



Project no. 691735
REPLICATE PROJECT
Renaissance of Places with Innovative
Citizenship And Technology



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European Union's Horizon 2020 research and
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691735

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REnaissance of PLaces with Innovative Citizenship And Technology

Project no. 691735

H2020–SCC–2015 Smart Cities and Communities

Innovation Action (IA)

D 3.6 Report on the deployment of EVs in the city of San Sebastian

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D3.6 Report on the deployment of EVs in the city of San Sebastian



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1. EXECUTIVE SUMMARY

This document exposes the process that has been taken by local administration of the city of San Sebastian to prepare the city before the arrival of electromobility.

This document describes the approach adopted by the city in this regard, separating the electric vehicle from its respective charging infrastructure. However, as progress has been made in the process, the need to consider both elements jointly has become clear, since the implementation of one influences the other.

During the project implementation period, the administration has acquired 12 electric vehicles with the purpose of renewing its municipal fleet (the municipal fleet includes 180 vehicles approximately, of which 29 are hybrid), but also to serve as an example for citizens, that electric mobility is a real alternative to the most polluting modes of transport in the city.

In addition, the administration has clearly influenced on groups, private owners, that have an intensive use of mobility in the city to take a step towards electromobility, offering institutional support and complementary services to help them in the transition process. As a result, today there are 7 electric taxis in the city (there are 308 taxis in the city, so EV represent 2.23% of the fleet whereas Hybrid cars represent 22%) and with prospects that this number will gradually increase.

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2. REPLICATE

The main objective of REPLICATE project is the development and validation in three lighthouse cities (**San Sebastián** – Spain, **Florence** – Italy and **Bristol** – UK) of a comprehensive and sustainable City Business Model to enhance the transition process to a smart city in the areas of the energy efficiency, sustainable mobility and ICT/Infrastructure. This will accelerate the deployment of innovative technologies, organizational and economic solutions to significantly increase resource and energy efficiency improve the sustainability of urban transport and drastically reduce greenhouse gas emissions in urban areas.

REPLICATE project aims to increase the quality of life for citizens across Europe by demonstrating the impact of innovative technologies used to co-create smart city services with citizens, and prove the optimal process for replicating successes within cities and across cities.

The Business Models that are being tested through large scale demonstrators at the three cities are approached with an integrated planning through a co-productive vision, involving citizens and cities' stakeholders, providing integrated viable solutions to existing challenges in urban areas and to procure sustainable services. Sustainability of the solutions is fostered in three areas: economic and environmental and finally, fostering transparency in the public management.

In addition, the Model features the replicability of the solutions and their scale up in the entire city and in follower cities, particularly in three follower cities (**Essen** – Germany, **Laussane** – Switzerland and **Nilüfer**–Turkey) that are involved in the project and therefore, have access to know-how and results achieved on the project so they can apply the developed model. At the moment, there are 2 observer cities, Guanzhou (China) and Bogota (Colombia).



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3. INTRODUCTION

3.1 Relation to Other Project Documents

The District Management Plan delivered in WP1 (D1.4) explains the organisational structure of the whole pilot action in San Sebastian, covering the three main intervention lines of the project: energy, ICT and mobility, which is the one where this deliverable is framed.

Furthermore, considering mobility actions expected to be developed in San Sebastian, this deliverable is directly linked with the deliverable D3.7 Report on the deployment of charging infrastructure in the city of San Sebastian.

3.2 Reference documents

This document is based in the following projects level documents:

Ref.	Title	Description
REPLICATE Grant Agreement signed 240713.pdf	Grant Agreement	Grant Agreement no. 691735
DoA REPLICATE (691735)	REPLICATE Annex 1 – DoA to the GA	Description of the Action
REPLICATE Consortium agreement signed December 2015 (7 th December version)	Consortium Agreement	REPLICATE project – Consortium Agreement
REPLICATE Project Management Plan	D1.1 Project Management Plan (v.1) (29/04/2016)	REPLICATE Project Management Plan
REPLICATE District Management Plans	D1.4 District Management Plan San Sebastian	REPLICATE District Management Plans

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	D1.5 District Management Plan Florence D1.6 District Management Plan Bristol	
REPLICATE Communication Plan	D11.1 Communication Plan	REPLICATE Communication Plan

Where there are contradictions, the documents listed above supersede this deliverable. The Grant Agreement is the contract with the European Commission so takes precedence over all other documents.

3.3 Abbreviations list

GA	Grant Agreement
CA	Consortium Agreement
DoA	Annex I–Description of the Action
EC	European Commission
H2020	Horizon 2020
PC	Project Coordinator
PL	Pilot Leader
PMP	Project Management Plan
TC	Technical Coordinator
WP	Work Package
WPL	Work Package Leader

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4. DELIVERABLE DESCRIPTION

This document describes the deployment of electric vehicles in the city of San Sebastian, considering the main actors of the city: The municipality, the different mobility groups of the city which request mobility services, and finally, citizenship.

To fulfil the description of the action, the document is structured in the following sections:

Section 5. State of the Art. Electromobility. Provides general information about the city regarding mobility aspects, and the policies that have been defined related to electromobility according to the agreements adopted concerning the environmental aspects of the city.

Section 6. Electromobility deployment in San Sebastian pilot. This section explains how the city has focused the arrival of electromobility, both from the point of view of modes of transport and the different users who will consume it.

Section 7. Innovations, impacts and scalability. This section describes the first effects that have been perceived in the city as a result of deploying electromobility in the different areas of the city.

Section 8. Conclusions. This section sets out the different conclusions that have been obtained from the measures developed in the project as well as the vision of the city's closest future when it comes to addressing energy alternatives in the field of mobility.



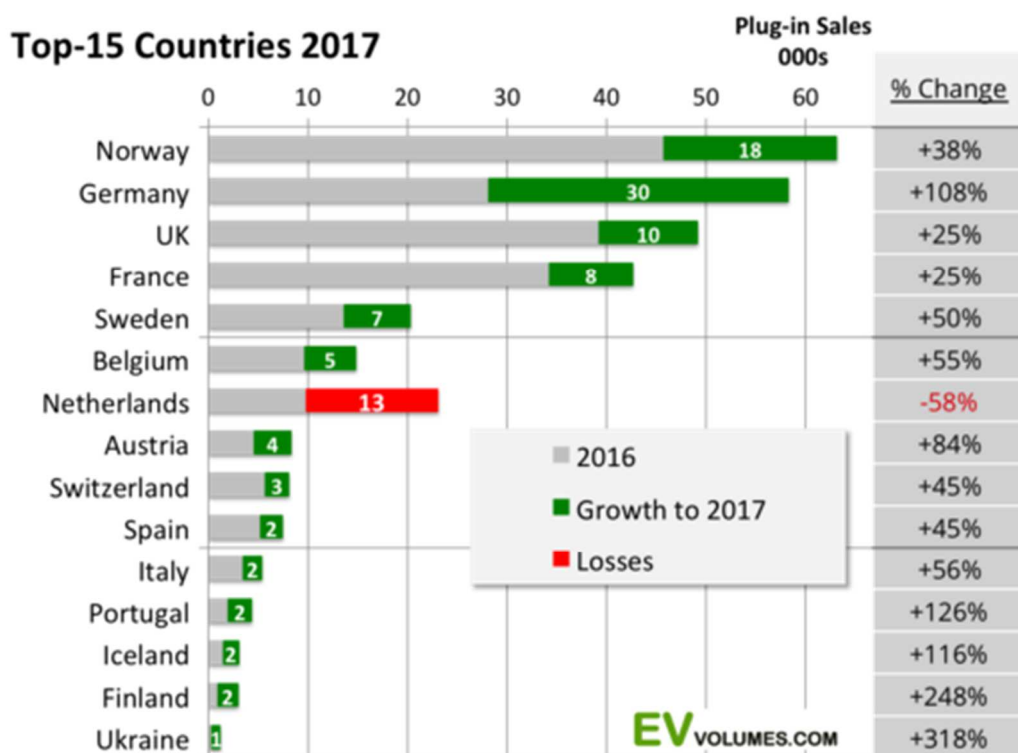
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5. STATE OF THE ART ELECTROMOBILITY

Analyzing the general trends in the field of electromobility, in comparison with other countries of the European territory it could be said that the presence of the electric vehicle in Spain is still in its initial phase. Today it is estimated that its penetration only reaches 0.2 percent of users who use the private vehicle.



[Picture1. EV sales in Europe ordered by countries.2017 source:evvolumes.com]

Central Government through the ministry for the ecological transition has been launching promotional campaigns since 2009 (MOVELE, MOVEA, MOVALT and VEA) aimed to the purchase of electric vehicles, but it seems that they have not yet had the desired effect, since to date the budget allocations for the promotion of the electric vehicle by the central administration has been limited.



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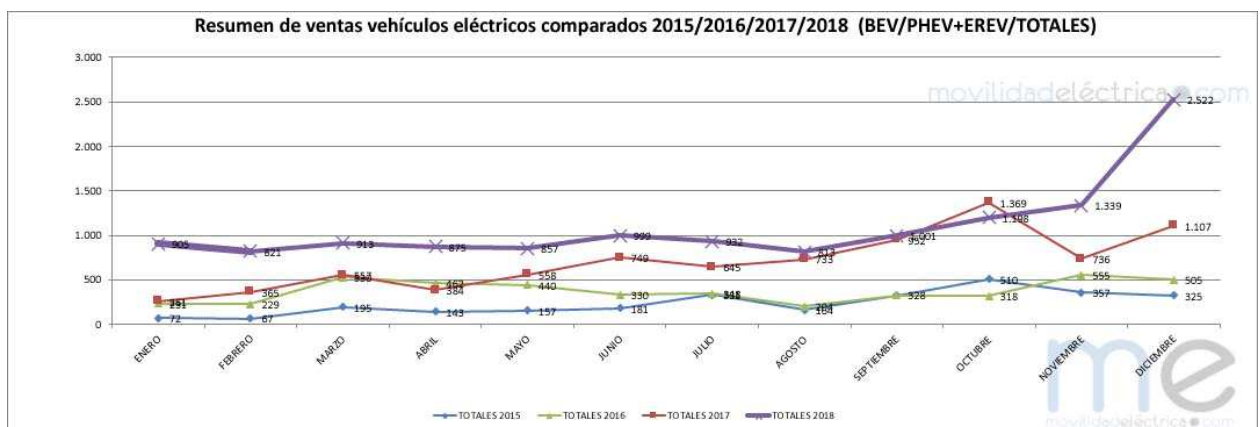
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[Picture2. EV market sales in Spain source:movilidadelectrica.com]

The reasons why society has not yet made the leap to electric mobility are varied, although basically they could be summarized in two: technical and social reasons.

With regards to technical reasons there are several factors that are conditioning the sale of electric cars. On the one hand, there is the sale price of the vehicle itself, which is conditioned by the price of the batteries, and which is still considerably higher than that of an equivalent combustion vehicle.



[Picture3. EV sales comparison among 2015, 2016, 2017 and 2018 years
 source:movilidadelectrica.com]

It is true that the price of batteries has suffered a sharp decline in recent years and forecasts say that it will continue to decline in the next years. However, the current price does not allow to compare the price of the electric vehicle to the combustion vehicle, which is the first barrier when considering buying an electric vehicle.

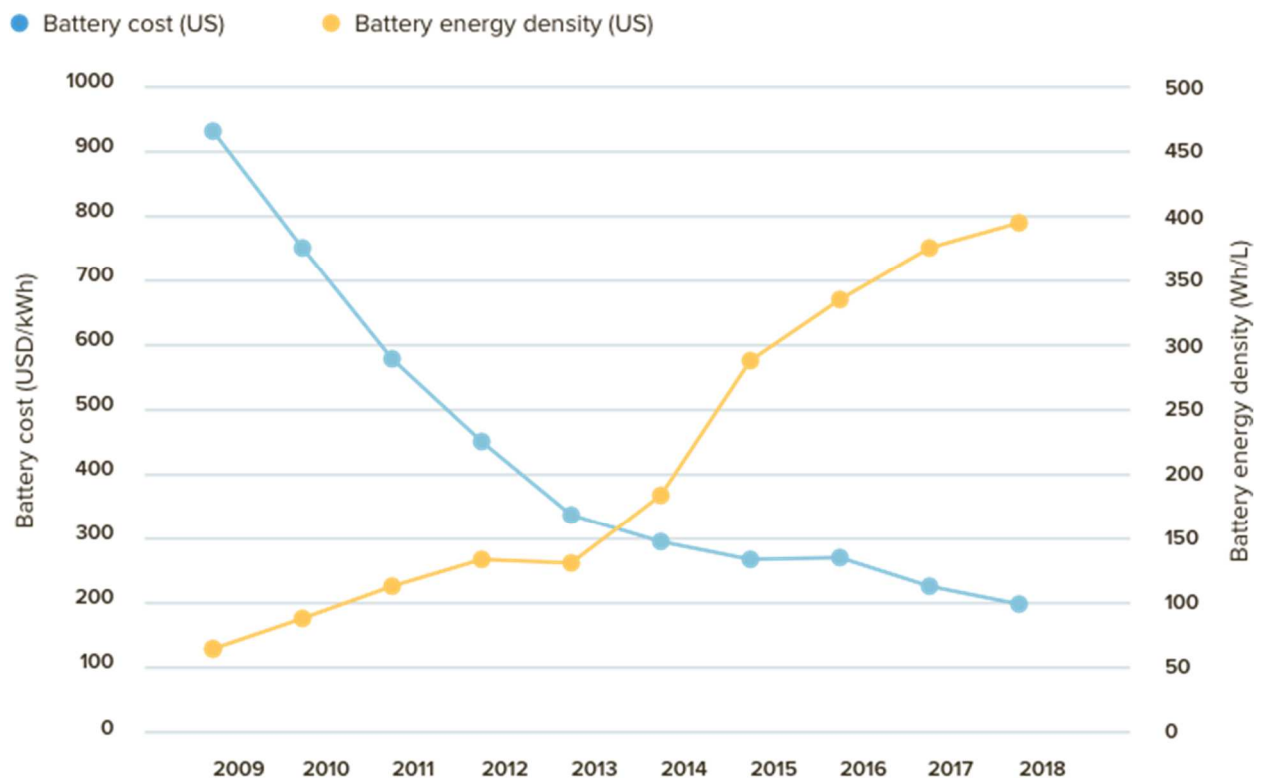


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For that reason and with the purpose of offering a lower final price, some brands offer the sale of the electric vehicle with the battery for rent, with which the potential buyer avoids the initial investment of the cost of the battery making in its place a periodic payment which in many cases includes other associated services such as battery maintenance and an operational guarantee.



[Picture 4. Battery prize reduction chart vs battery energy density source: bambooapps.eu]

There are other similar formulas to reduce the final price of the electric car but they all have a common denominator, which is that they are aimed at a very specific profile of buyer. The formulas might be interesting for a buyer that gives an intensive use to the electric vehicle. For the buyer profile that the use of the electric vehicle most of the time parked when applying these formulas of purchase (that are based on the vehicle with battery rental), the payment is not in accordance with the use, so their effectiveness is very restricted.

Another determining factor is the autonomy or range of the vehicle and that is probably the most mentioned factor when listing the limitations of the electric vehicle in any of its modes of transport. As with the price of batteries, the autonomy of electric vehicles

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is improving a lot in recent years, although there is always the uncertainty of whether it will reach the values offered by the current combustion vehicle.

This uncertainty can be considered as one of the causes of the debate that has arisen around the need to have such high autonomy when only resort to them in very specific situations throughout the useful life of the vehicle.

It is true that the technology surrounding electric mobility is advancing very fast and not only autonomies are increasing, but recharge times are also decreasing considerably, which contributes to equal the electric vehicle to the conventional vehicle in the same terms.

As can be deduced from all this, the electric car has generated many questions about how to make better use of energy with respect to the way in which it is wasted with combustion vehicles, without going into detail about the demand for electrical energy would suppose to have a fleet of electric vehicles similar to the one we currently have with conventional vehicles.

Another of the technical factors that condition the sale of electric vehicles and that is directly linked to the lack of autonomy is the need to have a national charging infrastructure that offers coverage throughout the territory.

By matching the situation of the combustion vehicle in relation to the refueling network that has been extended in the national territory, a social demand has been generated, in addition to the interests of the electric companies, according to which the recharging network must be at least equal to or greater than that.

One of the great advantages offered by the electric vehicle with respect to combustion is that it does not depend exclusively on external refueling stations to recharge its batteries, since refueling can be carried out at home (as long as it has a garage where to do it). In fact, the actors involved in electric mobility do nothing but emphasize that a very high percentage of private reloads will be carried out at home, for practicality and economy, since charging at home only electricity consumption is paid, while the emergency or route type of recharging is usually linked to a charging operator/manager, which increases the cost by paying not only the consumption but also the offered service.

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it is for this reason that the external recharging services must fulfill a function designed mainly to cover emergency situations as long as we are talking about short routes, which are what a normal user uses in their daily journeys. For long-distance trips, it is clear that a recharge network (preferably fast) is necessary, which will support the recharge carried out at home and allow it to reach destination.

Because of all the comments regarding the charging infrastructure of the electric vehicle, it seems clear that a recharging infrastructure is necessary to cover, above all, the long-distance needs and, in part, to cover specific emergency situations, without entailing saturation of the road network with charging points.

As mentioned at the beginning of the section in addition to the technical reasons, the social reasons also affect the low sales of the electric vehicle.

Due to its low penetration rate, the electric car does not just take off in Spain and the efforts that are being made to reduce its cost are closely related to business models aimed at renting or sharing the vehicle which clashes with our culture, a strong component of disposing all or almost all goods in possession. The car sharing formula is being tested in different cities. In San Sebastian a car sharing service was implemented from 2012 to 2014, and also launched in the two other Basque capitals, Bilbao and Vitoria. The implementation in San Sebastian is further developed in point 5.1.

Beyond the mentioned technical or social reasons, one of the situations that has led to an impulse to the electric vehicle has been the episodes of high contamination that have been suffered by the nation's great capitals and that have forced them to apply restrictive measures to access to city centers. These restrictive measures, in relation to transport, are mainly aimed at prohibiting the entry into the city of the most polluting vehicles, and opening the window to the most ecological ones, hybrid and electric vehicles. In addition, the implementation of electric sharing services that covered precisely the restricted areas and considering that they also had some advantages of use such as the possibility of parking for free or of being able to circulate in roads limited only to high-occupancy vehicles, has made these services to have an unexpected success.

These situations of high pollution that have been happening mainly in the major cities of Europe, together with other unforeseen external factors, such as the case of diesel-gate, have somehow generated a social alarm that has increased the need to look for

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alternative energies for the propulsion of the vehicles, to dispose as soon as possible of a substitute to the combustion vehicle.

5.1 Approach of San Sebastian to electromobility

Although in the case of medium and small cities the situation may not be so worrying in terms of situations of high pollution, the measures that are adopted as a result of what is happening in large cities will end up reaching smaller cities, as is the case of the city of San Sebastian.

San Sebastian is the administrative capital of Gipuzkoa, one of the three provinces making up the Basque Country. It is located in the north-east of the Iberian Peninsula, and it is 30 kilometers away from the border with France. It is a medium-sized coastal city with more than 186,000 inhabitants and with a wide metropolitan area reaching 435.000 inhabitants.

The main economic activities are oriented to commerce and tourism, and that is one of the reasons, why apart from the daily demand for mobility is increased by the demand generated by visits from tourism and other areas of the province for being the capital of the province.

As a medium-sized city, internal displacements are mainly resolved in a pedestrian way, although cyclist mobility also has an increasingly prominent presence.



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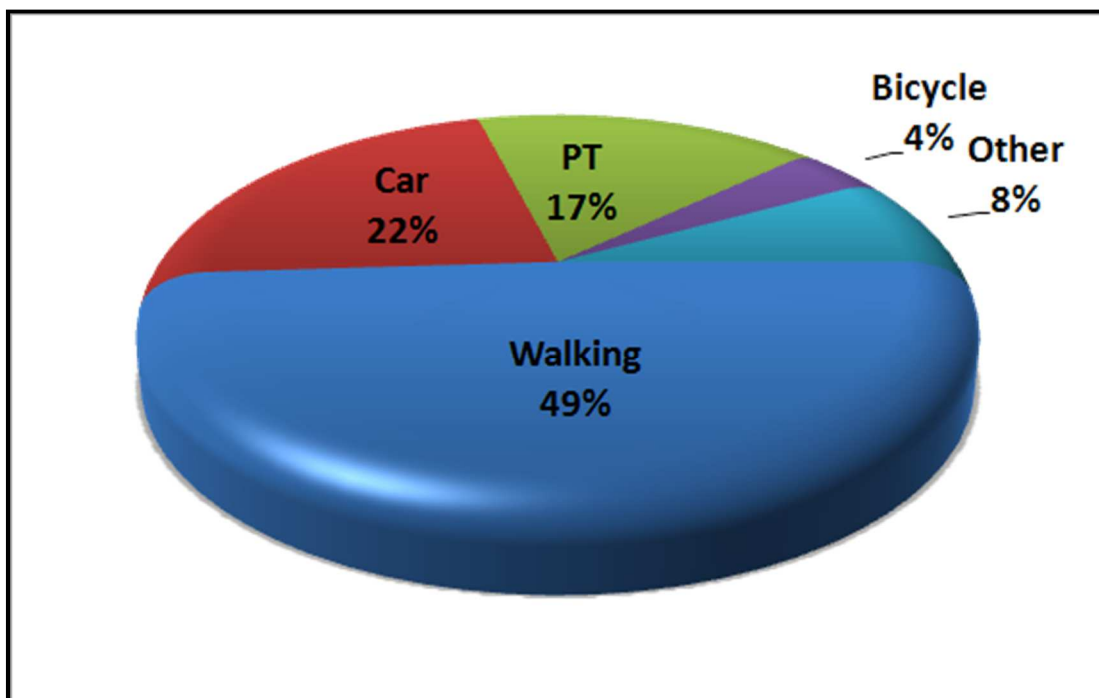


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[Picture5. Pedestrian distances Map of San Sebastian]

That is why thanks also to an efficient public transport service, that internal displacements are mostly sorted out by sustainable means (almost 75%).



[Picture6. Modal shift San Sebastian 2016]



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From what is seen in this graph, it is clear that the mobility policies of the city are aimed at continuing to bet on active and healthy modes to the detriment of motorized modes. For this reason, the commitment of the city to increase the quality of life of its citizens is oriented in terms of transport to reduce internally the use of private vehicles, recovering gradually the public space assigned to it in the last decades of the last century.

However, despite having a clear idea about reducing the presence of private vehicle in the city, it is also clear that there are groups that need the vehicle to develop their activity in the city, such as urban services, urban logistics or taxi service, among others. And it is in these groups where we see a line of action to which we can direct the use of electric vehicles in the city.

In that sense, the city council began taking the first steps by renewing the municipal fleet of local police vehicles with three hybrid vehicles in 2007. This renovation has been done gradually ensuring that the characteristics of the vehicle covered the needs of the service, in this case the local police.



[Picture7. Local Police clean vehicles presentation in 2008]

At this point it is necessary to highlight that municipal vehicles, not only local police ones but also other municipal vehicles used for other tasks have a specific municipal



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livery, so they stand out more among the rest of vehicles and therefore at the time of using them as a showcase is easier for people to notice them. For this reason, the renewal of the municipal fleet fulfills a dual purpose: on the one hand, to serve as an example of the commitment acquired by the consistory in the renewal of its vehicle fleet acquiring clean vehicles and on the other hand, to serve as a showcase on the street of clean vehicles.

Being aware of the high impact that citizens can have on vehicles that are regularly circulating around the city, the philosophy of renewing the fleet of municipal vehicles was extended to other services and modes of transport, hence one of the services that more presence it has and also greater visibility is the bus service, which was chronologically the next type of vehicle that took its corresponding step towards the transition to clean vehicles.



[Picture8. First Hybrid Buses in San Sebastian.2011]

The first hybrid bus that was introduced in the DBUS service was in 2011 and since then the incorporation of vehicles of this type has increased. This increasement is reflected in the number of the total hybrid vehicles, 30 hybrid buses from a total fleet of 120 buses.



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[Picture9. First Full Electric Bus in San Sebastian 2014]

Bus technology also evolved over the years and in 2014 the city pioneered one of the first fully electric vehicles, taking advantage in this case of the development carried out by the local company Irizar.

The bicycle has been also benefited from the arrival of electric assistance. In the case of San Sebastian, the city had a first public bicycle rental service that was implemented in 2008 with conventional bicycles and whose contract ended in 2012. For the renewal of the contract and given the success of the public bicycle service, the second contract offered the possibility that the service was entirely electric bicycles, facilitating access to the city's hilly areas, which was one of the most demanded aspects by the users of the previous service.



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[Picture10. DBizi public bike sharing system]

As it can be seen, the arrival of the electromobility to the city has not only been approached from the perspective of the modes of transport available in the city but also from the uses to which it could be intended. In this way, among the municipal services mentioned above, the cleaning services or the collection of waste have also been migrating towards environmentally friendly vehicles, trying to reduce their environmental and acoustic impact with respect to the rest of the citizen activity.



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[Picture11. Cleaning vehicles fleet]

Finally and as an introduction to the role that electromobility has played in its beginnings in the city, it is worth mentioning the pilot experience that was launched within the framework of the European project CIVITAS, in which for the first time a car-sharing service was offered to citizenship. The service was constituted solely by full- electric vehicles and was an initiative that was launched in the three Basque capitals, Bilbao, Vitoria and San Sebastian, with the claim of having the three capitals connected through a car-sharing service with full-electric vehicles.



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[Picture12. Iblek car-sharing service presentation 2012]

The service that was launched in 2012 had two main new features for the city, on the one hand to offer the electric vehicle to the public, and on the other hand, the service itself, since to date, the city had not had a similar service of car-sharing cars.



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[Picture13. Ibilek car-sharing service location in Hernani Street. San Sebastian 2012–2014]

Precisely because of the novelty of the service, this first attempt to introduce car-sharing in the city had limited success, but it served to make people aware of what the arrival of the electric vehicle entailed, since the service was available on the street. All the elements linked to the electric vehicle were on the street: from the vehicle itself to the charging infrastructure to charge them on the street.

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5.2 Policies related to electromobility

Although the first measures adopted in relation to the electric vehicle would be considered as specific events, from the beginning it was necessary to reflect this transition towards electromobility in those municipal reference documents in which the electric vehicle could play an important role in the decision making.

Those municipal strategic plans in which sustainable mobility and energy prioritize the rest of the actions, in the case of the city of San Sebastian they already have the electromobility established as a tool in their long-term vision.

According to its departmental structure there are two reference documents for the city council of San Sebastián in this regard:

- Sustainable Urban Mobility Plan (SUMP) published by the mobility department and approved in 2008.
- Sustainable Energy Action Plan (SEAP) published by the department of environment and approved in 2011.

Although the Sustainable Urban Mobility Plan (SUMP) has a quite long horizon of action from 2008 to 2024, it already established guidelines to reduce the environmental impact of transport, proposing, among other actions, the management of clean vehicles fleets with special emphasis on those entities that may have their own fleets, the fleets of the companies that are destined to city's urban freight distribution, and car fleets oriented to public service, mainly taxi fleets. At that time car-sharing was already included as one of the possible actions to assess with the aim of finding formulas to rationalize the use of transport in the city.

In the case of Sustainable Energy Action Plan (SEAP), this document has had several evolutions, being the main trigger the Paris agreement that took place in 2015, in which the first global agreements for the reduction of greenhouse gases were signed.

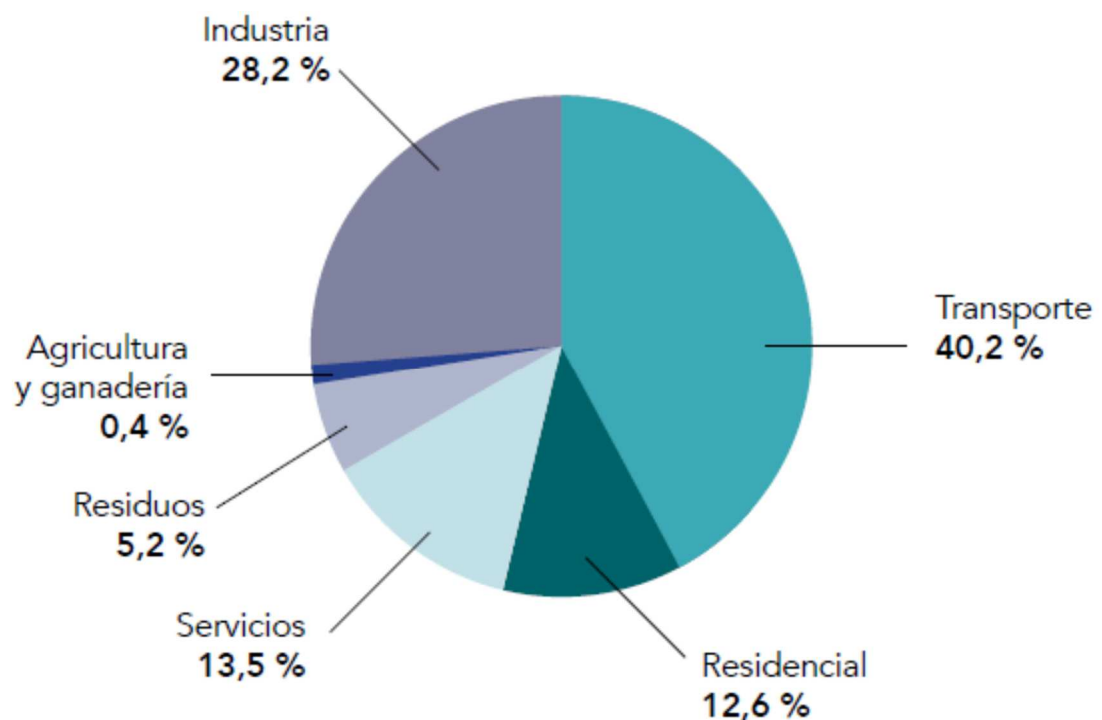


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The commitment of the European Union is to reduce greenhouse gas emissions by 40% by 2030 and by 80–95% by 2050 compared to the 2005 figures. In the inter-country distribution of non-industrial emissions (transport, agriculture, buildings) to Spain has corresponded a reduction of 26% until 2030. The commitments of the city of Donostia / San Sebastián in the reduction of greenhouse gas emissions are deployed in all sectors of urban activity and, in particular, in mobility, the main responsible for emissions with 40% of the total.

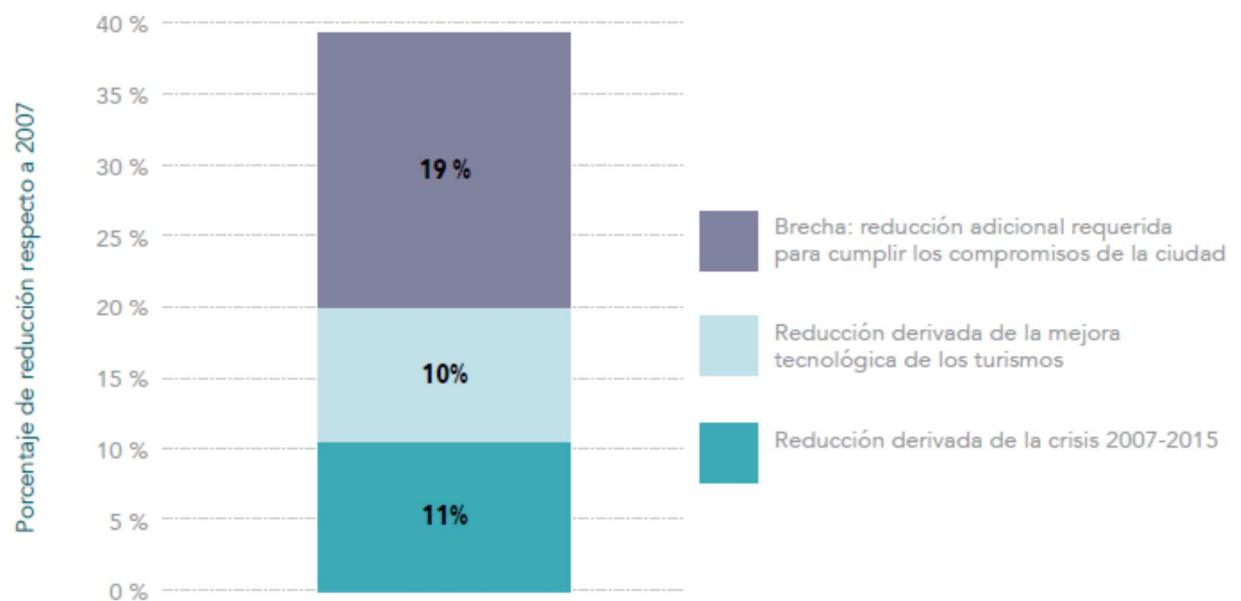


[Picture14. Distribution by sector of activity of the greenhouse gas emissions of San Sebastián in 2015¹]

These commitments pose a reduction of the city's emissions of 40% compared to 2007. As mobility is one of the sectorial objectives for the reduction, some estimations can be considered on how transition should be executed to reach a less polluting mobility model.

¹ Chart Text translation: Industria: Industry, Agricultura y ganadería: Agriculture and Livestock, Residuos: Waste; Servicios: Services; Residencial: Residential; Transporte: Transport

Although the introduction of technological improvements and the increase in the fleet of hybrid and electric vehicles will be one of the determining factors in achieving the commitments made by the city, it is no less true that technological change in the field of the automobile is not enough to reach such commitments on its own, so it is necessary to consider a change of the current model; regarding the behaviour with regard to the displacements and of a greater weight of the collective modes (especially electric buses and underground services) and active modes of transport. The following graph shows the contribution of each of the mentioned factors in achieving the agreed emission reduction level.



[Picture 15: percentage of emission reduction compared to 2007²]

Although both the sustainable urban mobility plan and the sustainable energy climate and action plan are considered the reference documents in this point, it is necessary to emphasize that the city and its metropolitan environment already has extensive

² Graph text translation:

Brecha: reducción adicional requerida para cumplir los compromisos de la ciudad Gap: additional reduction required to meet the commitments of the city

Reducción derivada de la mejora tecnológica de los turismos: Reduction due to the technological improvement of cars.

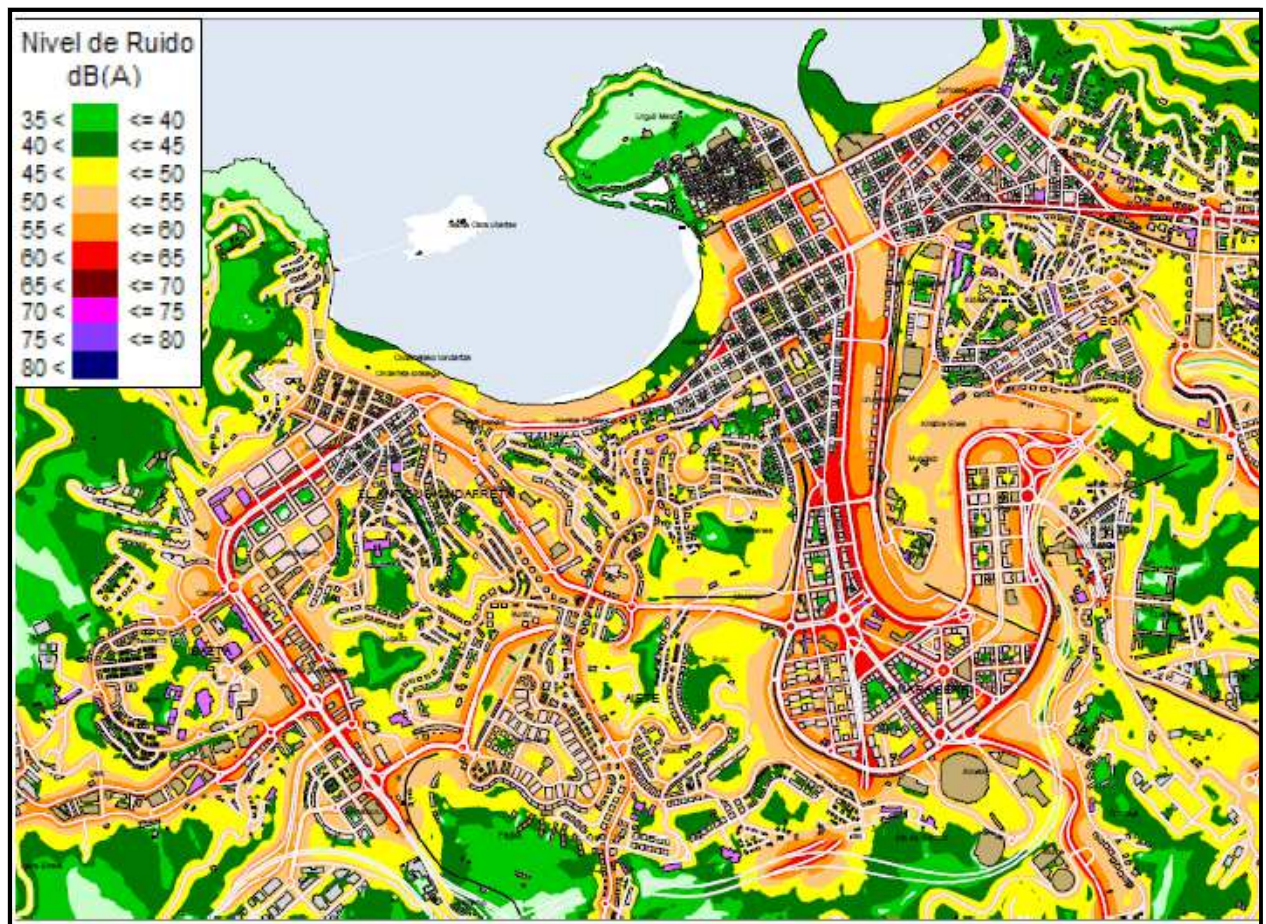
Reducción derivada de la crisis 2007-2015. Reduction due to 2007-2015 crisis.

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documentation and sectorial planning that it is necessary to align and, in some cases, review and update with the latest agreed commitments:

- 2010 General urban plan
- 2012 Master Plan for Cooperation and Education for Development
Sustainable Humanity of the Town Hall
- 2015 Donostia / San Sebastian Smart Plan 2016–2020
- 2015 Environmental Strategy Hiri Berdea 2030
- 2015 III Environmental Action Plan/ 21 Local Agenda 2015–2022
- 2016 Partial Territorial Plan of Donostia / San Sebastian (Donostialdea – Bajo Bidasoa)
- 2017 Adaptation plan to climate change
- 2017 Update of the strategic plan of the city. E2020DSS Strategy
- 2017 Tourism Master Plan of Donostia / San Sebastián 2017–2021
- 2017 Waste Master document of Donostia / San Sebastian
- 2018 Municipal housing plan

It is also worth mentioning that the study carried out to map the noise and the subsequent preparation of the noise map of the city in 2012 showed that urban traffic was the main noise source that affects the city's population. Considering the night period which is the most sensitive period to noise effect, it was concluded that the noise due to road traffic affected 22% of city's population, while railway traffic for instance, only affected 2% of them.



[Picture16. Noise map of San Sebastian in night period]

The absence of noise produced by electric vehicles is a strong reason to reinforce the promotion of EV that would reduce the indicators that arise in these types of noise studies. The action plan proposed as a consequence of the data collected from city's noise map, included the possibility of increasing the presence of electric vehicles in the city, contributing to the reduction of traffic noise levels.

Based on the commitments acquired, the SEAP proposes an action plan that, in relation to mobility, establishes four main lines of action:



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Líne ID	Generic Objectives	measurable objectives and references
M.1	development of a sustainable urban and metropolitan mobility model	Proportion of 60% of motorized journeys in public transport and 40% in private transport in 2030 in internal mobility to the municipality
M.2	strengthening of sustainable means of transport	Percentage of active journeys (pedestrian and by bicycle) of 55% in 2030 over the total of the internal to the municipality
M.3	reduction of motorized trips	Reduction of 20% of the trips made in private motorized modes in 2030 compared to current figures
M.4	decarbonization and electrification of mobility	Achieve throughout the city in 2030 the quality of air that recommends the World Health Organization [Do not exceed the 20 µg / m ³ of annual average PM10 particles in the city] Electrify the entire DBus bus fleet by 2030 20% hybrid cars in city 10% electric cars in city

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6. ELECTROMOBILITY DEPLOYMENT IN SAN SEBASTIAN PILOT

According to the different municipal plans mentioned in the previous section, the deployment of the electromobility of the city has been decided to focus on two main lines of action:

- Deployment of a recharging infrastructure
- Promotion of the electric vehicle in the city

Given that the line aimed at the deployment of the charging infrastructure provides its own deliverable (D3.7 Report on the deployment of charging infrastructure in the city of San Sebastian) in this document, we will focus on the line aimed at the promotion of the electric vehicle, although during the explanation the references to the charging infrastructure will be necessary.

It is necessary to clarify that the term of promotion of electric vehicle is a conditioned aspect to the general strategy of reducing the use of private vehicles in the city, so that the campaigns directed specifically to the promotion of the electric vehicle will have determined target whose mobility in the city is to some point unavoidable.

6.1 City's prospects towards the change to electromobility

Due to the wide scope that electromobility covers today, when considering a city strategy, it has been necessary to make a double approach in order to differentiate those modes of transport that can be used both from the public and private sectors. An approach based on modes of transport that act in the city and another approach based on the uses given to each mode of transport in particular has been considered, from the point of view of whether its use is public or private.

6.1.1. Transport modes perspective

From the picture 6 on the modal distribution of the city shown at the beginning of the document, it can be deduced that the urban modes of transport capable of making the leap to electromobility are the bus, the car, the bicycle and although it does not appear

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directly, it is It is necessary to have the motorcycle, due to the presence of this type of vehicle in the city (around 26.000 motorcycles are registered in the city of a total of 128.700 vehicles).

Without a doubt, the vehicle that has made the most progress in the city in terms of use, visibility and adaptation to urban environment is the electric bus, since its routes are already defined in the urban environment, so, up to a point, it is easier to define the requirements that must be met. In this case, there is also the advantage of working with a local company that gives the possibility to refine the required product better, making a tailor-made product.



[Picture17. Electric bus DBUS)

In this case, in addition to working hand in hand with a local company, the situation was that the company had no experience in urban transport, so all the operational parameters for the design of their vehicle have been collected from the tests carried out in San Sebastian, therefore, the vehicle received was perfectly adapted to the needs of the city.

As a result of this close collaboration, the progress made by the company has been tested in the city, which is why some of its strongest future bets have been tested in our city, becoming a perfect benchmark for them, for putting their future products in real operating conditions.



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[Picture18. ieTram irizar brand electric bus test]

Another public service that has supposed a change of mentality and attitude among citizenship, has been the introduction of the electric bicycle in the public rental system.

Regardless of the success that the service has had, for many citizens the public electric bicycle has been the first contact with this type of bicycle, which has meant a discovery, since beyond considering them a vehicle for lazy people, it has meant a change of consideration turning it into the appropriate vehicle for the topographic peculiarities that the city possesses, as it has been previously mentioned in the document, approximately half of city's population lives in hilly neighbourhoods.

In this way, people living in these hilly neighbourhoods have been able to make the most of the advantages provided by the bicycle in the city in terms of the lack of congestion problems or parking space, reducing the physical effort thanks to the electric assistance but without stopping doing a physical activity.

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From all the above, it is understandable that the public bicycle rental system has contributed in a decisive way in the sale of bicycles of this type in the city. Although, the sales data is not known, the perception on the street is undeniable.

In this sense, the city council has also become aware of the need to set an example to citizens, for which it has provided the agents of the authority (local police) with electric bicycles to carry out their public service.

The approach in relation to the electric car has taken a different path, since as previously mentioned, there is a commitment from both the SUMP and the SEAP to progressively renew the municipal fleet of vehicles. As already mentioned, the renovation began with the replacement in the local police of combustion vehicles by hybrid vehicles.

The trend was replicated to other municipal departments and thanks to the progress done by the automotive industry, the renewal of fleets has gone a step further, replacing old vehicles with full electric vehicles as has happened in the maintenance department taking advantage of the Replicate project framework.

There was a need to renew the three vehicles that were destined for urban surveillance tasks and another additional vehicle for the municipal corporation. A market study was carried out in order to ensure that the characteristics of the electric vehicles available matched the needs of the two types of vehicles that were intended to be renewed and then a public tender to award the purchase was launched.



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[Picture19. KIA Soul EV for maintenance department]

As a result of that public tender, 3 units of the Citroen Zero model and one unit of the KIA soul EV model were acquired. It should be noted that it was not necessary to establish conditions related to autonomy, since as vehicles with a mainly urban character, the market offer covered the minimum needs of the department.

The vehicles that have been in circulation since January 2017, are running without major incidents and apart from their purpose they are serving as a showcase for citizens that electric mobility is already a reality and that it is already capable of meeting the same needs as combustion vehicles.

In a similar context, we proceeded with the renovation of the motorcycles of the local police although the process of market study was more meticulous, since previously they had already made several attempts to purchase electric motorcycles but without success. Since the appearance of the first electric motorcycles on the market, sporadic tests have been done in order to evaluate the suitability of this type of vehicle at service required by the local police.

One of the peculiarities of service vehicles is that, in addition to the equipment provided by the standard vehicle, auxiliary equipment is incorporated, which, in the case of police equipment, is mainly made up of lighting and acoustic elements, thus energy requirements are increased significantly. This circumstance that for a combustion

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vehicle affects fuel consumption, has a special influence on electric vehicles since the consumption of that auxiliary equipment comes from the battery that propels the vehicle so it can limit its autonomy.

For this reason, when looking for the right vehicle, it was important to see what solution the market proposed in this regard, being the option to provide a dedicated battery the most appropriate for the interests of the service, as this way it was assured that the consumption of the auxiliary equipment would not affect vehicle operation.

Regardless of the technical characteristics that must be met, one of the key points to demand has always been to have an efficient and close after-sales service, since being vehicles intended to serve the city, they must be in operation for a long time and for that reason, the response of the brand to any incident must be quick so that its service can be restored with the least possible impact.

Given this situation, there was a period before the start of the Replicate project in which different brands were tested, most of them newly created to provide only the electrical product and in many cases did not have a significant representation in the city and they were only represented by delegations that had offered to distribute that specific product locally.

While these brands timidly broke into the world of the automotive industry, the established brands of motorcycles did not offer any electrical products yet, so there was no possibility of comparison between the products offered by those new brands and usual ones.

During the time that the tests were developed with these new brands of motorcycles, some of them disappeared from the market (Vetrix for example) that despite offering an interesting product and that could meet the needs of the operational section, we found that suddenly his local delegation disappeared, so, it was detected that with these new brands it was a risk of running out of after-sales service.

Considering this situation, it was decided that in order to guarantee the motorized service, one of the conditions to fulfill would have to be that the product offered should come from an already reputed brand that offered subsistence guarantees firstly, and to have a long-term support eventually.



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From that moment, it is when at departmental level an action plan was made for the arrival of the 6 scheduled electric motorbikes (joining the fleet of 7 motorcycles that were at that time) and given that the increase of the motorcycle fleet was going to suppose also an increase of the operating range of the local police, it was decided to acquire two motorbikes to test them under real service conditions, testing not only the current operating range that the local police had then assigned but also the one that was going to be assigned in a near future.

The process of acquiring the 6 motorcycles was carried out through an open public tender in order to guarantee equal treatment to other possible brands that could be submitted to the tender, but only BMW with its C-evolution model was presented taking into account the requirements imposed above all at after-sales service level, since today there is no official representation of any other brand of electric motorcycles in Donostia.



[Picture20. Electric Bikes presentation in February 2018. San Sebastian]

The 6 electric motorbikes provided within Replicate project framework are in circulation from January 30th, 2018 and the general performance and opinion from riders is excellent.

6.1.2 Urban User Groups Perspective

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The recovery of public space in cities is one of the challenges of this century that faces all cities for having given priority to motorized modes of travel in order to facilitate access to our cities to the bigger number of people possible. The model of city to which San Sebastian goes instead, is a configuration in which life on the streets is prioritized, so that people are offered a friendly and safe environment, trying to reduce as much as possible conflicts with other transports.

The transition from one situation to another inevitably has to take a while and that is why some of the activities are going to have to be linked to vehicles more than others. From this reason, the city hall has detected those groups that will continue using vehicles because of its service.

The first detected group was the taxi considering that it is a public service that is regulated by the local administration and therefore it is the responsibility of the city council to guarantee a good service by taxi drivers.

The work that has been done has led to practically contact the entire value chain that today comprises electromobility. Starting with the automotive companies that already offered electric vehicles, the purpose was to know the development status of each automotive company in relation to the electric vehicle, in order to guarantee the provision of a reliable product to the end user, which in this case is the taxi driver.

In order to evaluate the situation of each manufacturer, and having previously agreed with them, a test schedule was established, in which a field test was to be carried out with each of the models offered by each automobile manufacturer. This test served not only to test the offer of electric vehicle of each manufacturer, but also for those reticent taxi drivers, to test the product in real conditions of use, since the drivers in many cases have their own opinion formed of what represents the electric car for its service, mainly as far as limitations are concerned.



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[Picture21. Taxi Test carried out in San Sebastian]

For the tests, only those brands that in their range had vehicles that could provide the taxi service were considered, which is why some brands were not taken into account (Renault or BMW for example) because despite the fact that they had electric vehicles in their catalog, the vehicles did not meet the requirements of a taxi vehicle. In most cases these requirements were referred to the dimensions of the vehicle and its habitability.

Eventually, three were the brands that showed interest in participating in the test: Mercedes, Nissan and Hyundai; and the models that provided for the test were the Mercedes B-Class Electric Drive, Nissan Leaf (2016 version 30Kwh battery), Nissan e-NV200 and Hyundai Ioniq electric. It is worth mentioning that each model corresponds to a different level of evolution of the electric vehicle, with the Mercedes being the least developed vehicle, the Hyundai the most evolved and Nissan models would be in an intermediate situation.

The tests served to get a better idea about the strategic commitment that each brand had with electric mobility, since its implication was very different in the test. In this way, Mercedes offered a B250e unit for two days, one for each taxi association that operates in San Sebastian (all the taxis in San Sebastian belong to one or another association: TaxiDonosti or Vallina). On the other hand, Hyundai only had one test unit because it

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was a model that had just been launched on the market and it was provided in a private way, because it was not possible to use it as a taxi.

Special mention deserves the treatment received by the Nissan brand, since its commitment to the electric vehicle was total at least in our territory. This brand provided a unit of each mentioned model fully equipped for taxi service, to be tested for one month by each taxi association. This company also provided the necessary infrastructure to recharge the vehicles in the premises of each association.

Tests were carried out simulating real conditions of use, for which provisional authorizations were provided for the vehicles under test so that they could be used as a taxi. As mentioned above, the Hyundai model test could not be performed in taxi conditions, and those taxi drivers who showed interest in testing it had to test it as a private mode of transport without carrying passengers.

The tests were successful, which is in the end what was intended and in fact some of them had media coverage as it was understood that this awareness to taxi drivers could be disseminated to make it participate with citizenship, also taking advantage to do it within the framework of the Replicate project, with which in this way it was possible to disseminate both the tests and the project itself.



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[Picture22. Taxi –Town Hall test agreement with Nissan car dealer in San Sebastian]

As a result of those tests and the whole process carried out to know how to adapt the operation of the taxi to the electric vehicle, today there are already 7 electric taxis that are expected to operate in the city. In fact, 5 of them are already in circulation and the remaining two are expected to come into circulation at the beginning of 2019.

Other group that we have been working with closely with is the urban freight distribution. In this case the municipal influence with respect to them does not have as much involvement as for the taxi group, which is why we have not been able to carry out the process in the same way.

In any case, different forums have been organized with them, in order to inform about the Replicate project initiative as well as the different vehicle alternatives that may be available for their business.



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[Picture23. UFD Forum meeting focused on the analysis of the introduction of the electric vehicle in its sector]

In the same context, surveys have been carried out to detect possible companies that might be interested in taking the step towards the electric vehicle in order to establish work lines with them to detect incentive measures that may promote the step of this target group to the electric vehicle and actually, it is a work that continues today.

In the following table the different modes of transport susceptible to electrification that are present in the city and their possible uses are presented (whether they are intended for public or private use).

Transport Mode	Private / Public	Uses
Car	Public & Private	Taxi, Freight distribution, Fleets, private use
Public Transport	Public	Public service (Buses)

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Bicycle	Public & Private	Public bike sharing service, Private use
Motorbike	Public & Private	(Municipal) Fleets, private use

6.2 Link between the electric vehicle and charging infrastructure

When it comes to dealing with the arrival of electromobility, it is imperative to consider the electric vehicle together with its associated charging infrastructure, either from a public point of view or from the private one.

In the processes that we have carried out when planning the arrival of electromobility, both aspects have always gone hand in hand. In the contacts we have had when buying both motorcycles and municipal cars, in all communications have been present both the manufacturer of the vehicle and the infrastructure, since the recharging characteristics of the vehicles logically affect directly to the recharging infrastructure that you install.

Throughout this process there have often been needs to contrast information at the municipal level, and for this reason several days have been organized to exchange experiences, in this case with the city of Barcelona, since it is the region of Spain that has advanced the most in electromobility issues. These sessions of work and exchange have been raised in a variety of topics, in which a specific day was organized, aimed at both taxi drivers and urban distributors in order to resolve any doubts that might arise from the user's point of view.

These actors took part in the sessions:

- Manufacturers of charging points (Circutor), trying to clarify the issues relating to the installation of charging points both in the public and private sector;
- eTaxi drivers, to provide more specific information to taxi drivers, in relation to the service using an electric vehicle, both from the economic point of view, use and maintenance services, and
- members of the regional government, to inform on current and future policies applicable to the electric vehicle and the taxi.

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The director of the Live! Platform! also took part in the session, Live! is a public-private platform that operates in the region of Catalonia and that addresses all aspects related to sustainable mobility in the region, and in which electric mobility plays a leading role. The fact of hosting both public and private companies allowed to address different issues and the participation of the director was an added value for all attendees.

Another of the sessions that were organized were oriented to the operation of electric mobility for parking, which was about installation and management criteria, using as a reference the case of different facilities in the metropolitan area of Barcelona. In this session Live! Platform also participated, both by its director and by its technical secretariat which had extensive experience in the parking sector applied to the needs of the electro-mobility.

6.3 Municipal regulations oriented to electromobility

In parallel to the operational aspect, it has been necessary to define the regulatory aspects aimed at electric mobility. In neighbouring cities, the regulation has been mainly aimed at defining incentive measures in order to facilitate the arrival and transit of electric vehicles, often at the expense of other modes of transport.

In the case of our city, until the arrival of the Replicate project, the only bonus that users of electric vehicles could take advantage of was a 75% reduction in the municipal circulation tax, during the first three years of the vehicle's life.

Within the framework of the project, the general direction of traffic launched a series of environmental labels with the initial purpose of identifying the emission level of each vehicle. This label has also been a tool that has made available to municipalities so that we can establish incentive measures for those less pollutant vehicles. One of the first measures linked to these environmental labels that will be launched during the year 2019 in San Sebastian, will be the reduction of regulated parking fees for urban distribution vehicles that are full-electric.

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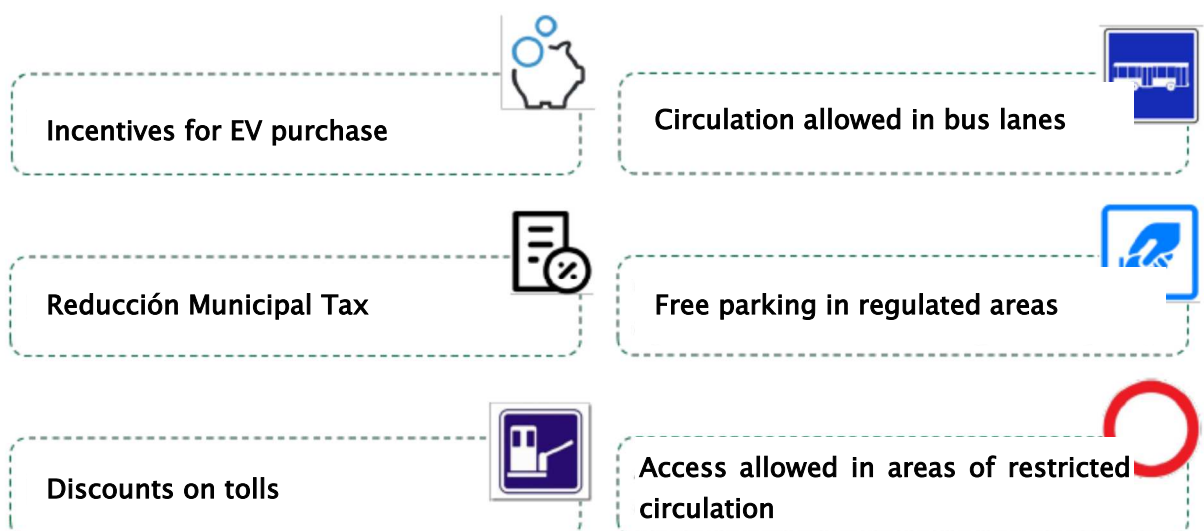


Picture 24. Environmental labels launched by the general direction of traffic at national level

Although this is one of the first incentives associated with the environmental label, the application of future linked incentives will always be conditioned to the general mobility policies to seek formulas to reduce the entry of traffic in the city, as previously mentioned.

6.4 Electromobility promotion tools

This section only aims to mention the promotional tools that have been gathered from different actors involved in electric mobility at the national level and who have contributed in a definitive way to the city's strategy..



Picture25. Incentives examples applied at national level in other Spanish regions

As discussed throughout the document, one of the main objectives of the city is the reduction of traffic in favour of expanding the public space dedicated to people. It is

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true that the measures collected encourage the use of electric vehicles in the city, but they do not contribute any benefit to the objective of reducing traffic, which is the reason why we have decided not to implement those measures that do not contribute to the general objectives of the city.

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7. INNOVATIONS, IMPACTS AND SCALABILITY

7.1 Innovation solution

The introduction of electric vehicles in the municipal fleet has conducted to a separate management of the electric fleet, given its peculiarities in terms of recharging and having to park them in specific spaces.

From the operational point of view, the use of clean vehicles for municipal use has meant an innovation in those events that require their accompaniment, mainly in sports events, since by not emitting gases, they do not have a negative impact on the participants.

7.2 Social impacts

In the case of the municipal fleets, the social impact has been very positive, since it has served to show citizens that electric mobility already can be used as a response to the daily demand that any entity may have, in this case an administration. The continuous use of both cars and electric motorcycles in the city, also serves as a showcase for electric vehicles and that electric mobility is already a reality in our city.

In the case of electric taxis, in addition to the benefits already mentioned in this document regarding electric vehicles, in many cases it has been the first contact with the electric vehicle for taxi users, and they have experienced the sensation of traveling in an electric vehicle not only from the perspective of a passenger but also from a potential buyer of the electric vehicle.

7.3 Environmental impacts

Having only data from municipal fleet vehicles, the environmental impact of these has been positive since the use of clean energy instead of polluting energy.

As of December 31, 2018, the 8 bikes have covered a total of 105.000 km which corresponds to a saving of 7,140 Tn of CO₂. It is necessary to mention that there have been periods when one of the bikes could have been out of service due to being in the workshop or at the request of the motorcycle manufacturer.

In the case of maintenance vehicles, its use has been more intensive and the mileage travelled has amounted to 60.000 km, which has led to a saving in emissions of 8,790 Tn of CO₂.

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7.4 Replication and scalability potential

The use of electric vehicles by both the local administration and by taxis has generated much expectation from the surrounding municipalities, and several municipalities have consulted and visited us to learn about the operation of use with these vehicles, with the purpose of assessing their integration in their fleet.

Some of them have been requested to be exhibited in fairs or conferences related to electric mobility, celebrated in our environment, as is the case of the GoMobility fair held last November 2018, in which one of the electric taxis was exposed. the city.



[Picture26. Hiunday Ioniq eTaxi show in GoMobility congress in 2018]

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8. CONCLUSIONS

Among all the contributions that have been received during the process carried out and that continues nowadays before the arrival of electric mobility, everything seems to indicate that in the near future it will not be only the electric mobility the alternative to the current combustion vehicles, but there will be several types of propulsion systems, so electric mobility may be only the first of the alternatives.

With the arrival of new technologies applied to the urban environment, the administration often adopts a conservative attitude before putting it into practice, to see if it is a technology that extends among citizens and in this way its implementation can be addressed with guarantees.

The arrival of the electric vehicle has come at a time when it has been considered as one of the transport solutions to reduce the environmental impact we are suffering, but beyond that initial premise, the arrival of the electric vehicle is a first contact with the new modes of mobility that will arrive to the cities, and that will test the capacity of the different actors that are part of the mobility of the cities, to adapt to what is going to trigger in many cases, a new lifestyle.

Because of the influence that administrations have in this regard, it is clear that according to the ability to adapt to these new modes of mobility, citizens will be able to enjoy a better or worse quality of life.