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Eborn, a leading public charging infrastructure in France

SYANE, SDE07, SDED, SEDI, SyME05

SDE03, SDE04, SIEL-TE, SDE43, SDES, SYMIELECVAR

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Summary

Initiated in 2015, eborn has been developed since then by 5 public authorities, covering Rhone and Alps areas in South-East of France, with a shared willing to offer homogeneous and high quality charging services to all electrical vehicles owners, over and above the place they live.

Comprising nearly 600 public stations at the end of 2018, with semi-accelerated and quick charges, it is one of the most popular public network in France, encountering an ongoing growth.

Strenghtened with many feedbacks about service operations and customers' expectations, eborn establishes an updated strategy for public infrastructures sustainability.

Keywords : infrastructure, provincial government, strategy, user behavior, business model

1 Eborn, an innovative public initiative

1.1 An initial grouping in 2015

Energy departemental organizations from Rhone and Alps areas, in South-East of France, worked together as early as 2015 in order to **create an interdepartemental, homogeneous and high quality service of public charging stations**.

Consequently energy organisations of **Ardèche, Drôme, Isère, Hautes-Alpes and Haute-Savoie joined together to create "eborn"**.

Pursuing a common objective, these organisations drive the deployment and the exploitation of public charging stations over their territory in a unique way. The worked together in order to establish a shared contract comprising the establishment, the maintenance and the supervision of their charging networks.

Figure 1: eborn logo - SyME05, 2018

As a result, same charging stations technologies, same services, same tarification, same communication media and same visual identity standards are today offered to eborn users.

This smart and shared way of developing charging infrastructures already bears fruit, according to the figures highlighted in section 2.

1.2 A wider grouping by 2020

Empowered by the success of their initial grouping, **eborn founders were, in summer 2018, willing to expand the networks across most parts of Auvergne-Rhône-Alpes and Provence-Alpes-Côte-D'azur** (PACA) Regions, always with the same initial goal of establishing an interdepartemental, homogeneous and high quality service of public charging stations.

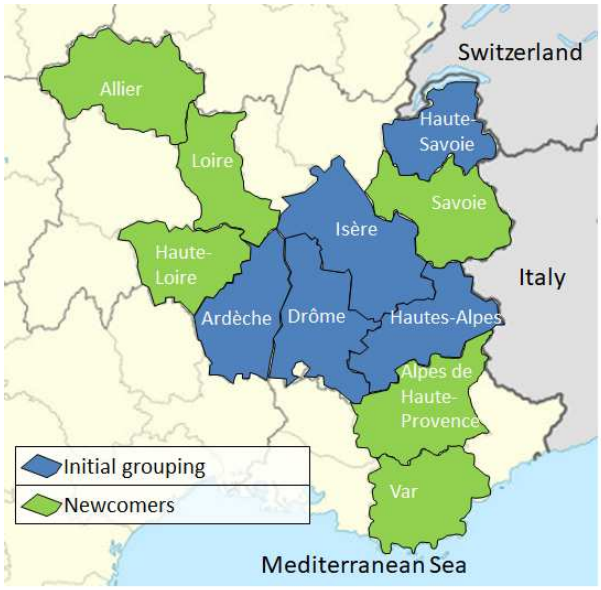

Figure 2: eborn areas – eborn, 2019

All the energy departemental organizations within the two previously named Regions were officially questioned about their will of joining eborn grouping. Half of them, by the choice of their Executive Committee, expressed their interest in taking part of eborn's future. This new gathering has been facilited by mutual work habits within all these energy departemental organizations, through formal and informal regular meetings.

By 2020, eborn will thus cover eleven French Departements, as shown in Figure 2 above. **It will encompass more than 1 000 public charging stations developed in rural, urban and semi-urban areas.**

This new scope should allow an enhanced sharing of day-to-day operations, an easier native interoperability, a stronger visibility to electrical vehicles owners and as a consequence a better conmpetitiveness towards other charging networks and/or services. **All in one, this should, in the end, give the opportunity to our organisations to find a business model between 2020 and 2030, helped by volume effect**.

All the figures listed in the following sections only concern the initial grouping, and not this wider grouping which will appear in 2020.

2 Eborn, a widely used networks

The first charging stations were turned into service in summer 2016.

Thirty months after, eborn operates 590 public charging stations. Most of them are semi-accelerated charging stations, with available power up to 22 kW under alternative current, and 45 of them are quick charging stations, with available power up to 50kW under direct current, or 43kW under alternative current.

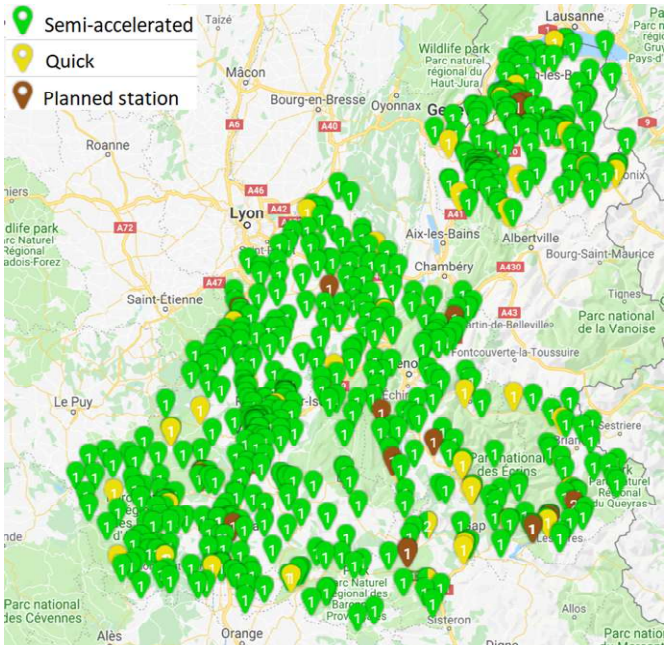

Figure 5: Eborn stations' map – SPIE, 2018

Figure 3: Available plugs for semi-accelerated charging stations

(each station having two charging points comprising these plugs)

Figure 4: Available plugs for quick charging stations

These charging stations cover urban, semi-urban and rural areas, within riverine, countryside and mountain landscapes. They thus **address every charging situation, from commuting travels to touristic travels.**

The number of registered users is constantly increasing, with 1 400 registration by the end of 2018.

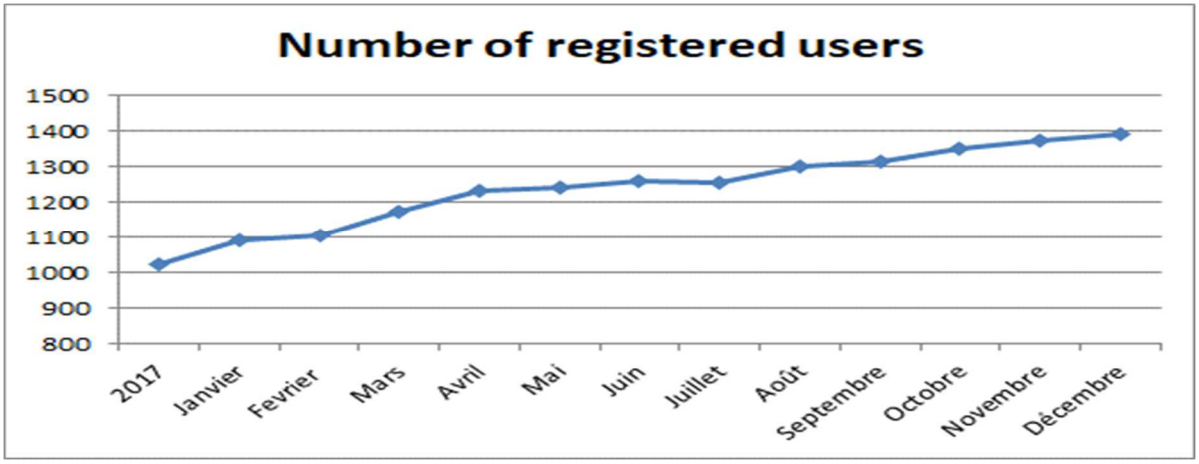

Figure 6: Registered users - service data, 2018

Accessible to everyone, **eborn public charging stations are also used by occasional users through smartphones or contactless payment card. They are equally accessed through roaming agreements with e-mobility service providers in France and Europe** (Switzerland, Italy, Netherlands, Spain) contracted through the French and international roaming platform "Gireve".

Up to now the average user plugs in the infrastructure in order to gain about 50km of electrical mobility (average charge of 9 kWh throughout 2018 year).

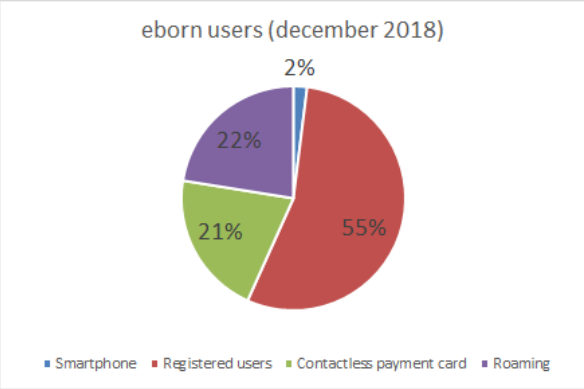

Figure 7: charges made by eborn users - service data, 2018

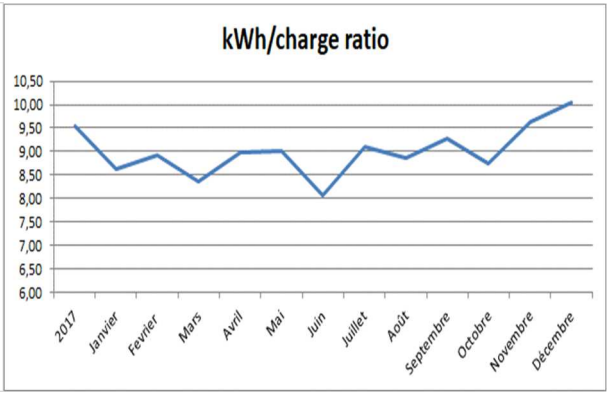

Figure 8: kWh charging ratio - service data, 2018

The overall use of the charging points stands for more than 50 MWh/month at the end of 2018, corresponding to more than 5 000 charges per month and 350 000km of electrical mobility provided over eborn area.

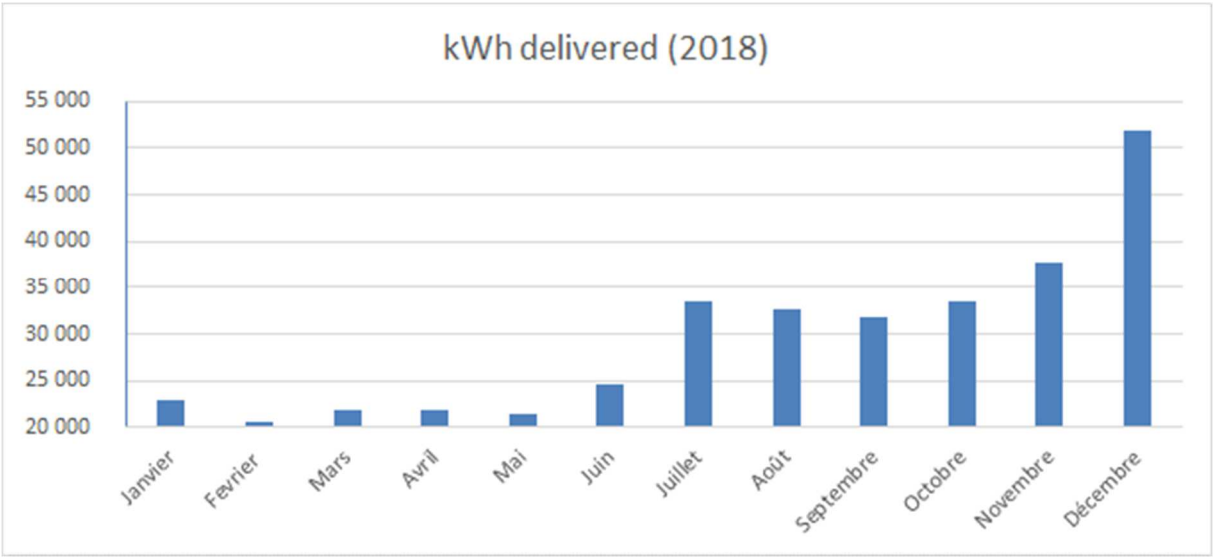

Figure 9: Energy delivered over eborn network – service data, 2018

3 Eborn, a leading customer service

3.1 Visionary services

Eborn has been the first public charging service in France to provide a tarification based on the actual energy delivered to the users. Encouraged by electrical vehicles (EV) owners', this kind of tarification has already been developed by other operators since then, and should develop again in the next years, thanks to clarification into the French regulation through the "Loi d'Orientation des Mobilités" (mobility governaing law).

Today the eborn organizations' continue their work to maintain eborn as a top of the list service, namely developing the following innovations :

- **eMSP :** The organizations became eMSP at the end of 2018, in order to offer to the registered users an access to chargins stations of neighbouring areas (Loire, Allier and Gard Departments as of 2019);
- **EV car sharing :** Electrical car sharing is being developed over underused charging stations in order to promote car sharing and e-mobility, and to enhance the use of these charging stations.

Experimentation has started with Citiz, a local car sharing operator, in Autumn 2018 over 5 charging stations of SYANE. **The first collected data shows a positive result, with an increase of 33% of the charging station usage thanks to car sharing** ;

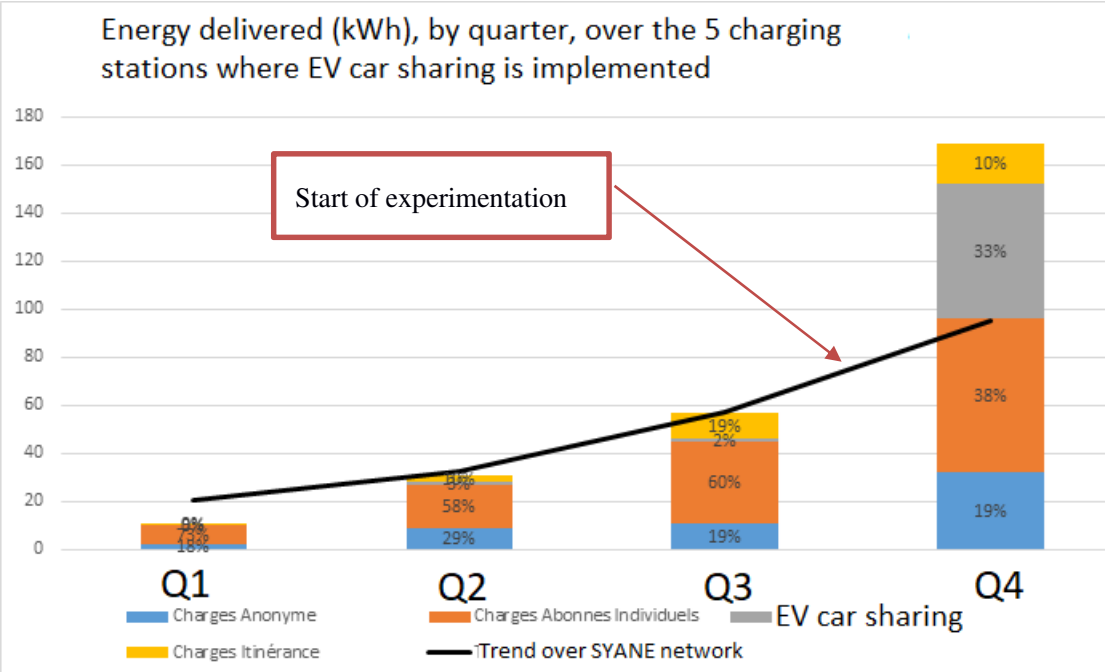

Figure 10: First results of EV car sharing experimentation – SYANE, 2019

- **Solar PV production :** Demonstration project with quick charging stations fuelled by photovoltaic panels is ongoing, where the energy provided by the solar panels is monitored in order to optimize the technological and operating solutions for the whole system. The system has been turned on in summer 2018. First results are expected to be analysed by summer 2019 ;
- **Adapted pricing depending on energy availability** : Along with PACA Region, RTE and Enedis (power distribution operators) and Orange (phone operator), SyME05 is working to establish a use case where registered users would be informed of power availability at a regional scale, through dedicated pricing, in order to ensure a smartcharging behaviour. This use case should be tested at SyME05 scale during 2020 ;
- **Wifi** : Wifi access is offered to users in remote areas of Hautes-Alpes, so that these users can benefit of Internet services during the charging of their car.

3.2 A fruitful customer survey

A survey has been made over the 1 250 registered users of eborn during Spring 2018.

Easily accessible online through Google Forms, the survey had been opened for 2 months.

35 questions were asked in the survey, within 5 sections :

- General profile,
- Use of the service,
- Service quality,
- Pricing,
- Overall impression.

285 answers have been collected and analysed, thus gathering many useful feedbacks about customers' opinon and expectations.

This kind of survey should be made every two years in the future, in order to get to know more about users' expectations, in order to make sure that charging services provided to them are ine line with their needs.

All the following figures come from the analysis made by the SYANE, in Sumer 2018. Only the "replicable" figures are exposed. Topics concerning dedicated services or specificities of eborn network, which cannot be replicated, are not shown in this paper.

3.2.1 Profile

The profiles of survey respondents' match with characteristics of EV market in France : two-third of the respondents use a Renault ZOE, and 20% use a Nissan Leaf. The remaining 15% are mainly dispatched between Peugeot, BMW, Tesla and Volkswagen cars. Less than 3% of the respondents have a plug-in hybrid vehicle.

As a result, battery capacity of eborn users are in line with the current EV market, with two-thirds of the respondents having a battery capacity of less than 200km, as shown in Figure 12, corresponding to electric vehicles sold on the market in the last 5 years.

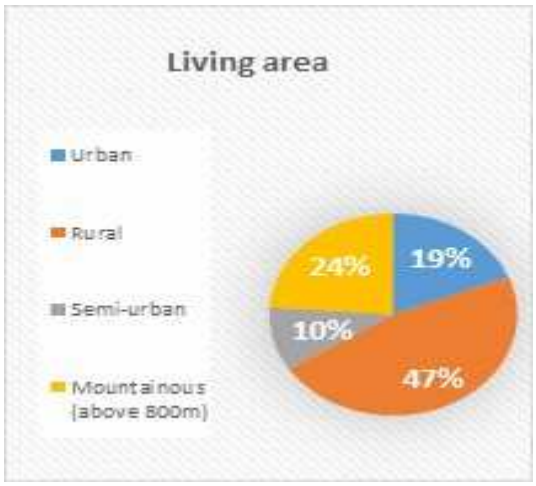

Figure 11

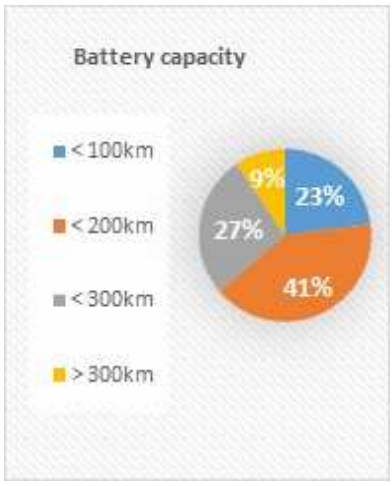

Figure 12

The living areas of the respondents, as shown in Figure 11, equally match with areas covered by eborn network. This is kind of a surprise, because it means **that urban or semi-urban areas are not predilection areas for EV users, and that citizens living in rural or mountainous areas ar as attracted by EV as citizens living in urban or semi-urban areas**.

An interesting figure, as shown in Figure 13, is that two thirds of respondents have their own charging station at home or at the office. **This means that most of eborn registered users can charge their EV on their side. Eborn public network will be used by them as an insurance during their unusual trips. As a result, the financial inputs of these users are more likely to be from their subscription to eborn services, rather than from their occasional use of the service**.

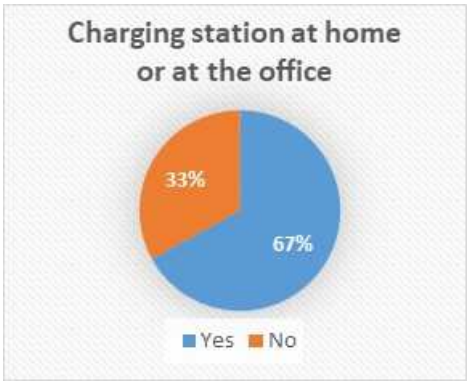

Figure 13

At the opposite, **one third of respondents do not have their own charging solution. For them, eborn has to provide affordable services which will encourage them to use eborn charging stations as often as their EV needs to fill up its battery.**

This results in two different needs towards the public infrastructure, which have to be addressed with dedicated schemes.

3.2.2 Use of the service

Seventy percent of the respondents have been using eborn services for more than 6 months. Given the fact that most of eborn infrastructures had been turned on in 2017 and early 2018, it means that the respondents have a rather long and accurate experience of the network.

The figures of frequency of use, as shown in Figure 14, are consistent with the figures shown in Figure 13. We can guess that users without charging station at home or at the office will use eborn infrastructures on a daily or weekly basis, where users with their own charging solution will use eborn infrastructures less often. According to the figures, this second category will more likely use the eborn infrastructure only a few times per year.

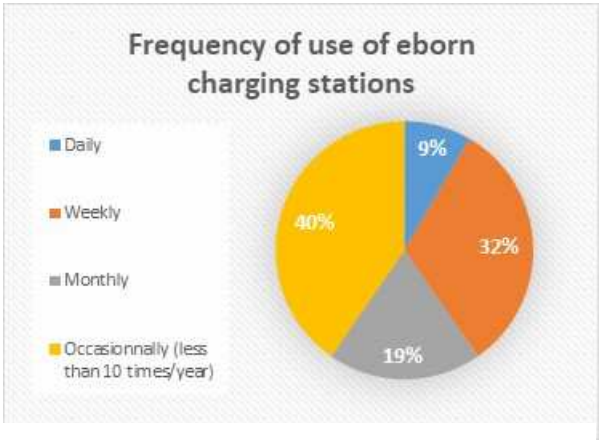

Figure 14

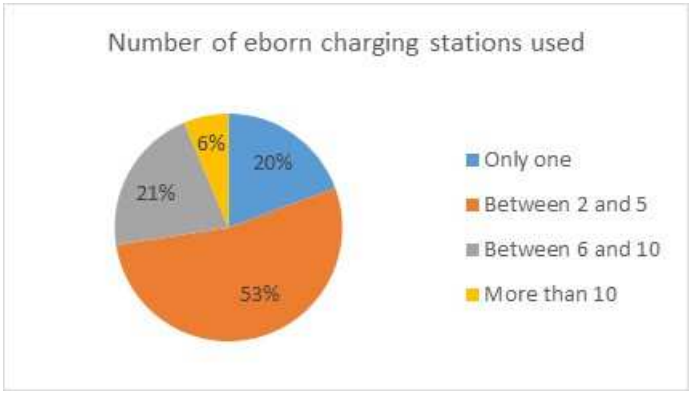

Figure 15

Another relevant figure is the number of eborn charging stations used by each single registered user. As shown in Figure 15, most of the users charge their EV on more than one public infrastructure. **This is a strong indicator to improve interoperability of the infrastructures.**

However, the range of different eborn charging stations used is quite low, with almost 75% of registered users using not more than 5 different stations. These figures are consistant with the actual battery capacity of EV users, but they will probably evolve within the next few years with extended EV battery capacity. **By now, we have to make sure that every user can access every public infrastructure around his commuting trip, but at the same time we have to provide him with local reliable – and affordable - solutions**.

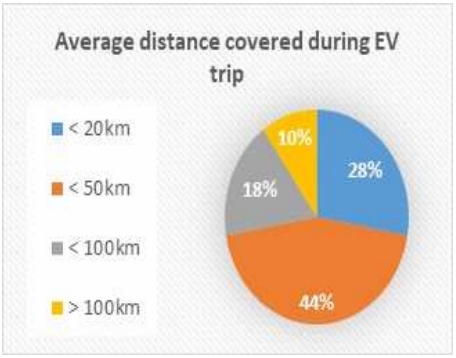

Figure 17

Registered users have been asked about their charging needs, in terms of autonomy. Suprisingly, 70% of them need charges of more than 100km (Figure 16) where only 10% of them actually need this range of autonomy for their regular trip (Figure 17). One answer to this is that **users seem to prefer spending a rather long time for charging their full battery, rather than using the public service on a daily basis with smaller charges.**

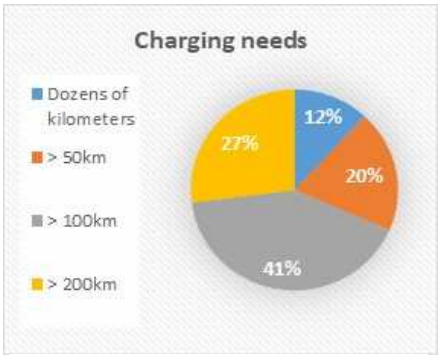

Figure 16

3.2.3 Service quality

The two main concerns about charging services offered to EV users, except of course their reliability, are the density of the network (quantity of the infrastructures) and the relevance of charging stations technologies' (quality of the infrastructures).

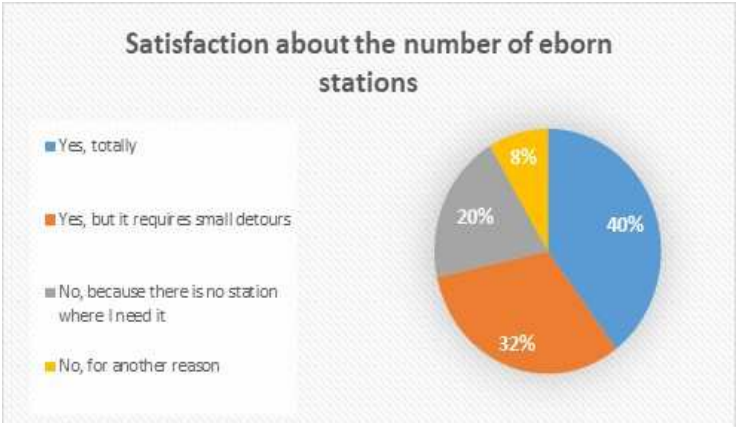

Figure 18

About the first concern, the survey showed that the first stage of deployment reached its goal, according to figures shown in Figure 18. Indeed, three quarters of the respondents find enough eborn charging stations according to their needs, even if this requires to make small detours on their way for one third of them. The survey also showed that the deployment should continue, in order to address the needs of 20% of the respondents who do not have eborn station where they need it yet. **Such a deployment would be made in a second stage, where demande-driven charging infrastructures could be put in place**.

About the second concern, the semi-accelerated stations – which stand for more than 90% of stations operated by eborn – seem to currently be the appropriate technical and economical solution, with about three quarters of the respondents happy with the speed of charges proposed by eborn infrastructures, as shown in Figure 19.

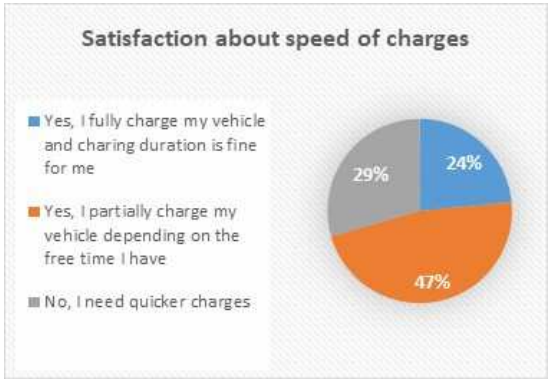

Figure 19

This statement has to be balanced with the fact that two-third of the respondents have a Renault ZOE vehicle, able to charge at a 22 kW speed on these infrastructures. The other third of the respondents is likely to have a vehicle which can only benefit a 7 kW speed. For example, 60% of the respondents who have a Nissan Leaf answered that they need quicker charges.

In ordrer to address the expectations of all the EV users, 22 kW DC charging stations could be additionally developed, as well as quick charging stations which already allow 50 KW charge under DC current.

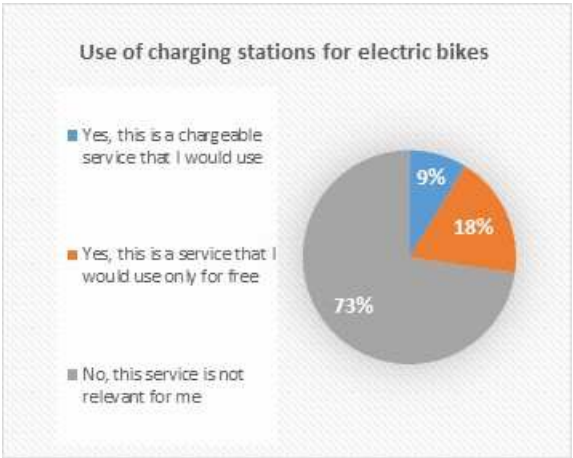

Figure 20

When developing an EV charging station, a recurring demand from local authorities is the ability of this stations to charge electric bikes. On the technical side this can be done, using the E/F plug available at each charging point of the semi-accelerated stations. On the economical side this is not seen as a profitable service.

The results given by the survey on this topic, shown in Figure 20, tend to separate the two kinds of infrastructures – the ones for the EV and the ones for the electric bikes. Indeed, three-quarters of the respondents do not need the service, and less than 10% of the respondents would pay for it. **Dealing with the electric bikes should as a result rather be made under a dedicated business scheme**.

3.2.4 Pricing

Tarification based on the actual energy delivered to the users has been equally put in place in January 2018 for all eborn infrastructures. The adopted pricing from this date is shown in Figure 21.

	Abonné		Non-Abonné (*)
	eborn	forfait eborn +	
	10€/an/badge	35€/mois/badge	
Recharge accélérée	0.24€/kWh	Inclus dans le forfait *Au-delà de 500 kWh/mois (**), charge à l'acte à 0.24€/kWh*	0.34€/kWh
Recharge rapide	0.34€/kWh	Inclus dans le forfait *Au-delà de 500 kWh/mois (**), charge à l'acte à 0.34€/kWh*	0.44€/kWh par CB en ligne (via IDCharge) ou 6.5€/charge par CB sans contact

Figure 21

By the time of the survey, more than 95% of the registered users have a regular « eborn » suscription. The other, less-than 5%, which have an « eborn + » pass, are only public authorities and private companies.

The main objective of this pricing, when decided by our organisations, was to be clear and easily understandable by every user. The answers given by the respondents about this topic, as shown in Figure 22, **tend to approve this strategy, pricing of eborn services being clear for 89% of the respondents**.

Figure 22

However, 40% think that this pricing is not attractive. When asked why, most of them answer that kWh on eborn infrastructures is much more expensive than kWh at home. This is a fact, but these users forget that eborn pricing also takes into account the investment on infrastructures and all operational costs (maintenance, supervision, customer services). As a consequence, **kWh price on eborn infrastructures and kWh price at home should not directly be compared**, and communication about this difference has to be made towards eborn users to convince them that eborn pricing is attractive (with basically 100km at a 4€ price for eborn registered users on semi-accelerated charges), especially given that the service is not currently profitable with this pricing.

Another interesting fact about the pricing is that two thirds of the respondents, as shown in Figure 23, do not know it precisely, and will mainly be interested by the ballpark cost when charging their vehicle. This prompts to find a **pricing with whole numbers that can easily be caught by users, rather than pricing with many digits which would precisely stick to cost evolutions.**

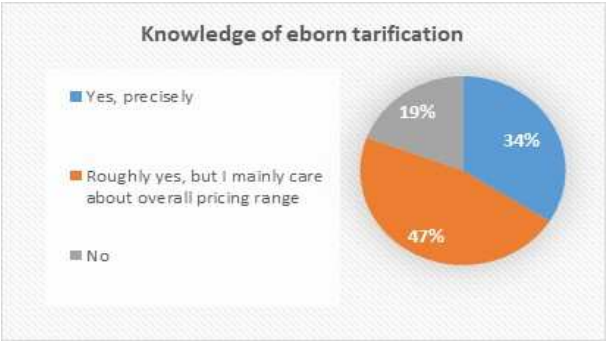

Figure 23

3.2.5 Overall impression

Public charging stations have a strong role in reassuring EV users when traveling on medium or long distances. The should also **motivate citizens to go for EV and use it as often as they need** to use a car, by ensuring them that they will find a satisfying solution to charge their battery in every place they go.

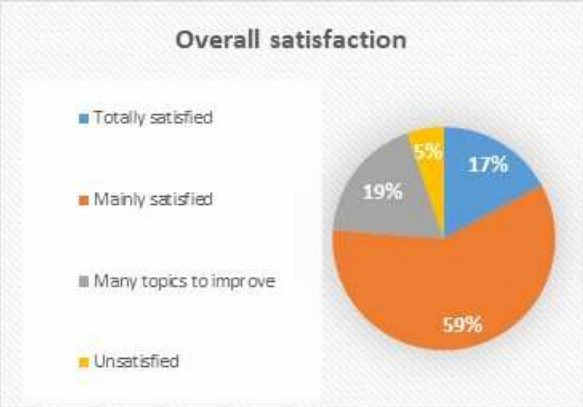

Figure 24

Regarding eborn services, three quarters of the respondents are globally satisfied according to the results shown in Figure 24. The service still has to improve, in order to convince the last quarter to carry on using it.

It has to be mentioned that the service faced many challenges during its first operating months, due to hardware and software failures. It has become more and more reliable over the time, and will hopefully continue to do so, but the first registered users may have faced problems that discouraged them to be satisfied about the services by now.

Last but not least, the same distribution (75% / 25%) is found about registered users who see eborn infrastructures and services as a motivation to use their EV. Figures shown in Figure 25 encourage us to **develop a reliable, understandable and affordable infrastructures and services so that EV charging public services could be seen by all car users as a motivation to use electromobility as often as the use of passenger car is needed.**

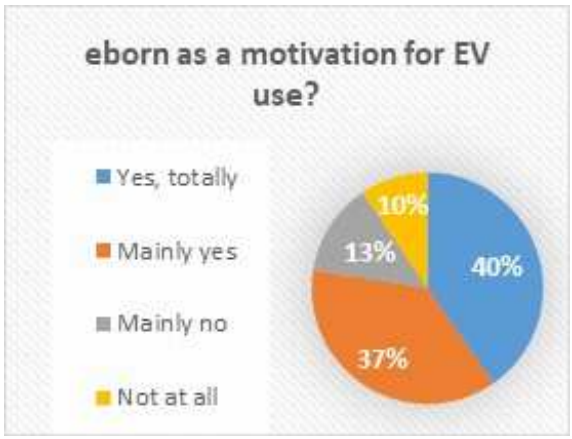

Figure 25

Acknowledgments

- **ADEME**, for their financial support in all the investments needed for eborn infrastructures, through the “Programme d’Investissements d’Avenir” over the 2015-2017 period ;
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- **Citiz Alpes-Loire**, local car sharing operator, for experimenting with us the EV car sharing with dedicated charging points within our eborn network;
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References

None

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