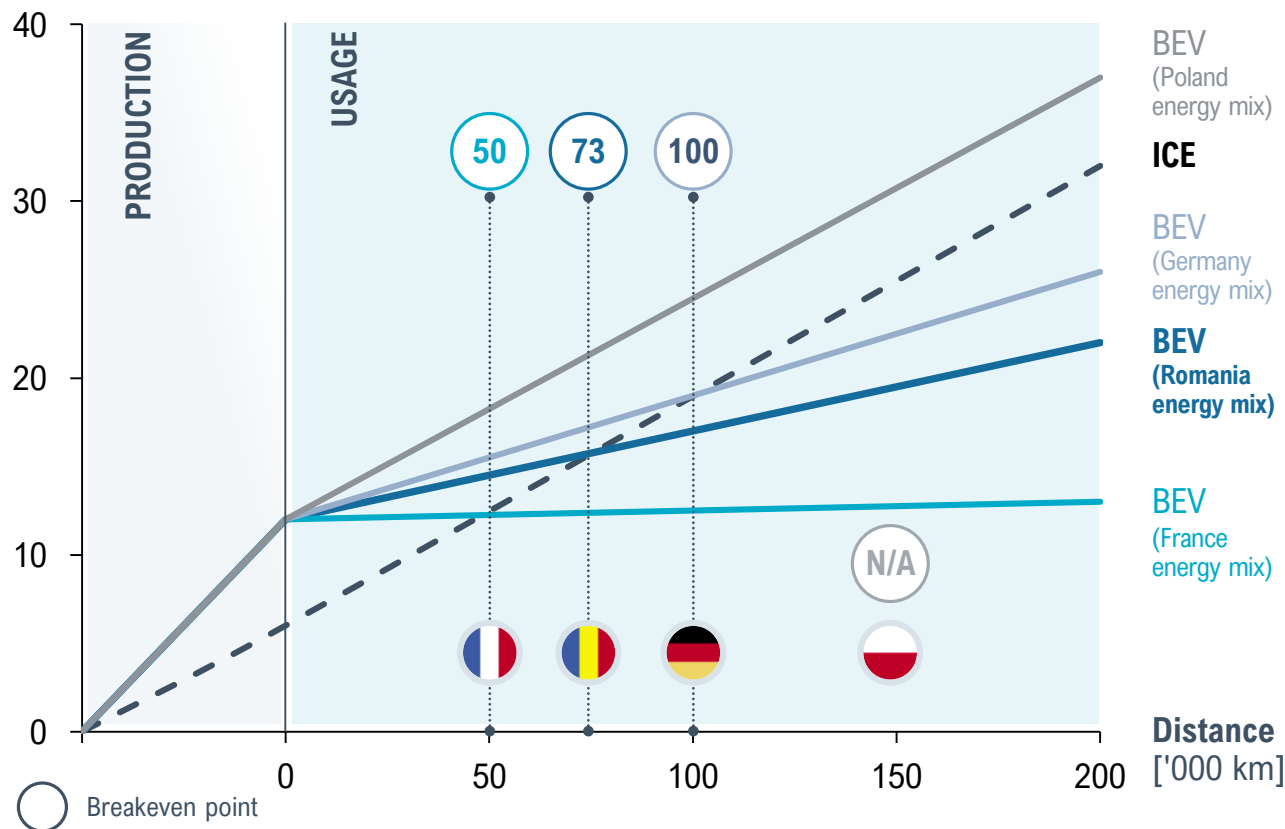
On the other hand, ICE vehicles are **particularly polluting** due to their **high well-to-wheels emission levels**, even though they are less carbon-intensive in production and recycling.

1) 2019 average new passenger car in the EU (ICE-equivalent emissions) – Avg. fuel consumption of 5.5 l per 100 km (ACEA study)     2) 2018 compact ICE/ BEV (same model) – Avg. fuel consumption of 5.0 l or 16.8 kWh per 100 km  
 3) Renewable energy for electricity production for charging only, not for vehicle production     4) 2017-2019 average

# In Romania, EVs are responsible for lower emissions over their lifetime than conventional vehicles

A compact electric car operating in Romania breaks even at 73,000 km<sup>1)</sup>

Emissions [tons CO<sub>2</sub>eq.]



Thanks to Romania's energy mix with ~60% of electricity produced originating in clean sources<sup>2)</sup>, electric cars represent an environmentally-friendly option – **EVs in Romania break even at 73,000 km**, which is significantly below the total life of such vehicles.

On the other hand, in countries with coal-intensive electricity generation means such as Poland, EV emissions never break even – Modern ICE vehicles are essentially "greener" than EVs.

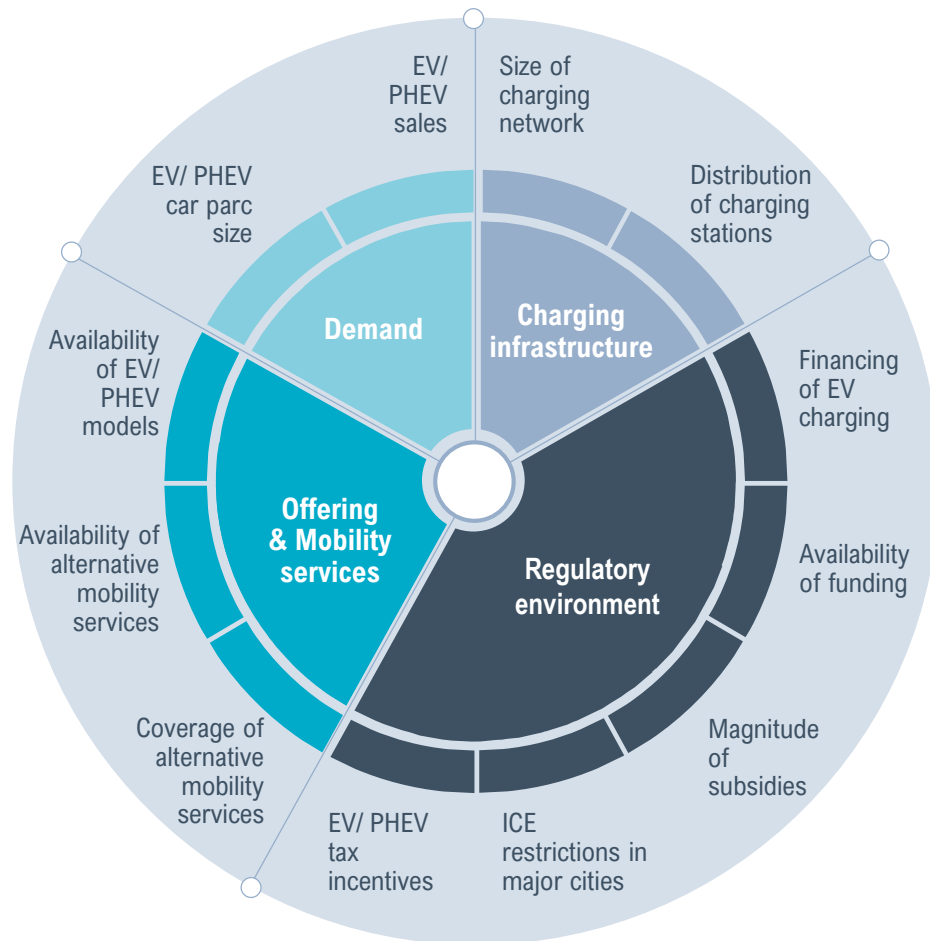
However, as the **EU continues to decarbonize** electricity generation, **emissions from both usage and production process will continue to reduce**, making EVs an increasingly attractive proposition for lowering greenhouse gas emissions at a global level.

1) Calculation based on a 2018 EV compact car vs. same model ICE compact car with a vehicle life of 300,000 km

2) Including hydro, nuclear and renewables (solar, wind, biomass, etc.)

# REI 3 stands at **38** at the end of 2020 H1

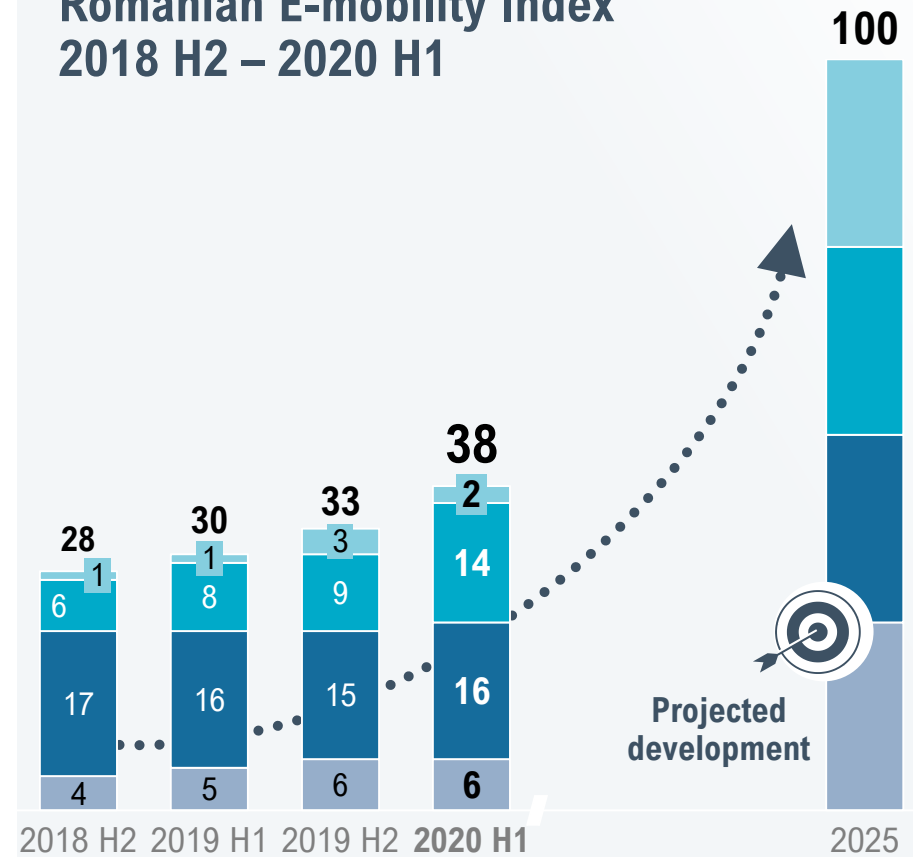
## Key dimensions of the Romanian E-mobility Index calculation



**+5 points** vs 2019 H2



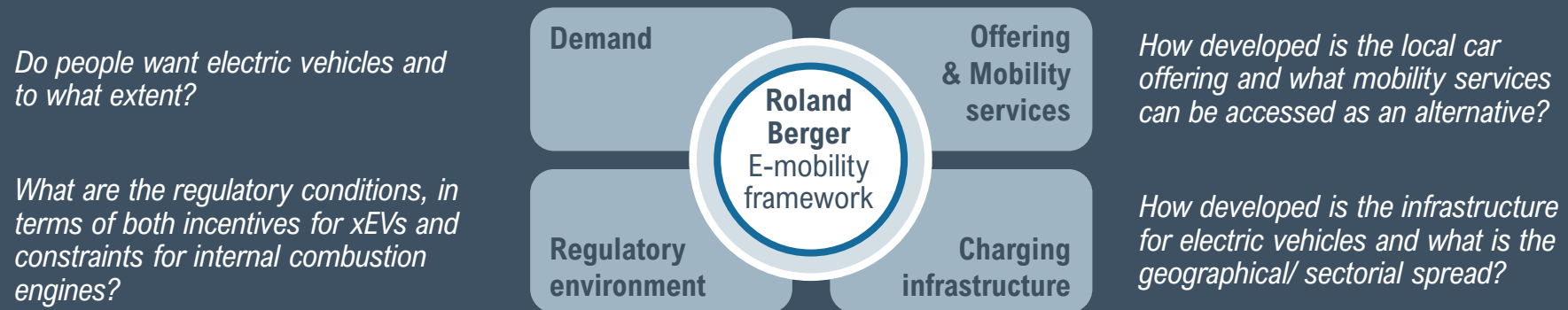
## Romanian E-mobility Index 2018 H2 – 2020 H1



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

# 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/ utilities, automotive, retail, financial services, hospitality, real estate, etc.), as well as public authorities. REI includes figures & analyses grouped into four dimensions illustrated below.



The Romanian E-mobility Index aims to answer key questions such as:

- > What is the development status of E-mobility in Romania and how does this compare to more developed markets?
- > Which factors are driving E-mobility developments and how do these factors evolve over time?
- > How does the TCO of xEVs rate against vehicles powered by internal combustion engines?

## 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 hybrid electric vehicles)

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

# Authors



## Szabolcs Nemes

Partner

+40 21 306 0500  
szabolcs.nemes@rolandberger.com



## Dragos Fundulea

Senior Project  
Manager

+40 21 306 0500  
dragos.fundulea@rolandberger.com

For more insights into our Romanian E-mobility Index figures and analyses please do not hesitate to contact us!

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