

D.4.4.4 MAPPING ON EXISTING/PLANNED ELECTRIC CHARGING POINTS

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Index

1.1 Introduction	4
1.2 The background of the MIMOSA study.....	4
1.3 The Italian public electric charging points state-of-the-art and the Emilia-Romagna Region	6
1.4 The Emilia-Romagna Region policies for electric mobility promotion	10
1.5 The key Emilia-Romagna electric charging points operators	11
1.6 Mimosa study key results: existing charging point in Emilia-Romagna Region (December 2021 update).....	12
1.6.1 Data on infrastructures operators	13
1.6.2 Typologies of charging infrastructures in Emilia-Romagna Region	15
1.6.3 Additional analysis on the geographic distribution of charging points in the Emilia-Romagna region and Bologna	16
1.7 Problems and potential solutions	19
1.8 Conclusion and recommendations	20
1.9 References.....	21

1.1 Introduction

The aim of this study is to assist the Emilia-Romagna Region administration in mapping the development of the electric vehicles charging infrastructures (both public and private) at the regional level. To reach this objective, all the main electric charging points operators were contacted in order to collect the most updated data on the existing charging points and the planned ones. This large data collection operation allowed to create a complete map of the existing electric charging points updated to **December 2021**. All the collected data were delivered to the Emilia-Romagna Region with the broader aim of informing future policies related to the promotion of electric mobility (both passengers and freights) at regional level. The creation of the institutional framework is fundamental in order to reach a full development of electric mobility in the Emilia-Romagna Region.

The Institute for Transport and Logistics (ITL) was in charge of developing this MIMOSA study. In order to guarantee a standardized and institutionally recognized methodology, ITL organized different preparatory meetings with the Emilia-Romagna Region. A common methodology was agreed, which saw the direct involvement of the key operators that in 2018 signed with the Emilia-Romagna Region a **protocol for the electric mobility infrastructure development at regional level**. For these reasons the MIMOSA pilot was oriented to updating the data collection activated in 2018 and to provide to the Emilia-Romagna Region a better and up to date database on the Regional electric charging points infrastructures.

1.2 The background of the MIMOSA study

It is not easy for a regional public authority to have a clear picture of the existing electric charging points of a wide area. In fact, there are several public and private stakeholders working on developing such an infrastructure. The electric charging points can be developed directly by a public authority (using for example European and national dedicated funds) or by a private company in cooperation with a local authority or directly by a private company on their own propriety. For example, a supermarket can build its own electric charging points and make them accessible to the wider public. Another case is related to the Tesla super-charge infrastructure own network. The variety of operators involved in the development such an infrastructure is an element that adds complexity to the activity of mapping the existing charging points of such a wide geographical area.

The approach adopted in this MIMOSA study was to contact all the main regional energy providers and the companies directly working on the installation of electric charging point at national and regional level. This allowed to have data not only of the public electric charging points but also of the private ones with public access. This strategy allowed to have a wider perspective on this specific topic. Nevertheless, it was not possible to map private charging points for private use (for example the charging point installed by private companies and used for internal operation and/or only for their employees).

Thanks to the data gathering activity, ITL was able to collect a wide set of data with the geographic coordinates of all the electric charging points. Difficulties were encountered in the collection of data related to planned charging points, in far as this is business-sensitive information for all companies and stakeholders involved, and they are not allowed to share these data. Hence, for the planned charging points it was possible to collect only some general information about the number of these charging points, but not the details regarding the exact location in which they will be installed. As the provided data are not complete, it was not possible to develop a specific analysis on this topic. However, all the collected data and the following elaborations represent relevant and valuable instruments for an improved regional planning on electric and sustainable mobility.

In the framework of the MIMOSA Activity 4.4 “Pilot actions for adopting technological solutions for emissions reducing”, this deliverable intends also to provide some evidence about the potential methodologies and solutions to adopt in order to assess the development of a public electric charge infrastructure network at a wider geographical area, both in the Italian and Croatian regions. This mapping activity at a wider geographical area could be a fundamental step in order to plan and develop equitable and well-balances infrastructures able to support the diffusion of electric mobility choices at local level. As evidenced in this study, a coordinated and wide assessment is important in order to create the infrastructural and policies conditions for a better electromobility promotion.

Better knowledges on public electric charge points are also important in terms of integration of different sustainable mobility solutions. For example, the MIMOSA deliverable D.4.4.1 in charge to ITL (Innovative electric light vehicles sharing service supported by a “Mobile Hub” in Emilia-Romagna Region) will benefit of the collected data as it is foreseen to provide to the electric bikes users some addition information about the points where they can charge the e-bikes. This will allows to plan longer trips and reduce the “range-anxiety” related to the duration of e-vehicles duration.

1.3 The Italian public electric charging points state-of-the-art and the Emilia-Romagna Region

The Italian electric charging point network is growing fast in the last years in Italy. It is a rapid growth and based on the last available data (July 2021) there are **21.500** public access electric charging points in Italy.

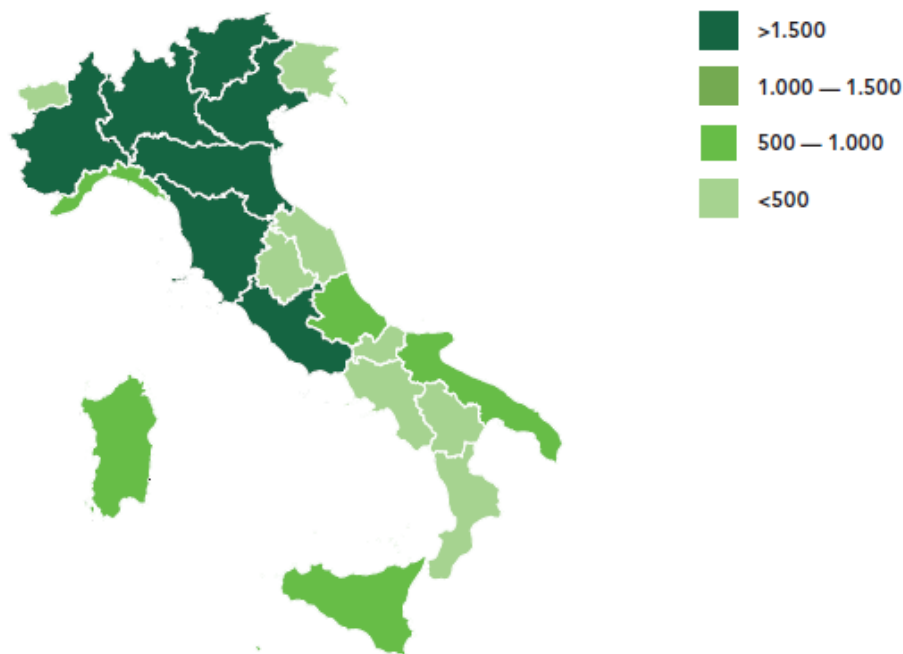


Figure 1. Electric charging points in Italy per Region (Source, Energy Strategy Group, 2022).

As evidenced in Figure 1, it is quite evident there is a great gap between the northern and southern part of Italy. The Emilia-Romagna Region is one of the few Italian regions with more than 1.500 public access electric charging points.

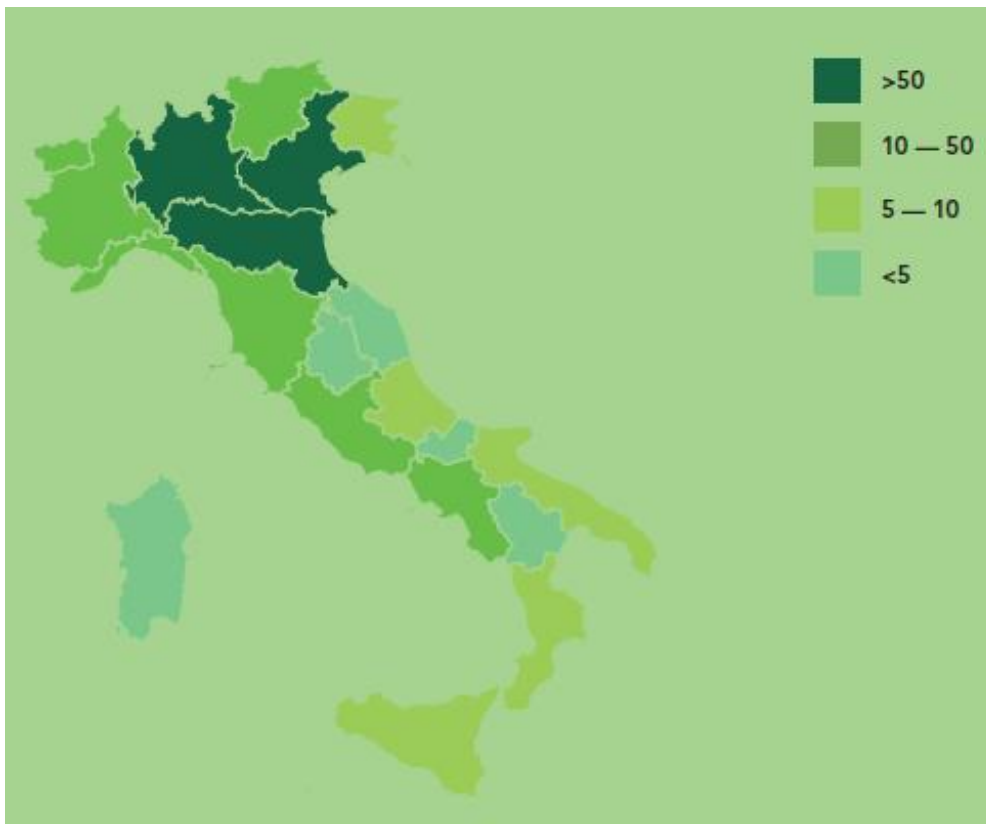


Figure 2. Ultra-fast (>50 kW) electric charging points in Italy per Region. This data includes the Tesla Super-Chargers Network (Source, Energy Strategy Group, 2022).

The distribution of the public access electric charging points in Italy is more differentiated if the ultra-fast charge network is considered. Based on the last available data, it is evident as the Emilia-Romagna, Lombardia and Veneto Regions are the only regions with a wide fast charge network at the moment. As evidenced in the scientific literature, these ultra-fast charging points are installed mainly in proximity of the big national highways.

Another interesting indicator is the ratio among the number of public electric charging points and the number of habitants and the number of circulating electric vehicles.

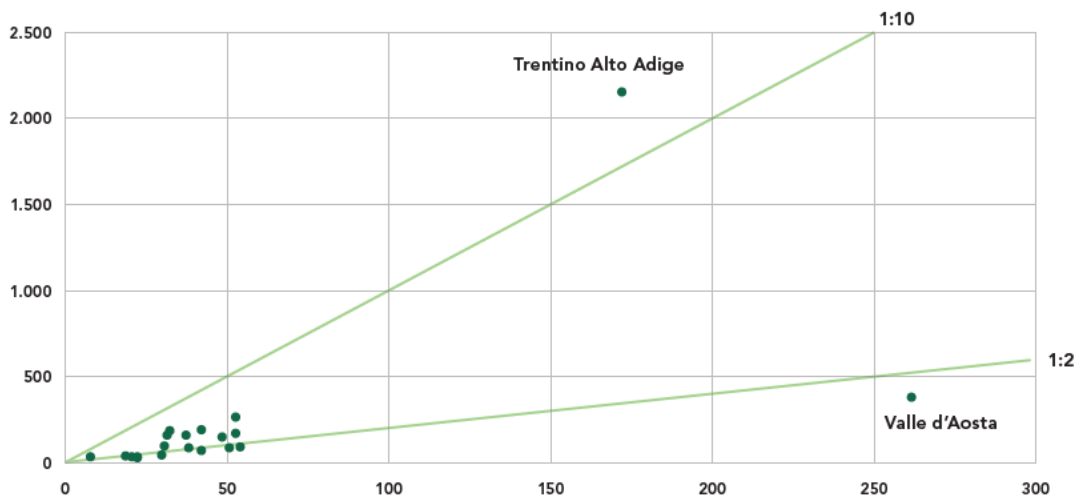


Figure 3. Ratio between public electric charging points and population (X axis) per 100,000 inhabitants and electric vehicles (both full electric and hybrid vehicles) in circulation (y axis) per 100,000 inhabitants in different Italian regions (Source, Energy Strategy Group, 2022).

As evidenced in the Figure above, the Trentino-Alto-Adige Region shows the greatest diffusion of electric mobility with over 150 charging points for every 100,000 inhabitants and 2,100 electric cars for every 100,000 inhabitants (which places it ideally among the leading European countries) and with a significant distance from all the other Italian regions.

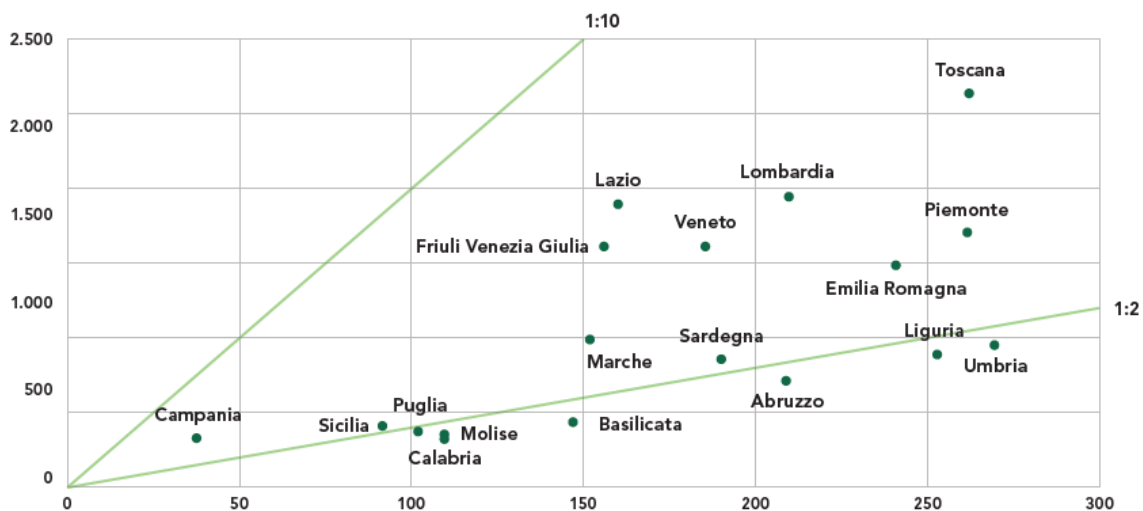


Figure 4. Ratio between public electric charging points and population (X axis) per 100,000 inhabitants and electric vehicles (both full electric and hybrid vehicles) in circulation (y axis) per 100,000 inhabitants in different Italian regions excluded the Trentino-Alto-Adige and the Valle d'Aosta Regions (Source, Energy Strategy Group, 2022).

As evidenced in the Figure 4 (which is a focus on the data showed in the Figure 3), with over **250** charging points for every 100,000 inhabitants and **1,250** electric cars for every 100,000 inhabitants, the Emilia-Romagna Region is quite in line with the others most “electric” Italian Regions.

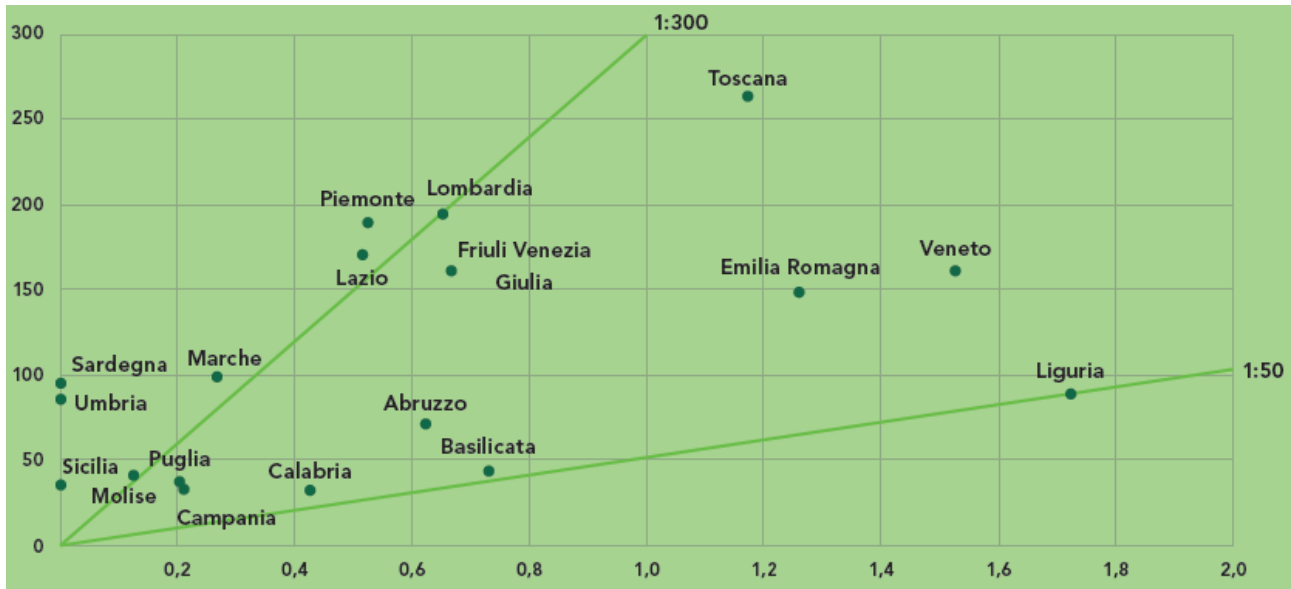


Figure 5. Ratio between public ultra-fast (more than 50 kW) electric charging points and population (X axis) per 100,000 inhabitants and electric vehicles (both full electric and hybrid vehicles) in circulation (y axis) per 100,000 inhabitants in different Italian regions excluded the Trentino-Alto-Adige and the Valle d’Aosta Regions (Source, Energy Strategy Group, 2022).

Moreover, the Emilia-Romagna Region is one of the first Italian Region in relation to the ratio among public ultra-fast charging points and the number of inhabitants and circulating electric vehicles.

1.4 The Emilia-Romagna Region policies for electric mobility promotion

The promotion of electromobility in Emilia-Romagna Region is one of the key pillars of the regional environmental and transport planning legislation. In particular, the electromobility centrality in the regional sustainability strategy was clearly identified in the **Regional Energy Plan to 2030** (PER 2030) and in the **Integrated Regional Transport Plan** (PRIT 2025).

The “Mi Nuovo elettrico” programme is the main Emilia-Romagna’s regional electromobility program. This project is based on the principles of **interoperability** on a regional scale and of **integration** of all the available mobility services. Being “the e-mobility promotion and dissemination at regional level rather than simply at city level the final goal of the program, the Emilia-Romagna Regional Government has signed agreements with all the electricity providers operating in the region (ENEL and HERA at first, soon to be followed by IREN), and with the main municipal administrations, setting up an innovative charging points network, integrated in the “Mi Nuovo” chip card. According to these agreements, and following the provider business principle, e-providers were bound to realize the infrastructure, while Emilia-Romagna’s task is to extend the charging points and the “Mi Nuovo” shared hardware and software standards also to big private retailers (such as shopping centers)”.

As identified in the Mi Nuovo regional programme, “the Emilia-Romagna Region identified the charging points are the key elements of the recharge device infrastructure for e-vehicles. The most important aspect is their interoperability, that is the possibility for drivers to use any charging station, regardless of the operator. In order to facilitate the access also to already circulating vehicles fleets, and while looking forward to a European regulation on standardization, charging points are provided with two different plug typologies, namely SCAME and MENNEKES. Charging stations are technically highly developed and in the future they will be able to act also as an access to the smart grid”.

For the purposes of this MIMOSA report, the key document is the **protocol**¹ signed in 2018 among the five key electric charging points operators and the Emilia-Romagna Region in order to develop a wide and interoperable regional network of electric charging points. It was one of the first protocols of this type signed at national level. This strategic document defined the key objectives for the Emilia-Romagna Region and for the electric charging points operators in terms of extension

¹ More info on the protocol are available (only in Italian) at this link: <https://mobilita.regione.emilia-romagna.it/mobility-sostenibile/mobilita-elettrica/protocollo-dintesa-settembre-2018>

of the charging network and its interoperability. One of the key objectives of this protocol is to reach 2.000 electric charging points by 2020.

1.5 The key Emilia-Romagna electric charging points operators

In December 2021, in collaboration with the Emilia-Romagna Region and following the Protocol signed in 2018 (see paragraph 1.4), ITL collected from all the key regional electric charging points operators the data about the existing charging infrastructures at regional level. The five key energy charging points providers/managers contacted were:

- **BeCharge**
- **Enel X**
- **Enermia**
- **HeraCom**
- **IrenGo**

Here above is provided a synthetic description of the involved companies.

Be Charge is a Plenitude company. Plenitude is “the *Eni gas e luce*’s new Benefit Company, an outpost of Eni’s decarbonization strategy. It currently provides energy to 10 million customers, integrating the traditional sale of electricity and gas with the production of renewable energy, services for energy efficiency and electric mobility. It is present today with its activities in Italy and many other countries at international and European levels. The key goal is to achieving carbon neutrality by 2040 and providing 100% decarbonized energy for citizens.

Enel X is the global business line of Enel Group working on the promotion of electric mobility at international and European levels. Enel X is one of the leading companies at international level in the field of energy transformation.

EnerMia is an innovative Emilia-Romagna start-up based in Parma operating in the electric mobility sector. It offers services and charging systems for electric vehicles to public and private

stakeholder. EnerMia offers different services related to the promotion of electric mobility with the aim to facilitate vehicle recharging.

Hera S.p.A (Energy Resource Environment Holdings) is a multiutility company based in Bologna. Hera operates in the distribution of gas, water, energy, and waste disposal in the provinces of Bologna, Ferrara, Forlì-Cesena, Modena, Ravenna, Rimini, Pesaro and Urbino, and in some Italian municipalities. Hera launched in the past years a business unit dedicated to electric mobility promotion and electric infrastructure charge development in different areas (mainly in the managed provinces of the Emilia-Romagna area).

Iren S.p.A. is an Italian company operating as a multiservice, in particular in the production and distribution of electricity, in district heating services, in the management of integrated water services and environmental and technological services. Iren launched in the past years a business unit dedicated to electric mobility promotion and electric infrastructure charge development in different areas.

As already evidences in the previous paragraph, all these operators in September 2018 signed a protocol with the Emilia-Romagna Region in order to develop a wide and interoperable regional network of electric charging points. It was one of the first protocols of this type signed at national level. The contact list of this Protocol was used as starting point for contacting the key stakeholders in the different companies. This was also related to the request to maintain a continuity among the MIMOSA activity and the ones in terms of electromobility launched in Emilia-Romagna Region in the last years.

1.6 Mimosa study key results: existing charging point in Emilia-Romagna Region (December 2021 update)

In the framework of this MIMOSA study, ITL mapped in the Emilia-Romagna Region **945** charging points (public access points, both on public and private lands). Considering that on average each charging points has at least two electric sockets, the number of available sockets is close to the regional objective defined in 2018 in the Protocol for the Electromobility promotion. The distribution for provinces is summarized in Figure 6.

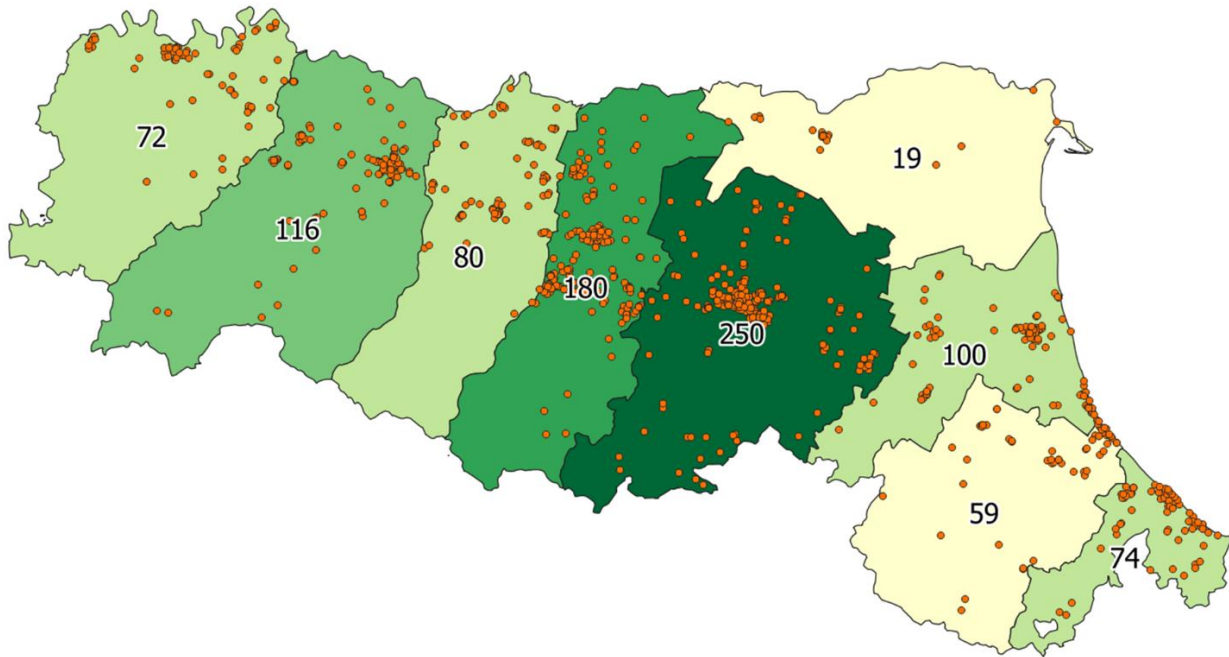


Figure 6. Distribution for Province of the electric charging points (Source: ITL elaboration).

The Province of Bologna is the area with the highest number of electric charging points (250), followed by the Province of Modena (180), Parma (116) and Ravenna (100). The Province of Ferrara with 19 charging point is the one with the lowest number of charging points.

The map shows very clearly as the charging infrastructures are mainly developed all along the Via Emilia/A14 highway, the highway Brenner corridor (A22 Highway) and the coastal area.

1.6.1 Data on infrastructures operators

In this sub-paragraph is reported the distribution of electric charging points per operator in Emilia-Romagna Region.

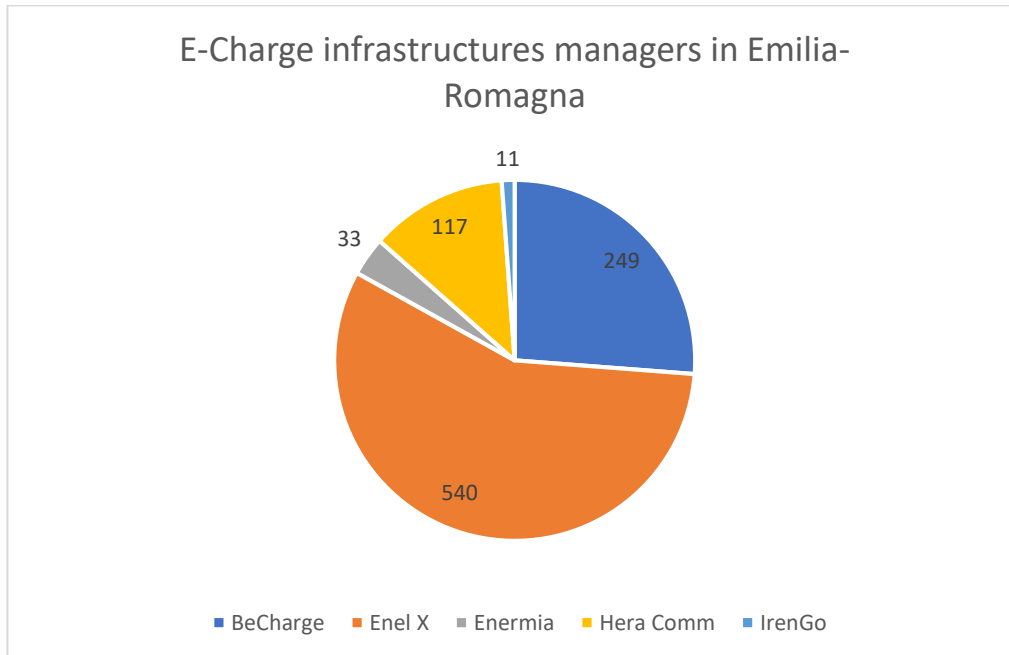


Figure 7. Distribution for Province of the electric charging points (Source: ITL elaboration).

These data show, as summarized in Figure 7, as **Enel X** is the operator with the highest number of points of recharge points in the Emilia-Romagna Region. It is followed by **Be Charge**. So, based on December 2021 data, the **83%** of charging points are managed by only two operators.

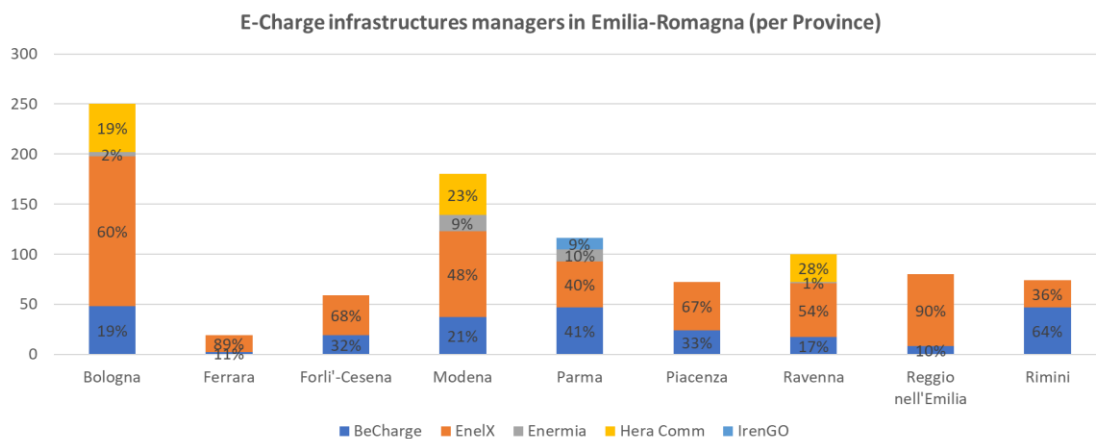


Figure 8. Distribution per Province of the electric charging points' operators (Source: ITL elaboration).

Figure 8 instead shows as there are some operators (**Hera** and **Iren**) working only in the provinces where they are active as energy and water providers. So, these two operators seem to be more

local in terms of strategy of development. Hera in particular is active in the Bologna, Modena and Ravenna provinces, Iren is active only in the Parma province.

1.6.2 Typologies of charging infrastructures in Emilia-Romagna Region

In the main Italian scientific literature, the charging infrastructure are classified on the basis of their power. In particular they can be classified in²:

- **Standard power charging points (or normal charge):** a charging point that allows the transfer of electricity to an electric vehicle with a power of 22 kW or less, excluding devices with a power of 3.7 kW or less;
- **High power recharging point (or fast charge):** a recharging point which allows the transfer of electricity to an electric vehicle with a power exceeding 22 kW but up to 50 kW;
- **Ultra-fast charging points:** a charging point that allows the transfer of electricity to an electric vehicle with a power greater than 50 kW.

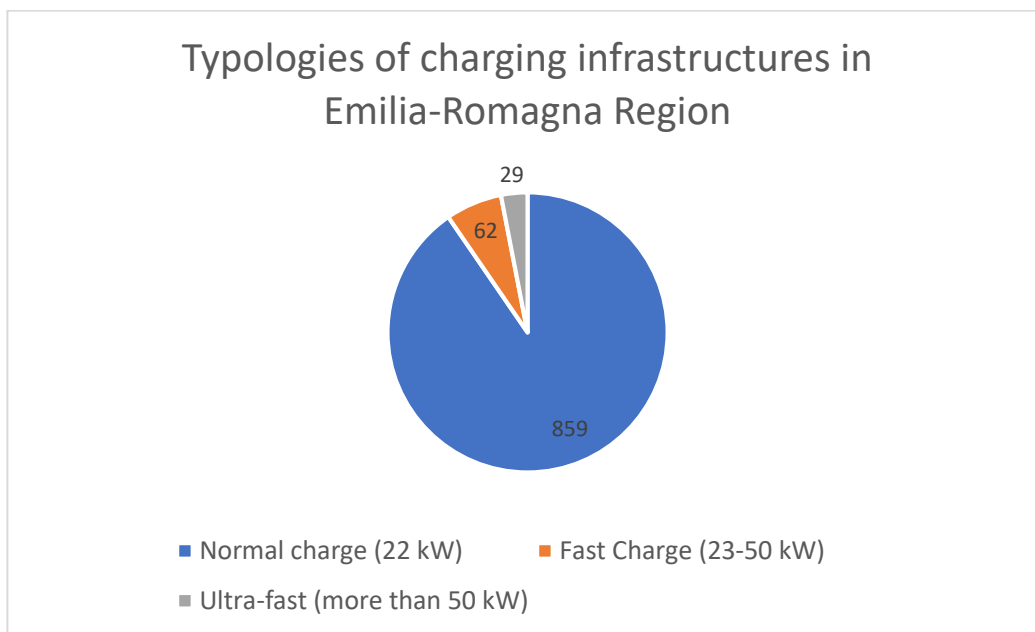


Figure 9. Typology of charging infrastructures in Emilia-Romagna Region (Source: ITL elaboration).

² The categories normal and fast charge are quite similar also in others EU countries. Instead in some studies the Ultra-fast charge charging points are considered over the 100 kW. Moreover is not available a common classification valid at international level.

The Figure 9 shows as the largest number of charging points are normal charge points (less than 22 kW). Fast charging points (more than 23 kW and up to 50 kW) are the 7% of the regional electric charge points equipment. Very few are the Ultra-Fast charging points (more than 50 kW).

1.6.3 Additional analysis on the geographic distribution of charging points in the Emilia-Romagna region and Bologna

An additional analysis was conducted on the collected data in order to see which the geographical factors are influencing the localization of these electric charging points.

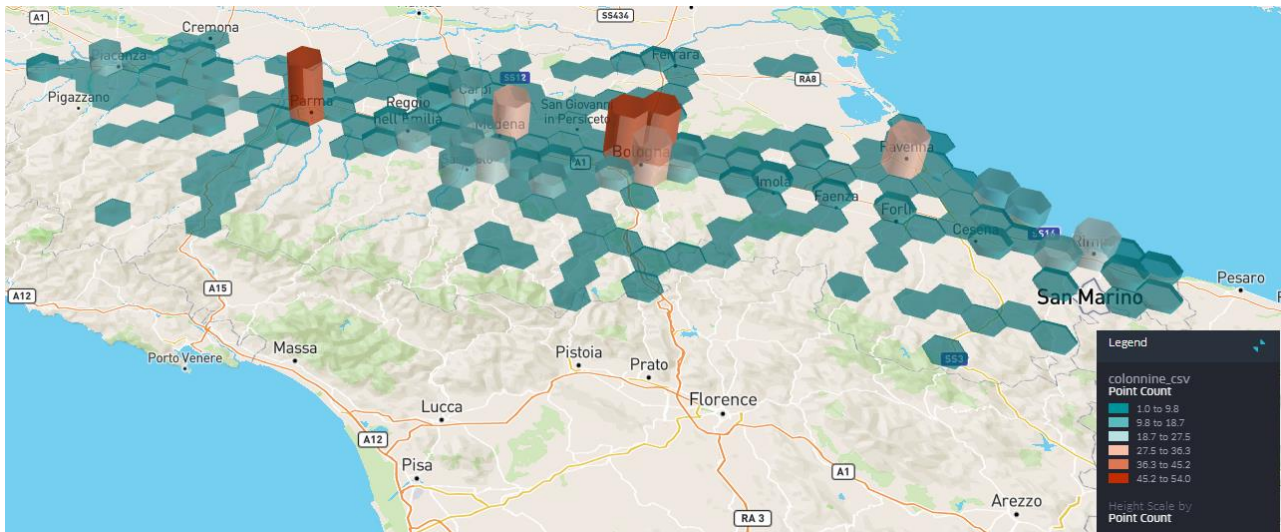


Figure 10. Geographical distribution of electric charging points in the Emilia-Romagna Region (Source: ITL elaboration).

The Figure 10 clearly shows as the largest concentration of these electric charging points are in the urban areas and in particular in the Bologna and Parma urban areas.

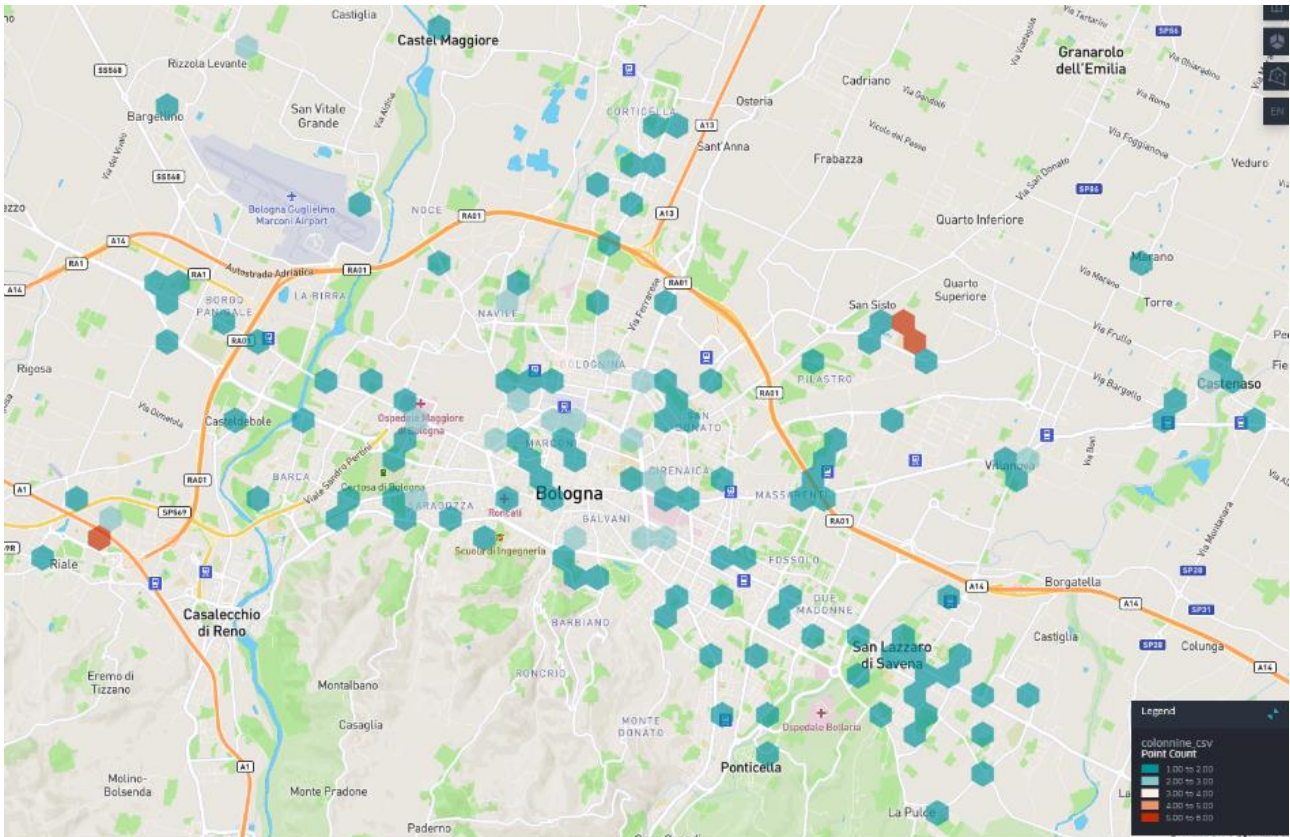


Figure 11. Geographical distribution of electric charging points in the Bologna municipality (Source: ITL elaboration).

A more in-depth analysis was conducted on the Bologna city electric charging points' distribution. As evidenced in Figure 11, there is a quite homogeneous electric charging point distribution covering all the Bologna core urban areas. Moreover, there are some places where a highest concentration is registered. These two areas are commercial areas with an attractiveness at provincial level.

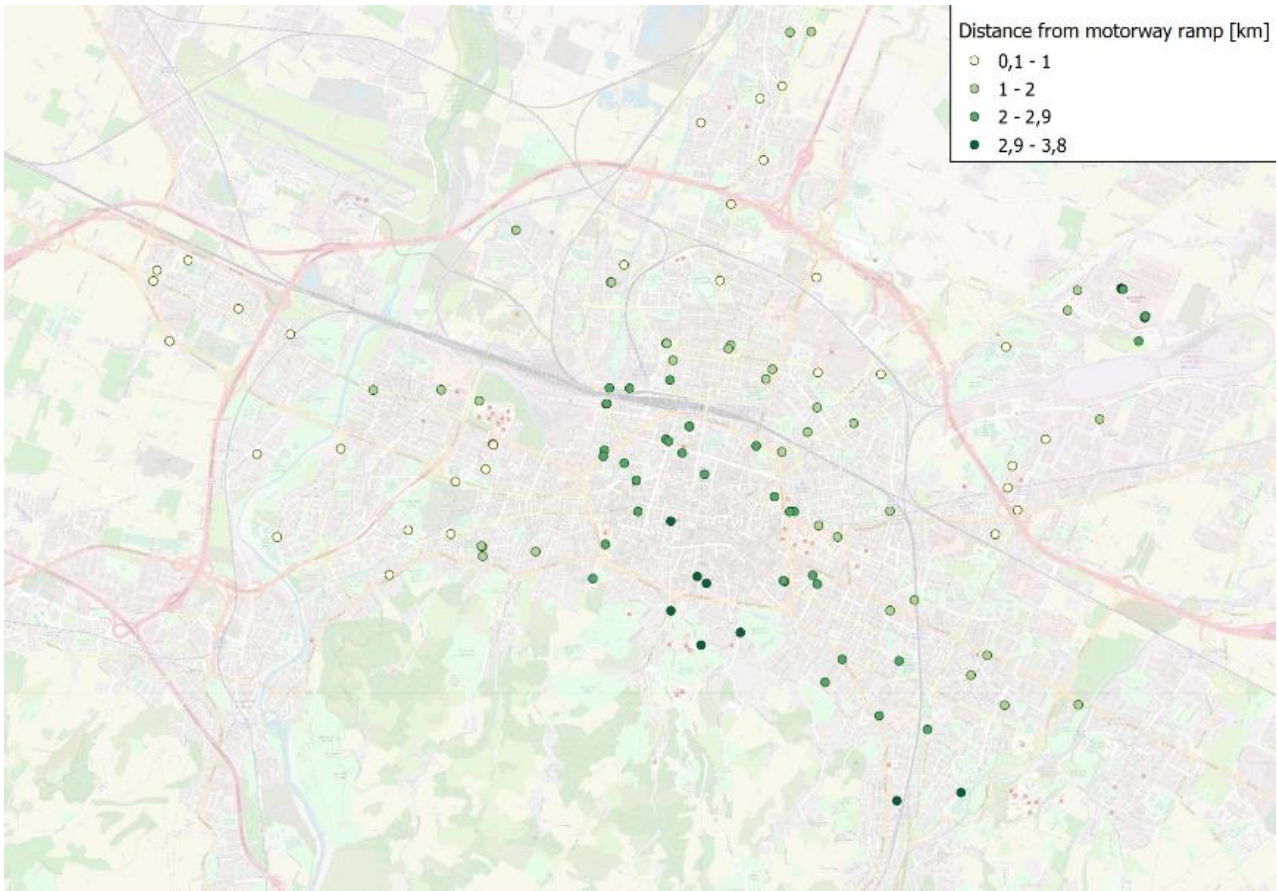


Figure 12. Geographical distribution of electric charging points in the Bologna municipality. Focus on A14 highway (Source: ITL elaboration).

Another interesting aspect related to the geographic distribution of the electric charging points in Bologna metropolitan area is summarized in Figure 12. A concentration of charging points is in coincidence with the exits of the Bologna main orbital road. This is a confirmation of the tendency of the electric charge operators to build their charging infrastructures in the most populated and congested areas.

1.7 Problems and potential solutions

There are different problems in mapping the electric charging infrastructures at regional level as it is very difficult to find reliable and updated data sources on these topics. In fact, available databases on electric charging points at national/regional levels are not totally reliable and often the points are not overlapping. In this sense one of the most popular open-source electric charging points database is **Open Charge Map** (<https://openchargemap.org/site>). Open Charge Map is a non-commercial, non-profit, electric vehicle data service hosted and supported by a community of businesses, charities, developers and interested parties around the world. The aim of this platform is to work with the community to develop and provide a high quality, public, free, open database of charging equipment locations globally. There are also several “private” databases providing this kind of information related to the location of the electric charging points. But these data are not downloadable, so they can’t be used as data input for better and wider analysis at regional/local levels.

For all these reasons it is very important to work on avoiding the proliferation of independent conflicting charging location maps/websites/applications and to provide (as much as possible) a reliable single point of reference for charging equipment location information. In this sense a national and/or a regional authority can have an important role in defining protocols and standard for a better and coordinated data sharing allowing to avoid de-duplication efforts among all the different involved public and private stakeholders. Moreover, an **open-data approach** at regional level can help in providing to all the relevant and interested public and private stakeholders a common base for the definition of new policies and new commercial tool needed for the promotion of electric mobility.

Another problem, as already evidenced, is related to the collection of the planned charging points. As several private operators are working on build charging points in the most profitable places, it is extremely difficult to collect this kind of data related to the future development. Moreover, the new charging points were defined and contracted with the single local public authorities and many aspects must be considered in order to define the agreements between the public authority and the infrastructures developers.

Finally, another problem is related to the availability of data on the demand of these electric charging services. As evidenced by the interviewed operators, these are relevant “business data” as they allow to identify the most profitable geographical areas. It is possible to have some aggregated data but nowadays it is not possible to have more precise data showing how many

users use the different charging points in the regional territory. Thus, in the framework of the MIMOSA study no one of the selected operators was willing to share these kinds of data on request. Yet, it was possible to have a clear vision of the offer of electric charging points at regional level but not of the demand of such electric charging point services.

The need of additional information on the electric mobility demand is particular important in the Emilia-Romagna Region because it is one the Italian region where the highest number of electric vehicles were sold in the last years. Based on the last available data (ACI, 2022) in 2021 the car fleet of hybrid and electric cars in Emilia-Romagna region, compared to 2020, grew significantly (**+ 60%**), going from **62,611** cars to **100,701**. However, it represents only the **3.4%** of the total number of cars in circulation in the Region. All the main national studies available on this topic agree on the addition fast growth of this sector in the coming years.

1.8 Conclusion and recommendations

The electric charge infrastructure at national and regional level is constantly growing. Based on comments collected by the interviewed operators and from the scientific literature on this topic, next years will be years of rapid growth. For this reason, it is extremely important to constantly monitoring the development of such infrastructures. In the short term it is key to monitor the development of such infrastructures in order to allow better coordination and management of the infrastructure development. In fact, as evidenced also in the literature, operators are interested to develop these infrastructures mainly in highly trafficked and most frequented urban areas. However, it is important to have this infrastructure grow also in the rural/peripheral areas in order to allow a more equitable access to the charging infrastructures. It becomes then central to enhance regional coordination in the development of electric mobility infrastructures, also in order to define policies and tools able to guarantee a balanced development and diffusion of these infrastructures. As we are assisting at very significant and rapid changes in this sector, it is recommendable to carry out monitoring activities on a regular basis, at least every 6 months. In the medium and long term, it is also important to monitor the growth in the demand of electric charging points in order to optimize and increase the usage of all the developed charging points. As a follow up activity of the present MIMOSA study, it is expected that, both in the short and long term, Emilia-Romagna Region continue in mapping the development and growth of these electric

charging points infrastructures using the MIMOSA analysis as a baseline for future considerations and policy measures. Further, it is recommended to define new strategies and tools aimed at collecting data on the demand side of the electric mobility in Emilia-Romagna Region. In particular, it will be very useful to know more on the recharging habits of electric mobility users.

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