Deliverable 2.3

Report describing hurdles encountered in the Electromobility policy making process

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Date: **January 27th, 2015**

Version: **7.0**

Document Information

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Distribution

Dissemination level		
PU	Public	X
PP	Restricted to other program participants (including the Commission Services)	
RE	Restricted to a group specified by the consortium (including the Commission Services)	
CO	Confidential, only for members of the consortium (including the Commission Services)	

Revision history

Version	Date	Author	Description
1.0	June 13, 2012	Enrique Meroño	Initial draft.
		Stine Helms, Paul McDonald, Jitka Andersson, Alexander Kihm.	Survey contributions.
1.1	July 31, 2012	Enrique Meroño	Second draft.
		Thomas Wiedemann	Survey contribution.
		Gabriele Giustiniani	Survey contribution, Reviewing.
		Stine Helms, Paul McDonald	Reviewing,

			Strategies contribution.
		Jitka Andersson	Strategies contribution.
1.2	September 14, 2012	Enrique Meroño	Third draft.
		Stine Helms, Paul McDonald	Second Review.
2.0	September 28, 2012	Enrique Meroño	Second Version.
		Victoria Plumed	Survey contribution, Reviewing.
		Mette Brinch Clausen	Reviewing.
2.1	October 1, 2012	Simon Hayes	Indicators contribution.
2.2	January 10, 2013	Vera Silva	External review.
3.0	February 25, 2013	Enrique Meroño	First version for approval.
3.1	April 10, 2013	Enrique Meroño	Final Version.
4.0	November 19,2014	Enrique Meroño	Update. First Draft.
		Stine Helms, Ian Winning, Hilke Rosler, Kasper Brenøe Isbrand	Survey design contribution.
	November 26,2014	Stine Helms, Kasper Brenøe Isbrand	Reviewing.
4.1	December 5, 2014	Enrique Meroño	Update. Second Draft.
		Stine Helms, Kasper Brenøe Isbrand	Reviewing.
		Stine Helms, Margaret O'Mahony	Contribution update.
5.0	January 13, 2015	Enrique Meroño	Update. Third draft
5.1	January 16, 2015	Stine Helms	Reviewing.
6.0	January 20, 2015	Enrique Meroño	Final Draft.
6.1	January 21, 2015	Konstantin Engelbrecht	External review.
7.0	January 27, 2015	Enrique Meroño	Final version.

Status	
For Information	
Draft Version	
Final Version (Internal document)	
Submission for Approval (deliverable)	X
Final Version (deliverable, approved on)	

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List of Abbreviations

CP	Charging Point
DoW	Description of Work (Annex I of Grant Agreement)
DR	Demo Region
DSO	Distribution System Operator
EV	Electric vehicle
EVSE	Electric Vehicle Supply Equipment
GeM	Green eMotion
IC	Internal Combustion
OEM	Original Equipment Manufacturer
PPP	Public Private Partnership
RFiD	Radio Frequency iDentification
WP	Work Package

Glossary

CP (Charging Point): Location where the electric vehicles can be placed, in order to recharge energy from the electrical grid or other sources. The means of this interchange can be diverse, as electric plugs, battery interchange or inductive charging. The concept includes the whole equipment necessary to ensure the process of recharge.

DSO (Distribution System Operator): Legal entity responsible for operating, maintenance and developing of distribution system in a given area as well as its interconnections with other systems. It has also to provide service to a reasonable quantity of energy demand. The DSO can be supplier too, but this condition is not necessary (this last role is designed just as “retailer” along the documents of Green eMotion).

DR (Demo Region): The different demonstration sites that are participating in the Green eMotion project.

EVSE (Electric Vehicle Supply Equipment): On a charging point, the equipment necessary to ensure the process of recharge.

EV (Electric Vehicle): Mean of transportation which propulsion system is some kind of electric motor. Within the scope of Green eMotion, the concept is restricted to road vehicles (cars, trucks, motorbikes and buses).

PPP (Public Private Partnership): Private business venture or government service which is funded and operated through a partnership of government and one or more private sector companies.

RFiD (Radio Frequency iDentification): A data collection technology that uses electronic tags for storing data. The tag, also known as an "electronic label," "transponder" or "code plate," consists of an RFID chip and an antenna attached together. Transmitting in different (and standardized) frequency ranges, tags may be battery-powered (active RFiD) or derive their power from the RF waves coming from the reader (passive RFiD).

1 Executive Summary

The demo regions in the Green eMotion project work as living laboratories and since they are remarkably different (location, culture, technology…) their results serve as precursors of the future European scenario when the market will be mature.

At the moment we go through the starting phase of Electromobility in Europe and face the situation that the uptake is much slower than expected. This report analyses hurdles that might hinder a faster market development based on the experience in the various demo regions in Green eMotion. The results in this report are based on surveys and therefore reflect rather the perception of the Green eMotion partners than statistically approved data. The findings reported here were also relevant for the report D9.7 "Policy evolution recommendations and stakeholder actions towards effective integration of EV in EU"[1].

Following there is a brief summary of the hurdles found by the different demo regions and respondents and the solutions proposed in order to develop proper policies in the future.

Vehicle related hurdles and proposed strategies:

- *Batteries, high cost:* Increase of the demand to help creating an economy of scale.
- *Maintenance and repairs, faulty EVs and lack of experience:* Increase the demand as previously; another option would be establish a minimum number of repair centers (by number of electric vehicle sold) that cars manufacturers must to make available through mechanisms that each region may consider most suitable.
- *Low range:* development of an optimal safety net trying to adjust as far as possible the deployment of infrastructure to the sales volume of EVs; promotion of EVs to the public, EVs are not for all uses but very suitable for some uses. In this case increasing of the demand is a solution will result in improving the technical capacity of the battery, combating range anxiety and the associated problems of heating and cooling.
- *Previous negative experiences with electric cars:* promotion of new cars; user experience sharing.

[1] http://www.greenemotion-project.eu/dissemination/deliverables-evaluations-demonstrations.php

Infrastructure hurdles and proposed strategies:

- *EVSE high cost due to the novelty of this technology:* Increase the demand of EVSE by stimulating private initiative with subsidies and a well-defined market regulation to boost the investments and creating demand in municipalities by subsidies and including environmental requirements that force to change part of the existing fleets into EVs.
- *Infrastructure, the plug in the CPs could present compatibility problems*: the solution is the adoption of mandatory standards in the plug. For the case of national regulators, it is important to comply with European laws.
- *EVSE lack of experience in the technical crew in charge of installation and maintenance:* Proper training and creation of generic manuals, something easier once the normative for EVSEs has been fully developed.
- *Infrastructure development, lack of unified criteria about where to install the CPs:* The municipalities are supposed to lead the effort for deciding where to install the different CPs, using clear rules and avoiding, where possible, the paperwork.
- *Infrastructure development, CPs underused because there are too many CP and/or locations were not adequately selected:* the number of the parking places for CPs should be adjusted to the sales volume of EVs. Another option is searching for business models that can use those points to the public via. If possible the selection of the parking places should be made in collaboration with enterprises that own parking places, like large commercial surfaces that also could see this as a way of promotion
- *Infrastructure, billing system and Clearing House:* The best solution is the use of the same billing system in all the regions. If this is not possible, the adopted billing system must be easily adaptable for the users from an outside region. Clearing House adoption should be evaluated in terms of the generated benefits compared to its costs.

Incentives, Marketing and Communications hurdles:

- *Lack of coordination of efforts in the development of the electromobility strategies*: It is important to set realistic targets, select the stakeholders that could be involved in the process, creating the proper communication channels and discussion groups, and configure a control entity to monitor activities and propose corrective measures.
- *Even with the co-funding the profits from the installation and operation of CPs are not attractive:* The municipalities should liberalize the investment and operation to private agents and define a clear business model

- *The absence of normative rules to install CPs in public spaces generates a sensation of lack of support for the potential EVSE Operator*: The normative rules to install CPs in public spaces should be active as soon as possible. In order to achieve this, the EC should have available some guidelines.
- *The EV dealer has no clear idea about how to access to the financial incentive*: Some info about the legal implications has to be delivered, including of course the tax reductions and other possible benefits, and also how to deal with them, in order to maximize the promotion.

2 Introduction

For a better understanding of this document, it is recommendable to have a glance at the document D2.1[2] called *Visions and Strategies of the Demonstration Cities*. On that document there are specific descriptions of some of the demo regions that have taken part on this deliverable, and consequently this new document is an extension for many of the previous ideas developed in D2.1, complementing and expanding its content in a comprehensive way.

Regarding the Green eMotion project, this document covers the works included in the task T2.3 (and update T2.5), seeking the **identification of hurdles arising during the different stages of implementation** when rolling out an infrastructure for EVs. This is done through the gathering of the experience from members of the project and external stakeholders, **in order to let the policymakers understand where these problems come from**, and also will serve as a **list of recommendations** based on the experience of both the stakeholders involved on each demo region and the external ones.

All surveys are documented in a non public annex to this report.

Appendix I: Complete list of internal survey answers
Appendix II: Proposals and actions about strategies. Solutions from partners
Appendix III: Online Survey answers and statistical analysis
Appendix IV: Other contributions for Electromobility experiences

2.1 Deliverable proposed goal

The demo regions in the Green eMotion project work as living laboratories and since they are remarkably different (location, culture, technology…) their results serve as precursors of the future European scenario when the market will be mature.

[2] http://www.greenemotion-project.eu/dissemination/deliverables-urban-concepts.php

The respondents who have filled out the questionnaires[3] represent different type of entities, so they can identify all the problematic aspects of the life cycle from design, project, implementation, maintenance and disposal of the composing elements, for a given demo region. Their experience, gathered in the form of surveys is the core of this document.

The first survey (see Appendix I: Complete list of internal survey answers) was oriented to the extraction of hurdles taking into account the experiences of the partners of the Green eMotion project in their demonstrator sites. This survey was completed with a second document (see Appendix II: Proposals and actions about strategies. Solutions from partners for details) with information about the strategies used to overcome these hurdles by the same partners.

The online survey (Appendix III: Online Survey answers and statistical analysis) was focused on hurdles and strategies to overcome them, but from an electromobility policies point of view, and it was completed by members of Green eMotion and various external stakeholders. Besides, the information provided by ESB "Supporting the Development of the Electromobility Market: Lessons from the Irish experience", about ESB Electromobility experience, has also been utilized (see Appendix IV: Other contributions for Electromobility experiences.) for the extraction of hurdles and strategies to overcome the hurdles.

2.2 Hurdles and strategies

This document has been developed around the concept of hurdle. The hurdle is a problem or complication that could have provoked changes in the initial plans of development of demo regions, as well as delays or even in extreme cases, the cancellation or failure of the deployment of the initiative.

The identified hurdles and strategies to overcome these hurdles are widely explained in the chapter 3 and 4 respectively.

[3] See the Appendixes I and II for respondent numbers and how representative are the gathered data.

2.3 Methodology.

This document has been created for the purpose of evaluating the collected relevant information about the knowledge acquired by the partners integrating the WP2 on the Green eMotion project initially, and then the knowledge obtained from the respondents of a general Survey designed by a team of WP2 members. This was done in four steps:

1. A survey designed to gather the difficulties and barriers found during the installation of CPs was completed by the companies that took part from the D2.3 document.
2. This information was analysed and presented in a comprehensive way, thus creating a guide to overcome the problems found by the partners.
3. To obtain the necessary **representativeness** for the statements and recommendations in the policies, a second survey (in this case an online survey) including the most important topics of Electromobility but aimed on policies and strategies was completed by members of Green eMotion and various external stakeholders.
4. The info from the survey and the information provided by ESB “Supporting the Development of the Electromobility Market: Lessons from the Irish experience was analysed so it could help to complete the current guide.

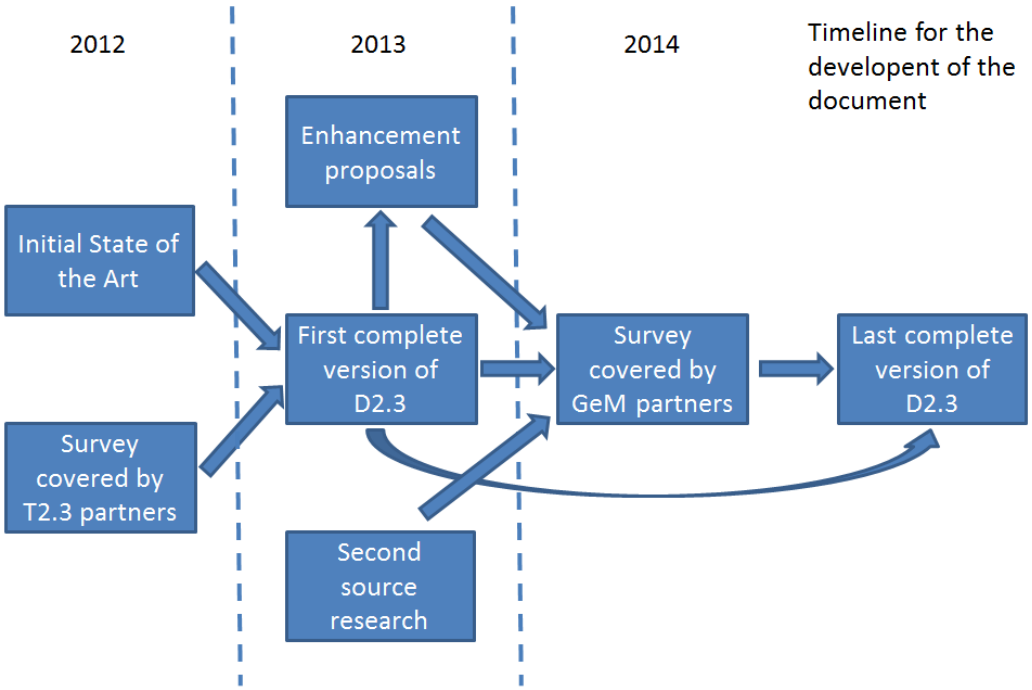

Figure 2.1: Methodology of the document creation

The initial survey was completed by a complementary document in the form of a "successes" survey, and together they will support the definition of strategies in order to overcome these hurdles, therefore taking advantage of the successes.

The online survey was developed by the WP leader along with the task leaders, with the help of ECN and the external collaboration of other GeM partners who provided the lists of potential respondents. For more info on the survey, check *Appendix III: Online Survey answers and statistical analysis*.

2.4 Target of this document and specifications.

This document is strongly oriented to two target groups:

- Organizations that could be directly involved in the process of creation of a new demo region.

- Regulating agents or policymakers which areas of interest include the installation of EV systems.

Both groups are formed by many stakeholders like manufacturers, utilities, city councils, energy resellers, governments, European institutions, R+D companies, universities, etc. As a logic consequence, this variety of targets is represented in the nature of the partners responsible for this document.

The companies and organizations involved in the designing of this document receive funding from the European Union Seventh Framework Program FP7/2007-13 under grant agreement no. 265499[4].

2.5 Completed work.

The hurdles appearing during the instalment of a new demo region have been identified, collected, analysed and then reported and presented inside this document. The core knowledge for the realization of the deliverable comes from the surveys completed by the partners and related stakeholders, as well as their advice and experience on similar issues.

These strategies will be complementary to the efforts made in Green eMotion project. Meanwhile this document treats the electromobility issues as a whole, the different work packages contain deliverables with specific contents regarding some of the foresaid electromobility issues. For a better understanding of the extension of this relation between the results of this document and the results from other work packages, a couple of documents can be referenced:

- D4.4 “Guideline for infrastructure deployment”[5]
- D7.6 “A common methodology to make developments in accordance with EV/ infrastructure standards”[6]

[4] You can read more about the project at www.greenemotion-project.eu.
[5] http://www.greenemotion-project.eu/dissemination/deliverables-infrastructure-solutions.php

It must be stated that, due to the early stage of development and investigation in most of the demo regions across Europe, there is still not enough information and experience to create what could be an ultimate document about all the possible hurdles that can appear and how to overcome them. There are simply many events and situations that have yet to be explored and evaluated, like the consequences of an irregular distribution of EVs, the wearing of components in cars and facilities, reevaluation of new Electromobility normative or the creation of regulatory agencies for roaming.

Anyway, even with this lack of complete set of data and return of experience, some of the main problems have been identified and classified and can be used as a valid starting point in future projects, thus the goals shared with this document would be easily complemented using this report as the reference.

2.5.1 Influence of market maturity on the deliverable.

The works comprised into the Green eMotion activities are being developed between 2011 and 2015. The scenery from the years in which GeM has been planned carefully has changed very fast: the previsions for market evolution have become obsolete, especially considering the numbers given for EVs sold during the actual period of time. Besides, the European legal framework is changing, and the EU efforts are moving forward also to other alternatives in transport like fuel cells and hybrid vehicles.

Therefore, **it is complicated to obtain references of usage and experiences from both users and policy and infrastructure implanters**, because of the **lack of previous experiences and info** about the matter that in many cases they are the consequences of the slow development for the electric vehicle market. From the point of view of the Green eMotion project, **the problems associated to the lack of market maturity have not prevented the partners to obtain a valuable insight of the European electromobility** and acquire the data necessary to **elaborate recommendations aimed mainly to the policy makers**, and considering that they can be valuable also for the whole stakeholder group.

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[6] http://www.greenemotion-project.eu/dissemination/deliverables-standards.php

3 Results and comments from the surveys

The purpose of this chapter is to combine the information obtained through the surveys (see Appendix I to III) into a structured document in order to provide a European view about the hurdles found on each of the areas considered.

The GeM members working in T2.3 were asked to fulfil a Survey with comments about the policies and strategies that they were applying (see *Appendix I: Complete list of internal survey answers*). Seven of the task partners completed the survey and gave advice about the related strategies. Then another survey, online in this case, was done by various stakeholders (see *Appendix lll: Online Survey answers and statistical analysis*). It was offered and promoted to more than 500 different entities related to electromobility, ranged from utilities to car manufacturers, municipalities, research centres…158 answers were registered, 19 of them fulfilling the whole survey. Besides, the information provided by ESB "Supporting the Development of the Electromobility Market: Lessons from the Irish experience", about ESB Electromobility experience, has also been utilized (see Appendix IV: Other contributions for Electromobility experiences.). The whole data analysed to be shown in this document. Consequently, the assertions and conclusions in this chapter and the following are the sum of the experiences from the respondents of both surveys.

In this section the hurdles have been distributed according to the following structure: EV, infrastructure and Incentives, marketing and communication.

3.1 Electric Vehicle.

This section is referred to the passenger car EV, the type of EV in which the policies of electromobility focused according to respondents.

3.1.1 Batteries.

There are a significant number of issues identified regarding EV batteries. The main hurdle is the concern about issues such as the **capacity of batteries** and so the low range of the cars. Other important issue is the **possible damages to the batteries on fast charging** (it might be

necessary to alternate between fast charging and slow charging in order to prevent these damages)[7], and **the recycling of old batteries** (they need the same treatments as the traditional ones). In general, the unknown issue of **long term performance and residual value** may be affecting batteries sales, and therefore EV sales.

Regarding batteries there are problems linked to users too. The capacity of batteries is strongly related to **"range anxiety" factor**: users are concerned that their maximum journey distance is longer than the battery can last, and that the available driving range and installed infrastructure will not be sufficient. Moreover, long charging time in slow charging mode is also a cause of concern.

3.1.2 Maintenance and repairs.

In certain demo regions the earliest **EVs incorporated were faulty** since the production of these vehicles is still in early stages of development so they cannot offer the same reliability as traditional cars. This problem is more noticeable in retrofitted cars. More recently OEMs have been producing more reliable EVs.

The **lack of experience of maintenance services** is another worrying problem: the supply of these services is limited because not all vehicle dealers or garages are trained in servicing EV models.

On the other hand the maintenance of EVs is far cheaper than IC one[8]: **EV engines avoid many mechanical operations**, such as replacing oil, oil filter, air filter, fuel filter, etc.. This fact

[7] Interview to Mark Perry, director of product planning for Nissan Leaf. (http://www.hybridcars.com/13-key-questions-and-answers-about-nissan-leaf-battery-pack-and-ordering-28007/)

[8] There are some suggestions from reports generated from private companies as FedEx (in FedEx, Annual Report 2011) and public ones as the French Postal Service that corroborate this point for their own experience with fleets of EVs. The issues reported by City of Copenhagen regarding "first generation" EVs can be considered of different nature on origin (lack of experience of EV manufacturers mainly).

could compensate for the problems with the lack of experience of maintenance services and the faults on new EVs.

It is necessary to emphasize that the problem of the maintenance is not always connected to the final user. Demonstration schemes based on renting transfer the problem to the EV owner, encouraging the potential users to try an EV.

3.1.3 Users.

The acceptance of EVs has been favourable in general terms. However, there is a very strong concern about "**range anxiety" so this is perceived as the main hurdle in the development of EVs**. Correction procedures are being made to help correct this: one of these corrective measures is the increase in numbers of CPs deployed; another is the alternative future use of other charging systems like battery swapping or fast charging.

There is another problem related to the **temperature** during winter, because switching on heating could reduce the battery durability considerably. On southernmost countries the air conditioning in summer may increase the consumption and so effectively reducing the time of use from the batteries.

3.1.4 General considerations about vehicles.

There is an remarkable difference between the first and second generation EVs[9], pointed out by demo regions with longer experience in integration of EVs. **Older cars were expensive, sometimes unreliable and hard to be repaired**. Thanks to these experiences there is something to compare with, and **modern EVs have become better in all senses**.

[9] Division between the electric cars manufactured before 2010 (first generation) and after 2010 (second generation). The first generation are mainly retrofitted ICEs and in most cases done by small manufacturers. The second generation include mostly commercial EVs specifically designed by large manufacturers.

Unfortunately, they are still very expensive, and the **incentives are considered to be insufficient**. As it has been commented yet, **the low range of the EV** is an important hurdle.

Moreover, the whole issues regarding the battery generate the greatest hurdle regarding EVs, considering that final users seem to consider an EV in the same way as a traditional IC car.

3.2 Infrastructure.

3.2.1 EVSE: market model

Considering the issues about licenses and permits, the fact that in some market models the eligible places to install access public CPs were owned by different kind of companies and institutions did not facilitate the deployment of infrastructure. It is clear that the different market models in different regions do not fit well together, i.e., some way of interoperability should be created between these different market models.

Even though there are some regulations concerning the different business models, it is usually difficult, especially in the case of CPs in public places, to answer three important questions for the regulation issue:

- Who is the owner of the infrastructure?
- Who will assume the costs of this infrastructure?
- At what price? (and if it's related with the real costs)

Besides, for the case of public access infrastructure, at short or midterm, it is important to clarify who are going to pay the deployment of the associated services, the legal figures behind the charging services and also the energy prices (general prices and subsidies or even free charging). While these schemes are not clarified, companies will be reluctant to implement such type of services.

3.2.2 Infrastructure Development and Urban Space

The management of **free parking place**, the **CP locations** and **the urban planning** are elements to consider during the design of electromobility roll-out strategies, especially at a local level, but under the guidance of norms that homogenize patterns of electromobility deployment.

The management of the urban space has some problems attached, like the **scarcity of available parking spaces or the decision about where to deploy a CP** (and how many of them). It can be also included the periodization in urban planning, affecting this both the public spaces and the private ones (the CPs at home).

Other problems that can result in a slowing the EV deployment are the need of many CPs at certain locations, high prices on equipment and/or equipment supplied with important delays and with faults. The fact there is no sub metering systems available in some locations caused some issues related with the identification of points with enough power capacity. On the Online Survey also it was indicated the lack of technical knowledge of installers as an important hurdle: technical crew in charge of installations, and also of maintenance, makes mistakes due to inexperience or wrong design.

Moreover, there is a lack of guidelines about where to install CPs that represents another barrier.

Otherwise, in some regions, extra CPs are required because there are many EVs and the number of CP is not sufficient.

3.2.3 EVSE deployment: technical problems

With only a few exceptions, no clear strategy for the selection of the charging system type was observed in the projects developed by the different partners. In fact, due to the lack of standards at European level (there is some standardization at national level in some countries though) the main criterion used to select the plug type was its availability. The main consequence to this hurdle is that the infrastructure is not harmonized and may become obsolete in a very short space of time. This is also true when devices are installed according to legal rules confined to a country level. These country specific rules could change in order to comply with new European regulations.

Another hurdle to be considered is the cost of the EVSE. This cost can determine what system to select, so some of these systems will be therefore rejected.

In some regions, other types of technology were considered, as inductive charging or fast charging, but these were in most cases discarded for various reasons. Barriers such as high costs of installations, the search for suitable places for CPs, and some further problems related to the lack of experience in installations with the technology often constrained the choice. In particular, inductive charging technology was not considered to be mature enough, however, in Dublin there will be trials on this technology circumscribed to the Green eMotion project.

Some of the hurdles attached to the technical issues cannot be directly affected by the use of policies available by the policy makers, like the technological development of the new elements (infrastructure and vehicles). The compatibility issues can be easily solved through the pertinent technologic normative, like in the case of the plugs standardization or the definition of charging modes that will help the manufacturers involved.

3.2.4 Billing System.

Regarding the billing system, one of the main issues is the payment procedure. Currently the discussion about the clearing house, RFID or payment (cash or credit card) option continues, and a majority position has not been defined[10]. Several hurdles such as the lack of standardization, the independence from the rest of the infrastructure, the cost of the commissions on credit cards (being this cost higher than charging costs in some situations), the confidential issues concerning the mobile phone payments or the lack of information about who the owner of the selling device is, were observed. The problems vary with the billing system type. Regarding mobile phone, there could be a confidentiality problem, for example mobile companies could know who the clients of the different utilities are. Also some users could be

[10] There is a prototype design of clearing house and market place in Green eMotion project, inside the WP3, that can be consulted for further detail. See D3.2 “ICT Reference Architecture” at http://www.greenemotion-project.eu/dissemination/deliverables-ict-solutions.php.

reluctant to the payment using the mobile phone because they think that carry a security or confidentiality risk. On the other hand the use of credit card incurs a cost of bank fees that could be higher than the cost of the charging, while this system is not sufficiently established and has little traffic transaction due to this issue.

Before the deployment of CPs, this issue was analysed in order to cover some points like security, compatibility, multiple providers, roaming, and some others that have been identified in European electric mobility projects.

Currently, the final billing systems chosen included both RFiD tags and integrated prepay and this choice was driven mostly due to the short-term availability and fast solutions.

Regarding physical devices needed on the billing system, some security measures have been integrated into the CPs. This increase of complexity in the system, however, has a negative effect on the deployment of the charging infrastructure.

Other decisions about billing system, such us clearing house, should be evaluated in terms of the benefits generated compared to its costs.

The best solution is the use of the same billing system in all the regions. If this is not possible, the adopted billing system must be easily adaptable for the users from an outside region. Clearinghouse adoption should be evaluated in terms of the benefits generated compared to its costs.

3.2.5 General considerations about infrastructure.

The most common problems concerning infrastructures are the reluctance of private owners and public institutions to free places to install CPs. This problem will increase in the future along with the needs of more CPs, and in some cases the installation of infrastructures will be mandatory. (Several countries have defined that for the new buildings – for example every new apartment building, commercial places, etc. needs to have a minimum of places EV ready)

Another problem is the lack of interest and information shown by possible stakeholders. This situation appears in the other elements considered (Vehicle, Incentives, etc.) too, but it should be mentioned that this lack of interest is always advisable in the first steps in the introduction of new technologies.

3.3 Incentives, Marketing and Communications.

3.3.1 Incentives and other strategies.

Different strategies are used by municipalities and other public institutions to promote the deployment of EV: economic and non-economic incentives, strategies of placement of CPs, etc.. These strategies aim to remove some of the hurdles already mentioned but, at the same time, they may cause other problems in their implementation.

The **lack of a clear interrelationship procedure** resulting in lack of agreement between the different government stakeholders, is an especially problematic hurdle regarding the strategies application (in the online Survey, the 41% of the respondents considered that the coordination between the central government and the regions government is not sufficient effective). The cross-functional nature of EVs means that successful operation of a large scale fleet will span several departments, including energy, transport and environment department. While these departments are all in favour of the benefits that a large and efficient EV fleet would bring, the framework for close collaboration and interoperation is not always in place. In some regions some efforts towards Electromobility are even overlapped or ignored by different public institutions.

The access to restricted areas, the use of especial lanes and the reservation of parking places are good non-economic incentives to promote the electromobility, but in all these cases it is fundamental to consider the public perception of the measure because although they are measures that will be welcomed for potential users of EVs, they will **be badly perceived by users of conventional vehicles** that could **consider that their rights are reduced:** the existence of exclusive parking places for EVs meant fewer places to park conventional ICE cars, the locations were not adequately selected because the CPs were underused and, also, it was controversial to have EV parking places allocated with EV charging infrastructure standing empty when ICE cars were not allowed to park there. According to the results of the online Survey, these three measures, although they have not been implemented largely, are considered quite effective, especially the reservation of parking places measure, which was considered effective by the 69% of the respondents.

Regarding the financial incentives the main hurdle is that **the funds available are always limited**, and so the primary goal is to maximize the effect of the use of them. The problem, after considering the real necessity of these supporting measures, is to allocate the funds in the best possible way. The subsidies to buy new cars is perceived as the best way to encourage the

potential users to choose an EV instead of an ICE, but it is very important not to neglect the subsidies to install the infrastructure

On the other hand, the tax policies work correctly together with the financial promotions, overcoming the same financial hurdles (price of cars and infrastructure). The effects would be eventually less important, but the direct costs and the need of liquid funds are minimized. The problem with taxes could come from the fact that there could be legal issues to avoid, like the evaluation of the fairness of the actions or the normative imposed by superior instances.

In all these strategies and policies, different problems are frequently encountered, as can be drawn from the results of the online survey. The **lack of clarity and the lack dissemination of the measures** is a hurdle present in many of the strategies to be applied. Moreover, **some strategies cannot be implemented the same way in different regions** inside a country, complicating the homogenization of these measures on a national level. Another major problem is that**, even with the co-funding, the price gap between EV cars and ICE cars was still too high**. Also, regarding the surveys, in the most of the regions funds were not sufficient to cover the demand by potential EV users or applicants for a Grant.

3.3.2 Marketing and communication.

Other strategies of public institutions are intended to raise awareness of the benefits of the EV use. The elements to consider for this type of strategies include the usage of owned EV fleets, that is considered one of the best promotional actuations, the management of contracted services with EVs, the participation in EV projects, as long as without it there would not be chance to obtain real usage data, the dissemination activities, and the necessary deployment of infrastructure.

The policies of promotion are the envelopment necessary to give visibility to the actions for any initiative public or private which goals would include the general public. However, as it was noted in the online Survey, there are too few organizations trained to communicate the EV features and benefits to the general public.

The success of these measures would be measured in how the perception of the electromobility will change amongst the citizens, overcoming the hurdle of the **lack of knowledge** and generating a **sensation of confidence with the new technologies.**

3.3.3 General considerations about Incentives, Marketing and Communications.

There is an interesting experience in relation to the use of older EVs, which may be seen as advice regarding the success of the development of EVs and their infrastructure, and a lesson for getting things done properly before setting up a demo region. It seems that the problems observed with older EVs (technical failures and very low range) generated in some cases more reluctance in users that had bad experiences with them.

3.4 Indicators.

3.4.1 General description.

Some indicators have been defined in order to give an objective measure of the degree of success in the installation done in a demo region. Finding indicators of success or failure of pilots can be very difficult (there are no indicators clearly showing the success or failure).

The indicators have been divided into two separate groups, for tangible and intangible indicators. This section has not been completed by all partners, so it has been obtained a limited number of responses.

The first indicator is the increase in the number of EVs in each demo region and/or CPs installed during the past two years. The success should be measured taking into account how large the increase in CPs has been in the range of the last years, and the numbers of CPs themselves.

In a DR the number of CPs was 182 in 2011 (data from 2010 is not available). In another DR, the increase in the number of EVs is 6 (15 EV in 2011 vs. 9 EV in 2010). Another DR has increased its number of EVs in 20 units. These are normal numbers considering the early stage of development, and the fact that the concept of demo regions just denotes a handful of CPs to generate useful data.

The second indicator is the Growth Km/EV in a period of 2 years. This represents the increase of the use of EVs, from testing and trial numbers, to everyday uses for the EVs being controlled that would give larger numbers each year. Unfortunately there is hardly enough data to make

considerations about it. There are not enough EVs in the DR or these EVs have no equipment capable of measure.

The third indicator is Economic target achievement. It is true that the original concept for demo regions is just for testing the different issues that can arise regarding the EV charging environments, but it must not be forgotten that there have to be some kind of benefit (especially long term benefits for the case of promotion and advertisement) or the whole system would be unsustainable. Right now, as long as the exploitation of charging has not begun yet, there are no results.

For intangible indicators, the first one is a change of habits of users or increasing popularity of EV in the target population. It is the use of the EVs what will grant success to the whole concept of Electromobility, so if the potential users are not satisfied, it is because something is being done wrong. In the survey there are some positive clues, as some willingness in changing mobility attitudes has been detected, and so has modification of plan travels for future EV use.

The indicator of decreasing of range anxiety in users should be given as a perception of how important it is for these EV users that there is a risk the car may have a smaller driving range than traditional IC cars. As it was indicated in the table, some surveys among EV users and potential users too are necessary to fulfil this indicator. Right now, this indicator has no comments from the surveys.

3.4.2 Value of indicators and their relation with hurdles.

It is easy to understand that the relation between hurdles and indicators is of many-to-many sort of. Each and every hurdle gathered through the definition of this document will affect all of the indicators selected to measure the progress and success of the demo region being developed. To get a visual idea about how strong is this influence, the relation can be expressed in the form of a relational table (see Table 3.1: Relation between indicators and hurdles).

Indicators	Infrastructure	Vehicle	Incentives, Marketing and communications
Number of EVs	++	++	+++
Growth km/EV	++	+++	++
Economic target achievement	++	+	+++
Change in habits of use*	++	++	+++
Decrease of range anxiety*	+++	++	++
Number of CPs deployed	+++	++	++

Table 3.1: Relation between indicators and hurdles

The values range between light influence (+) and strong influence (+++). The intangible indicators are marked with a *.

The values reflected in the table are self-explanatory if it is taken into account what has been considered into each description of the hurdles. The report is not going to go into detail, indicating each and every relation between hurdles and indicators as long as it will not deliver appreciable results.

Number of EVs.

The indicator just can properly measure the increase on EV numbers directly because of the implantation of the demo. When the demo doesn't include the EVs to be used, so they are going to be hired or bought by third parties, there could be inferred some relations between the indicator and the hurdles: this is especially true on hurdles related to Incentives, Marketing and Communication, just because the solutions applied here tend to obtain an immediate reflection on EV sales, meanwhile the overcoming of the other hurdles takes longer to be assimilated by the users. The fact of watching a large quantity of EVs in use along the streets is a powerful mean of advertisement.

Measurement: There are two possibilities. First, when the demo includes the EVs to be used, the number is fixed, so the modifications will just be reflected into the documents and data from the project. But if the demo relies on the availability of EVs directly unrelated to the partners of the project, it is necessary to monitor the using of the infrastructure (parking place usage, CPs data) to obtain the increase in the use of EVs for the selected demo.

Growth of km/EV.

The intuitive idea about the influence of the hurdles on this indicator is that solving the issues concerning the vehicle itself is a major boost to the growth of kilometers per EV. For infrastructures, and especially for Incentives, Marketing and communications, there is some influence, and considering that the value is a mean measure of the overall use, the relation with the marketing becomes quite clear.

It is true that in a certain demonstrator the evolution of this parameter could only exist in case of adding new EVs with better performance or evolved technology. A minor way to achieve better performance is an enhancement on the driving behavior for the users, but this would be noticeable once they get used to drive them.

Measurement: it is necessary to gather data from the service providers in order to get the total numbers, so these data could be obtained directly or indirectly. The measure would be calculated as the arithmetic mean of the kilometers traveled by the EVs in a specific EV Demo Region

Economic target achievement.

There have been almost no commercial experiences regarding EVs. In fact, most of the previous experiences regarding this issue could be included into two simple groups: one is the group of experimental developments, with no financial goals but technological ones, and the second group of projects realized with demonstrative purposes, where the costs were covered by institutional sources (national and/or European). As a consequence, and to the date, the benefits from previous experiences were of knowledge nature, not financial. Anyway, it is expected a bigger impact from the hurdles rose inside the Incentives, Marketing and communications group: adjustments on pricing, grants and subventions will strongly modify the values for this indicator, and the non-profit nature of most of the actual demonstrators just multiplies this effect.

Measurement: In this case the grants and subsidies could be or not included in the final numbers. So, in the case that the subsidies are not included this indicator could be measured in terms of % of revenue, being this calculated as (revenue – expenses)/expenses, where the revenue represents the money obtained directly and indirectly from the system, and the expenses the total cost of the system. The simplest way to take an overall indicator is to offer just the difference between costs and benefits, where the benefits would include the subsidies too. Anyway, the standard way to calculate this is including the incentives into the calculation.

Change of habits of use.

The first of the intangible indicators is directly related to the paradigm shift in transport, and should reflect the change in the mentality of the EV users. Consequently, the effect of marketing and communication is of greatest importance in this case.

This parameter could include: changes on mean of transportation, from IC vehicle to EV or less polluting one (like hybrid cars), increase on the use of public mass transport, evaluation of different alternatives for long distance trips, open mind on new clean technologies, etc.

Measurement: it could be helpful to gather information from the users of each demo region, so the answers could be transformed into useful data. Right now, the number of these surveys developed by the different stakeholders is uncertain, and there are not answers available. The only sources to get some data for the indicator are the vision and experiences from the stakeholders running the pilots.

Decrease of range anxiety.

This intangible indicator has become one of the main topics regarding the lack of EV penetration issues, so it gives off a good measure about if the corresponding demo is going on the right direction. Solving the infrastructural hurdles is the main source to affect this indicator, followed by the informative and educational campaigns covered in Incentives, Marketing and Communications.

Measurement: like the previous one, this indicator can only be measured through the use of surveys on EV drivers. To offer a concrete number, there are many ways to obtain it: for example, it could be offered a mean “safety distance” in Km in which the drivers feel “safe” to use their cars, or they could simply be asked about in which distance they consider that their EV should be substituted back by an IC vehicle. Said this, these surveys should be done in order to get these data.

Number of CPs deployed.

The number of CPs deployed is strongly influenced by the hurdles in the roll-out of the infrastructure. This indicator, along with the number of EVs, could be very useful in order to know how many data is going to be collected during the demo. Even though the indicator is indirectly related to the number of EVs, the relation in numbers between both of them can offer an idea about the distribution of CPs, the kind of use and the target public of the project. For example, if the demo were oriented to fleets, the number of EVs would be much higher than CPs. In case of having some CPs installed in private garages; the relation in numbers could be

even one to one. Or one can think about an electric public mass transport: there could be 2 or 3 CPs covering a route, for just a single EV. The growth of the CPs deployed respecting the original number could indicate that the problems caused by barriers are being solved.

It is necessary to indicate that there are fixed numbers proposed by the EC about the minimum quantity of CPs required on a country in the horizons of 2015 and 2020, so the contribution of the newly installed CPs has to be taken into account considering also these goals.

MS	Number of charging points	Number of publicly accessible charging points
BE	207	21
BG	69	7
CZ	129	13
DK	54	5
DE	1503	150
EE	12	1
IE	22	2
EL	128	13
ES	824	82
FR	969	97
IT	1255	125
CY	20	2
LV	17	2
LT	41	4
LU	14	1
HU	68	7
MT	10	1
NL	321	32
AT	116	12
PL	460	46
PT	123	12
RO	101	10
SI	26	3

SK	36	4
FI	71	7
SE	145	14
UK	1221	122
HR	38	4

Table 3.2: Numbers of CPs (in thousands) suggested for 2020 goal[11]

In the new European Directive: Directive 2014/94/EU of the European Parliament and of the Council of 22 October 2014 on the deployment of alternative fuels infrastructure, it is indicated that the number of recharging points will be established taking into account the number of electric vehicles estimated to be registered by the end of 2020 in each Member State. Regarding this Directive, the suggested number of recharging points should be equivalent to at least one recharging point per 10 cars, so surely in many cases the number of charging points will be lower than the one in the table.

Measurement: fortunately, the number of CPs is usually a predefined parameter for any demo deployment. In some cases, due to the change of needs or budget, these numbers can change.

As an indication, it could be interesting to differentiate between CPs working in smart grids and "idle" CPs. That is, to know how many of these installed CPs are able to send data for the demo, and how of them are just to support the EVs mobility.

[11] Proposal for a Directive on the deployment of alternative fuels infrastructure, Commission Staff Working Document Impact Assessment

4 Strategies to overcome the hurdles

4.1 Introduction.

The following chapter has been organized around the different hurdles encountered during the implementation of e-mobility and how the respondents have solved these problems. This, however, is not limited to a compilation of what was done, but also an analysis and evaluation of the solutions. The first survey (Appendix I: Complete list of internal survey answers) was oriented to the extraction of hurdles taking into account the experiences of the partners of the Green eMotion project in their demonstrator sites. This survey was completed with a document created by the same partners with information about the strategies used to overcome the hurdles (Appendix II: Proposals and actions about strategies. Solutions from partners for details).

The online survey (Appendix III: Online Survey answers and statistical analysis) was aimed on hurdles and strategies, but with an electromobility policies view of point, and it was completed by members of Green eMotion and various external stakeholders. Also information provided by ESB from its experience has been used for the extraction of hurdles and the strategies to overcome the hurdles (Appendix IV: Other contributions for Electromobility experiences.).

Nevertheless, some of these strategies are highly dependent on future decisions and norms from the EU, so this must be seen as a temporary solution before the definitive framework were set. This analysis aims at guiding new demo regions so that the issues experienced in the past are identified at the design stage and their impact reduced by avoiding the worst problems from experimental and new technologies. This section represents a feedback of experience that can be used as an input for other projects and bring value to other demo regions inside the Green eMotion project.

4.2 Description of strategies.

The format in which the different strategic proposals are shown is the following:

Problem: the description of the hurdle that has to be overcome.

Proposals: Solutions proposed to solve the problem based on the experience of the WP2 members, both surveys and the additional contributions (see Appendix III: Online Survey answers and statistical analysis). These sources have been filtered to strengthen the most suitable recommendations and to avoid redundancy.

4.2.1 EV: Batteries Cost.

Problem	The cost of the batteries makes the commerciality of EVs almost impossible without subventions and other economic support.
Proposals	One obvious solution to this problem may be the implementation of projects associating with leasing and renting companies which assume the cost of the battery. Other way to solve this hurdle is considering the problem as an economy of scale issue. It is a problem of economy of scale because nowadays the demand of this type of technology is small and the competition among companies is insufficient. Therefore the main solution for solve this problem is **to increase the demand**. Considering the influence of the battery in the price of EV, solving the problem of price in one of the two elements is resolved in the other. Therefore measures to **increase demand for EVs** can be turned into **increased demand for batteries**. From government and policies point of view there are many action that can help to increase the demand: • Stimulating the private initiative: by subsidies. Considering the online Survey, the **subsidies for the EV measure** is implemented nationally in many countries, and 76% of the answer considered the measure enough effective. Regarding the results of the online survey, the measure effect of the co-funding for purchase by public authority is a measure considered effective by the 80% of the

	respondents, and the tax reduction, is considered effective for the 83% of the respondents. • Stimulating the private initiative: establishing a market regulation well-defined. The definition of the market regulation. Once this regulation is clearly defined, private companies will be able to decide where and how create their projects with less uncertainty. • Creating demand in the municipalities: carrying out projects replacing municipalities' car fleets by EV fleets (this includes all kind of possible vehicles as vans, trucks, buses and motorbikes). Lastly, it is necessary a change of paradigm in electromobility. The public administration, governments and cities should promote this change by policies, laws, regulations and subsidies. Another solution (extracted of the online survey) consists in the support for R&D in order to find fabrication process of EV batteries more competitive economically. The solutions for these hurdles are in the hands of battery providers and public institutions.

4.2.2 EV: Maintenance and repairs.

Problem	As there was not market for EVs in the past, there is not a proper pool of experience on this issue, from the design of the vehicle to the maintenance and final disposal of the parts. The consequences are the faults in fabrication/design of EVs and the lack of the experience in maintenance services.
Proposals	**Increasing the demand** in order to help to create an economy of scale is the solution for this problem too (it is the option more proposed on the surveys). The existence of normative limiting the types of hardware elements should facilitate the repairing works, as well as the development of manuals of use. Another option would be establish a minimum number of repair centers (by number of electric vehicle sold) that cars manufacturers must to make available through mechanisms that each region may consider most suitable. These measures should be undertaken by maintenance services and car manufacturers in first time, seconded by the regulatory organizations for normative issues.

4.2.3 EV: Batteries Capacity and Range Anxiety.

Problem	The mentality of an average IC vehicle driver is that his vehicle can be driven a certain amount of kilometres, and he will find a gas station in a reasonable distance to refill the deposit of his car. And these distances, for a modern diesel vehicle with average features may range between 700 and 1000 km for the maximum distance driven, and less than 100 km for the maximum distance between gas stations, in countries with a similar population and road distribution like Spain. But right now, the range for an EV could be as low as 80 km, enough for short travels but clearly insufficient for travels between cities.
Proposals	Increasing demand EV, as we have seen in section 4.2.1, it could also apply to overcome this hurdle because creating an economy of scale would mean EVs technological improvements in all aspects of EV and therefore increasing improving battery capacity. Another solution for this problem (focused in the range anxiety problem) is the creation of a **safety net**: the deployment of the infrastructure in an intelligent way in order to ensure that an EV can reach its destination without danger of complete battery discharge. Once the user is aware that this safety net exists, range anxiety will decrease. The **promotion of the e-mobility and EVs** is also a feasible solution. It will be easier to convince the services of transport for goods or people to try an EV, because there is no risk of these "range anxiety" to happen, as long as the routes are usually fixed. Some others, like fleets for companies or public institutions could be more difficult to be convinced, but if they still keep some old IC cars for longer distances, the problem can be overcome. For the promotion of the e-mobility the measures of Setting targets for EVs and the consistent monitoring of progress in achieving targets, are appreciated by the 34% of the respondents. But it was also commented that these measures must to be completed with other strategies in order to be efficient. The agents that should solve this hurdle are the network developers, and entities in charge of promotion and advertisement.

4.2.4 EV: Influence of the weather condition in the battery: air conditioner & heating.

Problem	The use of heating of conditioned air depletes the battery of the EV faster, so the users can be forced to switch off them to avoid range problems.
Proposals	Sometimes the use of portable sources of heating is cheaper, in energy terms, than the heating from the car. And in some cases it could be an interesting option, for EV manufacturers, to design a heating system that only provided heat in the driver's seat (e.g.: taxis, goods delivery). The promotion of efficient driving is a good way because it is the users who can improve the performance of their vehicle. Another way is the improvement of the performance battery. For this purpose increasing the demand is a suitable measure as was explained in section 4.2.3.

4.2.5 EV: Previous experiences with electric cars.

Problem	Some users have had bad experiences with 1st generation EVs.
Proposals	**Promotion of the new EVs**, not forgetting to show the advancements in technology, availability of car parts, client service, and costs of maintenance. **Driving testing** and sharing of experiences about the new cars. This could be complemented **facilitating Electromobility elements to car journalists**. Promotional entities can take charge of this hurdle with the collaboration of car manufacturers.

4.2.6 Infrastructure: Cost.

Problem	Due to the novelty of this technology, in some regions EVSE systems are scarce and expensive.
Proposals	Again, other way to solve this problem could be overcome **increasing the demand** in order to help to create an economy of scale. A recommendation to the demonstration projects is to buy elements

	in groups, as a single purchase. The selling companies usually make interesting offers if you buy complete packages of products instead of single elements. Public institutions should be the first to stimulate demand stimulating street CPs installation, and also stimulating the increase of EVs fleet, which generate increased demand for indoor CPs. Moreover it could stimulate demand for private CPs stimulating the purchase of electric vehicles.

4.2.7 Infrastructure: Lack of experience.

Problem	Technical crew in charge of installations or maintenance makes mistakes due to inexperience or wrong orders/design.
Proposals	**Proper training and courses** to adapt traditional knowledge of grids to the new needs and technologies. Knowledge can be gained through experience and training, but the costs of initial failures could be less assumable than the costs of the courses. The existence of generic manuals will be only possible once the normative for EVSEs has been fully developed. Another solution could be the **inclusion of the quality clauses** in the installation contracts penalizing these mistakes, with the aim of secure that the installers do the job thoughtfully. These measures should be undertaken by energy providers and maintenance services in first time, seconded by the regulatory organizations for normative issues.

4.2.8 Infrastructure: Plug compatibility.

Problem	The plug in the CPs could present compatibility problems.
Proposals	For European institutions, the solution is the adoption of mandatory standards in the plug. This option was the preferred solution in the online survey. For the case of national regulators, it is important to comply with European laws, especially for certain elements like the ones related to roaming and market place. It will be also very useful for European manufacturers that could guarantee compatibility within the frontiers of the EU.

4.2.9 Infrastructure: Location of CPs.

Problem	In some regions, there are not unified criteria about where to install the different CPs.[12]
Proposals	The coverage could be considered in two directions. One is to cover the zone of the demo homogeneously, installing a minimum of CPs[13] in every zone/district/neighbourhood. The other is to develop the coverage in zones with higher density of population. There are different ways of dealing with this problem. One of the best options is that municipalities assume the role of deciding where to install the different CPs. Municipalities should analyse the CPs installation by their own criteria. EV ownership levels are low so it makes sense that Municipalities promote cards or other means by which users can access the fullest possible CP network. By offering this service, new EV users are identified and their needs are taken into account when planning the deployment of new CPs. In any case, CPs installation has to be positively sanctioned at least by the DSO. **DSO must guarantee technical requirement are fulfill**: power quality and other quality criteria, limited harmonic distortion… As stated before, the measures have to be assumed by municipalities and DSOs.

Problem	The installation of CPs on streets means fewer places to park conventional IC cars.
Proposals	Exclusivity on places with CPs installed is reasonable if EV numbers are not too high. Once the CPs need to be extended,

[12] Some info about solutions for this issue can be found in D1.6 “Final Report on Macro and Micro level infrastructure planning” from the Green eMotion project at http://www.greenemotion-project.eu/dissemination/deliverables-evaluations-demonstrations.php.

[13] The procedure to calculate this value cannot be generalized, as it was in the target numbers foreseen for European countries. It should consider many parameters (population density, size of EV fleet, size of total vehicles, quantity of available sole and its ownership, budget available, type of CPs to install, etc.) and so the analysis will require easily a small project.

	these places should be considered like other conventional parking places in terms of parking fees, timetables and other not related restrictions, but keeping this exclusivity until the situation between EVS and ICEs had been reversed. It is necessary to bear in mind that at this stage of the deployment of EV is essential **the promotion of the EV**. From government and municipalities this promotion must be a priority. Reserving parking spaces exclusively for EV helps potential users on taking the decision of purchasing an EV and also increases the visibility of EVs on the streets and the city. Also it could help the **adoption of complementary initiatives to reduce the use of private cars** with the goal to decrease the presence of many vehicles in the center of the cities, as was indicated in the online survey. So, the lack of parking places will not be a problem. This has to be solved by the municipalities.

Problem	The CPs were underused because there are too many CP and/or locations were not adequately selected. The problem is that empty parking places for EVs are negatively perceived.
Proposals	Due to its potential unpopularity, the selection of the parking place for CPs should be restricted to the necessary CPs and if possible in collaboration with enterprises that own parking places, like large commercial surfaces that also could see this as a way of promotion. Installing a moderate number of CPs, just taking into account the number of EVs available in the city, will prevent the problem of the underuse. In many countries the cities have the lists of cars available for tax purposes, so this should not be a problem. Moreover, it would be possible to create a “map” of EVs so the best locations to adequate an EV parking place can be selected. Another way is to allow the liberalization of the CPs installation. For this way it is needed the creation of a clear price system with an objective and homogenous price system and where the transfer of the price to the end-user is well-defined. Once these policies are clearly defined, private companies will be able to decide where and how create their projects with less uncertainty. A significant number of respondents of the online survey opted for this option. The municipalities should be in charge of this task, sometimes with the collaboration of owners of certain locations that could help in this case (e.g. parking place of large commercial surfaces).

4.2.10 Infrastructure: Faulty Equipment.

Problem	Some newly bought equipment has faults and defects.
Proposals	Relying on habitual providers may be expensive if their catalogue is still scarce on Electromobility solutions, but that means better reliability on equipment and services, and in the initial moments of uncertainty certain failures might create delays and extra expenses. In case of using experimental or new devices, systems and/or infrastructures, it is important to make sure that providers could offer fast and reliable solutions to these faults. From government point of view this hurdle could be overcome **increasing the demand** because it is related with the development of a specific market. For increasing the demand, measures of setting targets for infrastructure and the consistent monitoring of progress in achieving targets are appreciated by the 50% of the respondents. But it was also observed that these measures must to be complemented with other strategies in order to be efficient. The agent to solve this issue is the equipment provider that has to improve its products and consequently the satisfaction of the customers.

4.2.11 Infrastructure: Levels of use & maintenance.

Problem	Unless recharging rates are shown to be high – or to evolve from low to moderate – the municipalities that have used public subsidies to install CP infrastructure are not going to find operators willing to take over and maintain it.
Proposals	Integrate as many initiatives as possible. Some operators will promote their own investments assuming the risk of deploying CPs based on their business model and plan. Thus, a clear market model with defined rules is crucial to allow the players to define their business case. Agree the levels of aggregation for monitoring the deployment of CP infrastructure and its use.

4.2.12 Infrastructure: Institutional reluctances.

Problem	The authorities deny permissions or actively block the efforts to develop the elements required to bring up electromobility.
Proposals	There are some actions that can be taken to overcome these hurdles, depending on what the real problem is. When authorities are reluctant to help, the main cause for this is their lack of political will. The best solution would be the **creation of legislation for mandatory collaboration** between institutions for the development of sustainable mobility. Besides that legislation should require the creation of strategies electromobility at the national level. In other cases the reluctance to help is due to the lack of knowledge. In these cases, so, the solution is **information**. If a demo region with a big size and a large number of institutions is going to be deployed, making a small informative guide may be a good idea. In most cases, the typical dissemination task from most of EV European projects have a useful user's guide or similar ready to be used, so the job could be already done. Other way to acquire experience with the Electromobility is to **participate on the initiatives** that in the form of **European projects**, provide with budget and resources in order to achieve different goals that include new normative and policies towards Electromobility. The National government and the institutions themselves are the agents to solve this hurdle.

4.2.13 Infrastructure: Billing system and Clearing House.

Problem	In some countries the tariff structure and the physical support (RFID cards, coins, etc.) that applied to the EV charging payment process is different from city to city, and this implies different business models per city for the charging operator companies. A driver with an EV can just pay the recharge in his region, but not in others unless he applied for the services on the new region (if he ever could).
Proposals	These are two proposed methods to solve this issue: • Standardizing the billing system in the country. If national government forces the standardization of billing system in the country, every EVSE installation must adopt this

	standard and the problem disappears. • If billing system is not a standard, it will be necessary the coexistence of different billing system. For this coexistence billing systems should be easily adoptable by the various users of other regions, i. e., billing systems which not require previous subscription like credit cards or coins. In an European level, the best solution is the utilization of the same billing system in all the regions. If this is not possible, the billing system must be easily adoptable for the user from an outside region. Clearinghouse adoption should be evaluated comparing the benefits obtained with the costs that would generate. Regarding Clearing House, this project has performed some interesting research about it. An ICT solution has been created in WP3 in order to allow the roaming. This solution has been tested in the WP8, showing that the roaming and the billing, based on Service Detail Record with charging session data, is possible (see *D8.5*[14]). As it has been stated before, this hurdle has to be solved by the European and national public institutions.

4.2.14 Incentives, Marketing and Communication: Coordination and cooperation.

Problem	Amongst the different areas of a public institution there is a clear lack of coordination of efforts in the development of the electromobility strategies.
Proposals	The best solution is to **concentrate** all the **efforts in one single organization**. To achieve this, it is necessary to define the present and future actuations, and the degree of implication on Electromobility. These actions will define the profile of the people in charge, and the numbers of the staff that has to be involved in the development of Electromobility and related matters. The public institutions (local and regional) are the only agents involved in this hurdle.

[14] http://www.greenemotion-project.eu/dissemination/deliverables-evaluations-demonstrations.php

Problem	Some efforts towards Electromobility are overlapped or ignored by different public institutions: there is a lack of cooperation between institutions.
Proposals	Finding common goals and complementary efforts is mandatory to maximize results. This could be difficult due to the level of commitment of the different offices, and especially when there is a perception of intromission into the own field of responsibilities. The **directive head of both groups should take care of the matter**, if possible, **or transfer the problem to higher authorities** where it could be properly handled.

Problem	There is a lack of collaboration between institutions and stakeholders regarding the electromobility deployment efforts.
Proposals	There are many ways to overcome this issue. The governments from some EU countries have developed **specific programs** to aid the stakeholders on their respective fields (energy transport, charging infrastructure, business models, manufacture, taxes, etc.). It is true that there are private initiatives to create groups of interest for the electromobility, but the national and international institutions can redirect efforts and help to form consortiums. It is also necessary to **generate forums** in which the **stakeholders could collaborate** and have an active role to develop new policies. The actors to overcome the related hurdles are public institutions, and the stakeholders in second place.

4.2.15 Incentives, Marketing and Communication: Financial incentives for EVs.

Problem	Funds are not sufficient to cover the demand by potential EV users or applicants for a grant.
Proposals	The obvious solution is the raise of the funds through public institutions, but it is not possible in the majority of the cases. As was indicated for the 50% of the answer in the online survey, it is necessary assume that the funds restriction is inevitable due to the budget restrictions for public sector.

Problem	The EV dealer has no clear idea about how to implement the measure.
Proposals	Some info about the legal implications has to be delivered, including of course the tax reductions and other possible benefits, and also how to deal with them, in order to maximize the promotion. To do this, the national government has to publish the related comprehensive info and distribute the document to the network of car sellers.

Problem	When implementing the tax exemption or reduction measure, the purchase tax cannot be equally implemented in different regions, complicating the procedure
Proposals	The most effective strategy is the simplification of the process in all regions. On the other hand, the homogenisation of the "tax exemption or reduction measure" in the different regions is the strategy selected for the 50% of the respondents on the online survey

4.2.16 Incentives, Marketing and Communication: Regulations for installation of parking spaces for EV.

Problem	The absence of normative rules to install CPs in public spaces generates a sensation of lack of support for the potential EVSE Operators, and limits the spread-out plans of the current ones.
Proposals	The normative rules to install CPs should be active as soon as possible. In order to achieve this, the EC should have available some guidelines so the different countries could get valid advice about the new norms to apply.

Problem	Possible disagreements with the stakeholders about the intended policy regarding urban planning.
Proposals	The solution of compromise is just to apply the normative in new buildings, indicating a reasonable deadline to update the older structures, and taking into account the possible exceptions to the norm. It has to be noted that European directives could be useful so the national governments would harmonize them with their national laws, or directly adopt them.

4.2.17 Incentives, Marketing and Communication: Information activities

Problem	The information for Electromobility activities does not reach the public or the mass media.
Proposals	It is necessary to differentiate two different ways of actuation depending on the degree of development of the activities. The initial stages of implantation, with preliminary tests, research efforts and so on, can be covered in limited professional means, through congresses, professional meetings and the typical info sources for R&D. Once the technology and some of the implementations have reached the maturity state, the best way to spread info is through the use of mass media like television, magazines and newspapers, with articles and/or advertisement.

4.2.18 Incentives, Marketing and Communication: Reduced electricity costs and free charging.

Problem	The price reduction with reduced electricity cost or free charging is not high enough to notice the impact on running costs or the Lifecycle Cost due to the restricted range and use of EVs
Proposals	According the majority of the respondents of the online survey, it is necessary to assume that free (or reduced price) charging initiative is more a promotional measure than a definitive solution, and so the impact must to be measured in a qualitative way, instead of a quantitative way.

4.2.19 Incentives, Marketing and Communication: Exemption /reduction of road tolls/congestion taxes or other taxes to enter into restricted zones (city centre and special lanes)

Problem	For exception/reduction of road congestion taxes to enter into restricted zones, it is necessary that EV can be distinguished from the ICE cars, and it is not always possible (for example the retrofitted EVs).
Proposals	To overcome this hurdle, other experiences about traffic restrictions

	in the centre of the city[15] can be studied. For example identifications can be done through the usage of RFiD cards (even there could be some degree of integration with the cards used for other matters, like the ones to be read in the CPs) or in many cases the number plate of the car (ICE or EV) is photographed and automatically analysed… This has to be done without compromising the privacy normative corresponding to the implantation location.

4.2.20 Incentives, Marketing and Communication: Co-funding for purchase by authorities.

Problem	Even with the co-funding the profits from the installation and operation of CPs are not attractive.
Proposals	According to 55% of the respondents of the online survey, the municipalities should liberalise the investment and operation to private agents and define a clear business model (including prices, bundle with other services, etc.) to attract private investors.

[15] London is a paradigmatic example for this. It can be consulted in https://tfl.gov.uk/