



e-MObility Transnational strategy
for an Interoperable COmmunity
and Networking in the Alpine Space
WHITE BOOK



Interreg
Alpine Space
— **E-MOTICON**



EUROPEAN UNION



Dear readers,

The e-MOTICON project started with 15 Partners and more than 40 Observers across the Alpine Space area on November 1, 2016.

The consortium jointly worked for more than 3 years on problems of low and inhomogeneous deployment of electric mobility (e-mobility) that affects entire Alpine Space region. Among several causes of the e-mobility low distribution, the project focused on the limited integration of planning instruments used by Public Administrations (PA) and their lack of knowledge in technological innovation and business modelling.

After the analysis of policies, technological solutions and business models, partners elaborated the White Book, a unique Alpine Space strategy on innovative E-CS planning complying with the e-mobility requirements. The partners then integrated and customized the transnational strategy into five Regional Action Plans and provided a toolset to anticipate E-CS network requirements, tested in three joint pilot actions. Furthermore, a transnational community was set up and involved Public Administrations and representatives of the e-mobility industrial sector, research centres, regional agencies, end users and public transport agencies to support the main achievement of improving the Public Administrations' capacity on E-CS planning and enhancing the transnational cooperation.

We are glad to present our result, the White Book, where you will find the transnational strategy for the Alpine area and Regional Action Plans that apply in each reference area a common framework, which represents a standard within the Alpine region. The strategy steamed from local needs, provides a shared framework, coherent with EU Policies and Alpine Space Strategy (EUSALP), for the planning of interoperable E-CS network across the whole Alpine Space area. It might be considered a strategic support for regional and local Public Administrations in definition of their policy in supporting e-mobility.

Enjoy reading

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This White Book contains two main chapters

STRATEGY



Public Administrations (PAs)
Define the best possible roles of PAs



RULES
Set supra-regional common minimum rules on infrastructure



INFRASTRUCTURES
Complete the minimum infrastructure



MAPPING TOOL
Adopt an integrated, supra-regional mapping tool



COMMUNICATION AMONGS PAs
Empower communication among public authorities



PUBLIC & PRIVATE TRANSPORT
Guarantee synergy among private and public transport

RAP

REGIONAL
ACTION
PLANS



ITALY



SLOVENIA



FRANCE



GERMANY



AUSTRIA

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1 Introduction

In the last years e-mobility is experiencing huge developments, passing from a niche solution to an actual alternative for personal transportation. The increasing interest both by manufacturers and policy makers is a clear signal that also in the next years electric vehicles (EVs) will gain new shares in vehicles market, giving a valuable contribution to CO₂ and pollutants emission reduction.

Despite this promising framework, it has to be acknowledged that e-mobility is still struggling against important hurdles, which are significantly lowering the speed of its diffusion. Two well-known elements appear to be still particularly critical: cost and range. The higher purchase price of electric vehicles with respect to conventional ones is an obvious obstacle for potential buyers, in particular in the sector of small and medium cars. On the other side, it is also well known that money is not the only parameter considered when buying a car, especially when moving towards bigger and luxury cars [1]. With the increase of EV sales, moreover, economy scale will help manufacturers to progressively lower production costs and selling prices. The second element is the problem of limited range, mainly due to technical aspects related to battery chemistry (energy and power density). This can be a real barrier for potential buyers, as it actually limits the vehicle functionality. The perception of a limited range can commonly turn into negative feelings towards the vehicle and the driving experience, also known as “range anxiety” [2]. To overcome this problem, two solutions are being addressed by e-mobility stakeholders: work on R&D to obtain improvements in battery performances (store more energy in the same space and weight) and work to deploy an effective charging infrastructure.

The e-MOTICON project focuses mainly on the last aspect, aiming to identify policies, tools and solutions able to create a favourable environment for the deployment of an effective charging infrastructure in the Alpine Space (AS). The project brings together 15 partners from 5 countries, involving 41 observers from the entire Programme area (Italy, France, Germany, Austria, Slovenia) and Switzerland; they represent managing authorities, regional bodies, research centres and private investors.

The partnership aims to support Public Administrations in facing the problems of low and inhomogeneous deployment of electric mobility that characterises the Alpine Space. The count of electric charging stations (E-CS) in the different countries varies from 15 to 235 E-CS per million inhabitants whereas electric vehicles number varies from 70 to 470 per million inhabitants. As previously said, one reason for the inadequate diffusion of e-mobility is a low confidence in the charging infrastructure, mainly generated by the low number of charging points and by low interoperability of E-CS, often due to the limited integration of planning instruments used by Public Administrations (PA) and to their lack of knowledge in technological innovation and business modelling [3].

After the analysis of policies, business models and technological solutions, enriched by direct test in three “pilot actions”, e-MOTICON is now able to highlight the most important open points and to suggest possible strategic solutions to overcome the problems, in order to speed up the process of e-mobility diffusion in the Alpine Space, with consequent benefits for environment and citizens life quality. The rest of document, mainly directed to policy makers in the Public Authorities, will briefly report the creation process of this “Transnational Strategy” and will then present six “strategic pillars”, representing the core aspects that need to be tackled in a medium-short period.

2 Strategy

2.1 What is the e-MOTICON transnational strategy?

The Alpine Space is both a challenging and rich-of-opportunities area. In a relatively small territory, it indeed includes 6 countries (Italy, Slovenia, Austria, Germany, France and Switzerland), big metropolitan areas (e.g. Milan area in Italy), quite small communities, many touristic attractions and an extremely variegated geomorphology. The presence of delicate areas and protected environments makes this territory extremely suitable for the adoption of a green and sustainable mobility but, on the other side, the energy consumption required by mountain roads can be a severe challenge. Moreover, the presence of many cross-border commuters, both for work and (mainly) for tourism, requires a high interoperability among the charging networks of different areas and countries. Last, the high seasonal variation in traffic flows due to tourism patterns, could cause a low usage of the charging stations for long periods, generating the risk of “market failure” for charging operators.

In such a complex situation, the development of fragmentary charging networks and the adoption of inconsistent strategies in different areas and different countries could create severe obstacles for EV users, hindering the diffusion of e-mobility in favour of the traditional internal-combustion vehicles.

The e-MOTICON partners strongly believe that the development of a transnational strategy is a key factor in order to commonly face the still existing problems and to identify the best solutions that should be jointly adopted by all the involved countries and Public Authorities. A shared view and a common strategy will help Public Authorities to make the best decisions for all potential EV users of the Alpine Space (and not only). Furthermore, a transnational and commonly agreed strategy would guarantee synergy and consistency among the different actions undertaken in the considered area.

The transnational strategy described in this document is mainly expressed through 6 “strategic pillars”, which represent the most important areas of intervention that public bodies should focus on. Following the strategic pillars, decision makers inside the PAs will generate a favourable framework for e-mobility development and will actually set up an effective and optimized charging infrastructure.

2.2 e-MOTICON strategy in the European framework

The e-MOTICON transnational strategy was elaborated in a period in which e-mobility and sustainable transport are much debated aspects, considered as key parts to reach more general environmental targets. Especially in Europe, several strong activities have been carried out with regards to regulation, plans, directives and roadmaps, and all the outputs of these activities represent the background and a reference point of the e-MOTICON strategy. In the next paragraphs, a short recall of the most important documents is provided. A particular attention is paid to the activities carried out within the EUSALP Strategy, specifically referred to the Alpine Space area.

2.2.1 European rules and vision on transport, energy & environment

1. Paris agreement [4]: signed by 178 countries on April 21, 2016, it commits the signatories to maintain the world temperature rise below 2°C and, if possible, below 1.5°C compared to pre-industrial levels.
2. Climate and Energy Package 2030 [5]: it foresees a 40% reduction in greenhouse gas emissions compared to 1990. This target means a 43% reduction in emissions compared to 2005 for the sectors involved in the so-called “Emissions Trading System (ETS)” and a reduction in greenhouse gas emissions of 30% compared to 2005 for “non-ETS” sectors, such as transport.

3. Effort Sharing [6]: it delineates the European target on national level by the proposal of the "Effort Sharing" Regulation of the European Commission;
4. European Directive 2009/28/EC [7]: it forces Member States to promote the use of energy from renewable sources. Specifically, it defines the commitments for each Member State to ensure that its share of renewable energy sources on gross final energy consumption in 2020 is at least equal to its national general target for the share of renewable energy sources for that year. These compulsory national targets are consistent with the objective of at least 20% of energy from renewable sources in the gross final energy consumption of the Community in 2020. With the aim to achieve these objectives more easily, each Member State is required to promote and encourage energy efficiency and energy saving;
5. Regulations 510/2011 [8] and 333/2014 [9] on CO₂ emissions: they impose progressively more severe limits on CO₂ emissions. In particular, they define respectively the average fleet target for new light commercial vehicles, equal to 175 g CO₂/km by 2017 and 147 g CO₂/km by 2020, and for new passenger cars, equal to 95 g CO₂/km by 2021. The Commission is also committed to finalize a strategy aimed at reducing emissions from trucks, buses and coaches before 2030;
6. World Harmonised Light Vehicle Test Procedure [10]: the European Commission introduced a stricter procedure for the certification of passenger cars and light commercial vehicles. Starting from September 1, 2017, the WLTP (World Harmonized Light Vehicle Test Procedure) procedure was introduced, which requires stricter and realistic laboratory tests and is completed by roadside testing (RDE - Real Driving Emissions) carried out using PEMS (Portable Emission Measurement System) systems. The aim is to drastically reduce the gap between CO₂ emissions, consumption and emissions of pollutants (NO_x in the first place) detected according to the current vehicle type approval procedures and those actually issued in the roadside guidance. It should be noted that a more severe and more representative evaluation process of actual use will also be used for electric vehicles, with the application of new approval cycles and attention also to the consumption of auxiliary devices such as air conditioning;
7. White Paper 2011 on Transport [11]: it sets up objectives and measures for an efficient transport system, respecting economic, social and environmental needs. In particular, in the 2011 White Paper, the user is at the center of transport policy and targets include increasing road safety levels, increasing awareness among users of transport costs, the dissemination of practices such as intermodality of passenger transport and rationalization of urban transport;
8. Green Paper on urban mobility, 2007 [12]: it reflects on the main problems of European cities. The report, published by the European Commission, is a collection of reflections aimed at stimulating a public debate on the most critical issues in urban areas: smooth traffic in cities, city cleanliness, smarter, more secure and affordable urban transport;
9. 2014/94/EU Directive on Alternative Fuels Infrastructure [13]: it establishes a set of measures for the creation of an alternative fuel infrastructure, to minimize oil dependence and mitigate the environmental impact of transport. At national level, the long-term strategic objective is to provide support for the rational use of all alternative fuels while being "technology neutral" and by searching optimal technical solutions and effective incentive/funding schemes. As alternative fuels the Directive considers all the fuels or sources of energy that may work in substitution (including partial, as in the case of hybrid vehicles) of fossil fuel sources in the supply of energy for transport: electricity, hydrogen, biofuels, synthetic fuels and paraffinic, natural gas (including biomethane) in compressed form (CNG) and liquefied (LNG), liquefied petroleum gas (LPG);
10. Others: there is a constant development of new rules and reports by the European Commission and related agencies. Some recent examples are the report "Towards clean and smart mobility" EEA Signals 2016 [14], the "European Strategy for Low-Emission Mobility" COM (2016) 501 [15] with its Staff Working Document (SWD 2016) 244 final annex, where the European Commission highlights how reducing emissions in the transport sector is one of the key points for a more environmentally friendly and energy-efficient economy, and the initiative "Europe on the Move", a wide-ranging set of initiatives that will make traffic safer, encourage fairer road charging, reduce CO₂ emissions, air pollution and congestion, cut red-tape for businesses, fight illicit employment and ensure proper conditions and rest times for workers [16].

2.2.1.1 Coherence of e-MOTICON strategy with the European Framework

European policy on transport and mobility covers a wide range of aspects, but it is particularly focused on environmental aspects and greenhouse gases emissions. Electric mobility could be a key solution to obtain a more sustainable transport system, guaranteeing a dramatic reduction both in pollutant and in greenhouse

gases emissions. The absence of noise is another crucial element to improve the quality of life in the big cities. Given this framework, the goal of supporting the creation of a transnational consistent and effective network of charging stations for electric vehicles, is aligned with European targets, contributing to create a favourable environment for e-mobility diffusion.

Moreover, the debate and the adoption of a common strategy in different countries contribute to lower barriers and to increase the consciousness that global problems as climate changes can be better solved with a synergic approach.

2.2.2 EUSALP strategy

The EU Strategy for the Alpine Region (EUSALP) is one of the so-called “macro-regional strategies”, i.e. an integrated framework endorsed by the European Council, which may be supported by the European Structural and Investment Funds among others, to address common challenges faced by a defined geographical area [17].

EUSALP concept was born in December 2013, when the European Council invited the Commission, in cooperation with Member States, to elaborate an EU Strategy for the Alpine Region by June 2015. The Commission prepared a Communication and an Action Plan about an EU Strategy for the Alpine Region (EUSALP), which was adopted by the College of the Commission on July 2015, endorsed by Council of the European Union on November 2015 and by the EU Council on June 2016 [18].

EUSALP general objective is to promote sustainable economic and social prosperity of the Alpine Region through growth and job creation, by improving its attractiveness, competitiveness and connectivity, while at the same time preserving the environment and ensuring healthy and balanced ecosystems.

As already mentioned, the Alpine Region is one of the richest areas in the world and among the most economically dynamic, innovative and competitive areas in Europe. However, significant economic differences still exist within the territories, requiring a common response. Common environmental, economic and social challenges are also clear: the Alpine Region contains Europe's largest mountain range, with low population density, high vulnerability to climate change and biodiversity loss, a high degree of seasonality, especially in some touristic areas, and ageing populations. EUSALP constitutes a strategic agenda that should guide relevant policy instruments at EU, national and regional level, by closely aligning and mutually reinforcing them. It constitutes ‘an integrated approach’ with coordination of actions across policy areas which are expected to achieve better results than individual initiatives. The combined effects on a specific territory of the interventions of focused policy areas can lead to achievement of sustainable, balanced and harmonious development [19].

2.2.2.1 EUSALP Objectives

As its main objective, the EU Strategy for the Alpine Region aims to ensure that this region remains one of the most attractive areas in Europe, taking better advantage of its assets and seizing its opportunities for sustainable and innovative development in a European context. The main challenge of the Strategy is therefore to tackle the economic, social and territorial imbalances existing in the Alpine Region, stimulating an innovative and sustainable model of development, able to conciliate the promotion of growth and jobs, and the preservation of natural and cultural assets in the area.

As priority is given to the issues of strategic relevance for the macro-region as a whole and to the issues that go beyond national borders and require coordinated responses, the EUSALP Action Plan presents a limited number of objectives with a first set of supporting actions. More precisely, the Commission has identified the following objectives:

1. fair access to job opportunities by building on the high competitiveness of the Region;
2. sustainable internal and external accessibility;
3. a more inclusive environmental framework and renewable and reliable energy solutions for the future;
4. a sound macro-regional governance model for the Region (to improve cooperation and the coordination of action) [19].

2.2.2.2 EUSALP Actions

To keep the EUSALP Action Plan manageable and to ensure a high level of ownership of the participants, the Action Plan focuses on nine actions that represent the main areas where the Strategy can contribute to delivery at the present stage.

Actions can be of different nature: some may require financial support while others consist of better coordinating national policies and decisions. In a number of cases, actions aim at highlighting the areas where activity is already in progress, but which require enhanced efforts of coordination within the Alpine Region and coherent funding strategies as a condition for success in their implementation. The Strategy provides a unique opportunity in this respect. The Action Plan also includes lists with indicators and targets that illustrate the performance of the actions and the progresses towards the objectives.

The nine actions refer to EUSALP objectives as in the following structure [19]:

- 1st THEMATIC POLICY AREA: ECONOMIC GROWTH AND INNOVATION;
 - 1st OBJECTIVE: fair access to job opportunities, building on the high competitiveness of the Region
 - Action 1: to develop an effective research and innovation ecosystem
 - Action 2: to increase the economic potential of strategic sectors
 - Action 3: to improve the adequacy of labour market, education and training in strategic sectors
- 2nd THEMATIC POLICY AREA: MOBILITY AND CONNECTIVITY;
 - 2nd OBJECTIVE: sustainable internal and external accessibility to all
 - Action 4: to promote inter-modality and interoperability in passenger and freight transport
 - Action 5: to connect people electronically and promote accessibility to public services
- 3rd THEMATIC POLICY AREA: ENVIRONMENT AND ENERGY.
 - 3rd OBJECTIVE: a more inclusive environmental framework for all and renewable and reliable energy solutions for the future
 - Action 6: to preserve and valorise natural resources, including water and cultural resources
 - Action 7: to develop ecological connectivity in the whole EUSALP territory
 - Action 8: to improve risk management and to better manage climate change, including major natural risks prevention
 - Action 9: to make the territory a model region for energy efficiency and renewable energy

As e-MOTICON project mainly deals with the topic of transport and energy, a small focus on Action 4 and Action 9 activities is reported in the following sections.

2.2.2.3 EUSALP Action 4

The geomorphology of the Alpine Region greatly affects the construction and maintenance of transport infrastructures. At the same time, transport infrastructures have a significant impact on landscape and the environment, which are the core resources of the Alpine Region. The search for a balance between transport infrastructures and the preservation of the territory has been identified for decades as a major challenge and an objective of the international community of States and Regions sharing the Alpine Region.

As directly stated in the Action Plan, Action 4 aims to promote inter-modality and interoperability in passenger and freight transport, in particular by removing infrastructure bottlenecks, bridging missing links, coordinating planning and timetables of public transport (including multi-modal information and planning services), modernising infrastructure, and enhancing cooperation. In this context, the term 'inter-modality' means combining several means of transport during the same journey, using different types of vehicles to

get from one place to another. ‘Interoperability’, on the other hand, is defined as the capability to operate on any stretch of the transport network without any difference (and this is particularly important for EU’s railways technical systems).

In order to achieve this, among other things, an international treaty (the Alpine Convention) has been equipped with a specific protocol on transport, adopted in 2000 and ratified also by the EU in 2013 as a significant contribution to the greening of transport policy in the core Alpine Region. This protocol aims at reducing the negative effects of and risks posed by intra-Alpine and transalpine transport to a level which is not harmful to people and the environment, inter alia, by transferring an increasing amount of transport, especially freight transport, to railways as well as ensuring movement of intra-Alpine and transalpine transport at economically bearable costs by increasing the efficiency of transport systems and promoting modes of transport which are more environmentally friendly and more economic in terms of natural resources [19].

2.2.2.4 EUSALP Action 9

This action focuses on promoting energy efficiency and the production and use of renewable energy in the Alpine Region, in line with the EU’s energy efficiency framework and the Energy Union Package. Energy policy in the Region focuses on energy efficiency in the public and private sectors. A significant reduction in energy consumption could be achieved, in particular in the housing sector. The Alpine Region has substantial potential for renewable energy production which must be developed in a balanced way, taking-into-account ecological, economical and land use issues and considering societal trade-offs.

The countries in the Alpine Region have a strong potential related to energy efficiency, in particular in the building sector. This provides an ideal framework for working together on innovative solutions for the Alpine Region. Due to the vulnerability of the Region to the effects of climate change there is a certain degree of awareness within the population concerning the need for saving energy. The Alpine Region developed several isolated energy efficiency solutions like highly energy efficient buildings or sustainable mobility solutions. Further, it is feasible to extend existing energy model regions to the whole area of the Alpine Region and thus create a model Alpine Region of modern energy efficiency.

The Alpine Region already plays an important role when it comes to the production of renewable energies, providing hydropower, solar energy, biomass, wind energy and geothermal sources. The major energy resource available in the Alpine Region is hydropower, being one of the most important energy economic components. It is already used intensively in over 100 large hydroelectric plants with a total capacity of more than 28 Gigawatts [GW]. Added to this, the high number of smaller hydroelectric plants also has an impact on the Alpine ecosystem. In particular, hydropower has a high potential as an energy storage system (the ‘battery’ function – pumped storage hydropower).

A balance of interests between energy policy, nature protection and land use purposes is crucial for the further prosperous development of the Region, also taking into account the different needs in mountain regions and plains. The Alpine Region is providing a strong contribution to meet Europe’s energy needs but, at the same time, people in that Region need to have sufficient energy resources at their disposal to improve local living conditions and economic productivity [19].

2.2.3 Contribution of e-MOTICON strategy to EUSALP Action Plan

E-mobility is a cross-cutting topic, related both to the transport and the energy sector. Despite not being specifically addressed within EUSALP Action Plan, electric transport could represent a relevant solution to obtain a better “balance between transport infrastructures and the preservation of the territory”, as stated by Action Group 4, requiring at the same time a certain effort about “interoperability”. On the other hand, the use of electric vehicles in substitution of traditional combustion vehicles guarantees improvements with regards to “energy efficiency and (the production and) use of renewable energy in the Alpine Region”, as in the objectives of Action Group 9.

The e-MOTICON transnational strategy, with the aim of fostering e-mobility diffusion in the Alpine Space, can therefore give interesting contributions to the objectives of both Action groups 4 and 9, and the mutual

interest has been proved by the continuous contacts among e-MOTICON and EUSALP representatives. More in particular, the e-MOTICON partnership was invited to present its activities and results at EUSALP AG4 and AG9 meetings during the implementation of the project.

2.3 Creating the strategy: methodology and work-plan

2.3.1 Logical framework and work-plan

One of the core aspects of the e-MOTICON project was the possibility to debate among countries that, despite being physically really close, had very different experiences and expectations about the diffusion of e-mobility. The challenges of the present transnational strategy were therefore to analyse the different starting points, to identify some common objectives and to jointly select a strategic answer to the most important open issues.

In order to achieve that during the project lifespan, a logical framework was set up and directly reflected into a coherent work-plan.

1. The starting scenario description: analysis of the state of the art in different Alpine Space of European countries with respect to e-mobility diffusion, number and characteristics of the charging stations, existing policies issued by the Public Authorities, business models and involvement of private operators. This work was mainly done within the analysis of the state of the art;
2. The SWOT analysis on the state of the art: the SWOT analysis gave a better understanding of the context and of the possible leverages to reach the objectives. Three SWOT analysis were included, focused on policy, interoperability and business models;
3. The analysis of existing visions and strategies about e-mobility in Europe and in the Alpine Space: in order to provide a consistent strategy and to proceed in synergy with the already existing European plans, an overview of the most important existing visions was necessary. A particular attention was paid to:
 - European vision on transport, energy & environment;
 - EUSALP strategic vision on transport, energy & environment.
4. Definition of a common e-MOTICON long term vision with respect to e-mobility: given the different knowledge, role and background between the partners (from PAs to research centre from different countries), some discussion was needed in order to identify common features to sketch up a long-term vision about e-mobility development in the Alpine Space;
5. Finding a common understanding on the most important open issues and on the e-MOTICON specific objectives: after having defined a long-term vision, it was crucial to address the short-term one and to commonly identify the most important issues to be directly tackled by the project;
6. Debate, both internally and with external experts, about the open issues and identification of possible common strategic answers: leverage the experience of partners and external experts in order to identify the best possible solutions to the open points, considering a common approach for the whole Alpine Space;
7. First selection of strategic answers, defined as “strategic pillars”: selection of six most important strategic measures that should be proposed to Public Authorities according to the e-MOTICON consortium’s experience. These measures are presented as “strategic pillars” on which to build e-mobility diffusion in the Alpine Space;
8. Test and feedback by pilot activities: many relevant aspects addressed by the strategic pillars were analysed and tested within three e-MOTICON pilot activities. Both during the preliminary discussions and during the refining of the transnational strategy, practical feedbacks coming from pilot activities were a powerful source of knowledge and experience;

9. Debate and progressive refining of the strategic pillars, with special attention to the most critical issues: some aspects included in the strategic pillars needed a more intense debate, as different points of view came out from different partners, given the different frameworks of their home countries;
10. Final draft and presentation to external stakeholders: development of a final draft, representing a common and agreed version of the document and of its core part, the strategic pillars. The e-MOTICON final strategy will be shared with all relevant external stakeholders, including Ministries, Public Institutions and EUSALP members.

Please notice that as the first two points are extensively illustrated in reports [20] [21] [22] connected to the analysis of the state of the art, and being point 3 already covered in previous section 3, in the following chapters the main outputs of work-phases 4 to 9 are described.

2.3.2 Debate management and adopted instruments

The work-plan detailed in the previous section clearly highlights the importance of discussion and debate for the development of the present transnational strategy. In order to obtain the most effective inputs and feedbacks from the involved experts, several instruments were adopted.

- Open discussions: the most used “instrument”, an open debate among partners performed both in face-to-face meeting and in web-conferences. Commonly used by the responsible partner for Transnational Strategy to have direct feedbacks on the proposals;
- External experts’ presentations and Question and Answer (Q&A): performed during plenary e-MOTICON meetings, they gave the possibility to have an external point of view on the most relevant topics, coming often from the private operators or industries with a complementary knowledge with respect to the consortium;
- Site Visits: similar to the previous point, they were performed during project meetings and gave the possibility to directly interact with operators that run activities related to the e-MOTICON objectives;
- Workshops: mainly organized during e-MOTICON public events, they were focused on “hot-topics” and managed in a way to stimulate parallel discussion in small groups and then to synthesize the key results in plenary sessions;
- World Café session: as an innovative way to manage discussion, the World Café was used during one project meeting and consisted in the arrangement of several small discussion tables (6 - 8 people each) where people were able to discuss about “table-specific” topics for a short time (15 - 20 minutes) in an informal way. When the time was out, people reshuffled at other tables and discussed about new topics. In this way, each “table manager” was able to gather many points of view on the same topic in a short time;
- Questionnaires: in order to have a clear and structured picture of different partners’ points of view, a questionnaire on the e-MOTICON long and short-term vision was proposed to the partners. An interesting representation about different countries “agreement/disagreement” was realized, better detailed in Section 2.5;
- Networking Platform: the e-MOTICON Networking Platform was created. One “user group” directly devoted to discussion about the strategy content was created and used [23];
- Living document approach: the first release of the strategic pillars was developed more than one year in advance with respect to the final one. It was used as a dynamic basis on which the partners could provide comments and updates, in order to refine it and to obtain a completely agreed final version.

2.4 The starting point: existing hurdles for charging network development

In the last ten years, e-mobility experienced an extremely important growth, passing from a “niche” solution, to an actual alternative for drivers and a promising industrial opportunity. Despite that, analysing the current situation in the Alpine Space, it is possible to observe that the overall “framework” is still inadequate to allow a rapid and remarkable diffusion of electric vehicles in the short period. An in-depth and thorough analysis of the state of the art was performed within the e-MOTICON project, and the results can be found in [20] [21] [22]. Considering the scope of this document, only a short summary is reported, focusing on the most critical aspects related with regards to charging network development.

2.4.1 Public Authorities' roles

First criticism came out when the role and the interactions of private operators and public bodies in the development of the charging network were considered. To start, there are different administrative organs with different powers and responsibilities in five countries of the Alpine Space involved in the project:

- Austria;
 - 9 Regions / Länder;
 - 79 Political Districts;
 - around 2,100 Municipalities.
- France;
 - 18 Regions;
 - 101 Departments;
 - around 36,500 Municipalities.
- Germany;
 - 16 Regions/Bundesländer;
 - 401 Rural and Urban Districts;
 - around 12,000 Municipalities.
- Italy;
 - 20 Regions;
 - around 8,000 Municipalities.
- Slovenia;
 - 212 Municipalities.

Some complexity in developing common strategies and a consistent network is related to existence of different administrative divisions with different competences. Today, in the Alpine Space, Public Authorities play indeed many different roles concerning charging infrastructure deployment.

Choices of PAs can depend on many aspects and can find expression in many different actions. To give an idea of the complex framework of PAs' role, a simplified logical map is proposed in Table 1. In the table, a generic PA is characterized simply by two main aspects; its commitment towards e-mobility and its availability of money for the charging infrastructure. For each of these aspects, three levels were considered: low, medium and high, and on the other hand, nine possible actions were listed. According to the characteristics of the PA, different action can be considered feasible and reasonable. It can be easily seen that also within a really simplified framework, the final set of actions can be very different.

TABLE 1 - POSSIBLE ACTIONS OF PAS ACCORDING TO THEIR COMMITMENT AND MONEY AVAILABILITY

PA CHARACTERISTICS		POSSIBLE ACTIONS								
Commitment	Money Availability	Do nothing	Set technical rules	Plan the infrastructure	Promulgate Laws	Pay/manage the infrastructure	Convey National and EU funds	Simplify authorization procedures	Promote education	Communicate with other PAs
LOW	LOW						X			
LOW	MEDIUM			X			X			
LOW	HIGH			X			X			
MEDIUM	LOW		X		X		X	X		X
MEDIUM	MEDIUM		X	X	X		X	X	X	X
MEDIUM	HIGH		X	X	X		X	X	X	X
HIGH	LOW		X		X		X	X		X
HIGH	MEDIUM		X	X	X	X	X	X	X	X
HIGH	HIGH		X	X	X	X	X	X	X	X

Besides the fact of having different rules and levels of infrastructure deployment in different areas, the complete lack of common strategy and coordination on the role of PAs could also bring to critical (and opposite) situations:

- very strong commitment and public intervention by the PA, with the risk to distort the market and to hinder private operators and new players entrepreneurship;
- presence of completely unequipped areas, due to low public commitment/money availability and low economic appeal for private E-CS operators.

2.4.2 Complex procedures and regulatory framework

Despite the E-CS being quite a simple component, its installation and realization of a publicly accessible charging network require a certain interaction among different stakeholders. At first, the E-CS itself is commonly installed on public ground, implying the need to obtain permission for its usage from the competent administration. Secondly, each charging station needs devoted “parking” areas, requiring further authorizations and often the agreement on an annual fee. Coming to the grid connection, there is the need to require it to the local distribution system operator (DSO), with costs and timings depending on the exact location and on the number and power of the E-CSs. Other examples could be given and it is clear that if these procedures are not well-structured and simple, many hurdles can be experienced by the operators, risking severe delays and economic difficulties.

Probably more critic is the situation when dealing with public tenders and co-financing schemes. Especially in some countries (e.g. Italy), a really complex bureaucracy stands behind the possibility to obtain a public co-financing, and waiting more than one year to know if the proposals are accepted is not rare. Again, this can create remarkable problems for operators planning activities, creating long stand-by periods in the whole sector.

2.4.3 Infrastructure availability and accessibility

The State of Art analysis pointed out that more than 10,000 charging stations are today installed in the Alpine Space [20]. The number itself is starting to be significant and the service provided to EV users could potentially be satisfying. Nevertheless, the uneven localization and the adoption of multiple business models and systems to access/pay, sensibly limit the possibility to use the charging network, still generating “range anxiety” feelings for the drivers.

Starting from the localization issue (deeply considered also within one of the e-MOTICON pilot activities), it is evident that the first infrastructure was born following the “demand”, thus concentrating on the urban area of

bigger cities, naturally more suited for the first electric vehicles range, dimensions and use. Following the increase of EVs sales and technical characteristics, also the charging network evolved, increasing power and progressively spreading into smaller cities and towns. Nowadays a relevant number of Municipalities of the Alpine Space are (or are becoming) equipped with some charging stations (mainly AC, “normal power” ones) and some “corridors” are equipped with “high power” E-CS. France and Germany are particularly well positioned as E-CS numbers, but also Italy, Austria and Slovenia are presenting a good coverage. Anyway, some problem can still be highlighted with regards to:

- small number of E-CS in some “mountain/rural” areas, with the risk of actual “black areas” where EV drivers could have hurdles in driving and charging. This is mainly due to the presence of “non-profitable” territories, where traffic is too low to guarantee revenues for private operators;
- need for de-tours while traveling in highways and international corridors. Due to administrative/bureaucratic issues, in some countries installing high power charging stations directly along highways is still impossible, thus forcing EV drivers to modify their route with a consequent increase in traveling time and costs.

By the side of “physical” access, the E-CS are becoming more and more standardized and easy-to-use, being mostly equipped with the so-called “Type 2” plug/connector for AC charging and with “Chademo” and “CCS Combo 2” connectors for DC charging. The issue of plug/socket incompatibility, very critical in the first years of e-mobility development, is now becoming solved and cannot be considered as an “open point” anymore (some issue still remains on Light Electric Vehicles plugs/sockets). More critical, instead, is the aspects of access and payment [24] [25]. In the last years, the choices of the technical mean to access the charging station and of the payment method with related business model, were completely in the hands of the charging point operators (or e-mobility service providers). Considering that hundreds of providers exist in the Alpine Space, it is easy to understand how variable and multifaceted the situation can be with regards to access and payment systems. Despite the current effort in “connecting” different networks, looking for “interoperability” and “roaming”, it is still extremely common to have many networks in the same area, each based on different access methods and on the need to enter into contracts with the providers. This can create significant hurdles to EV drivers, which would be forced to sign many contracts or, on the other hand, to choose only one provider and to use only a small part of the overall number of charging stations. This situation, already critic in a small area, can become a real barrier when crossing borders and moving to other countries, where E-CS network is managed by different operators.

Given these aspects, it can be said that despite the good number of installed E-CS, EV drivers still have to carefully plan their travels in the Alpine Space, gathering information both on the localization and the access/payment method of the needed charging station. These difficulties undoubtedly slow down e-mobility diffusion in AS countries.

2.5 Definition of e-MOTICON vision and objectives

According to Collins English Dictionary [26], a strategy is

“a general plan or set of plans intended to achieve something, especially over a long period.”

After having analysed the present situation, the e-MOTICON long-term vision for the e-mobility development in the Alpine Space was identified. Despite a general “vision” being quite clear, including a widespread e-mobility diffusion and an effective, interoperable and easy-to-use infrastructure, given the different knowledge, role and background of the different partners, some discussion was needed in order to identify the key aspects of a more specific “common vision”.

2.5.1 Key aspects for a long-term common vision

In this context, the term “vision” refers to a long-term vision, which indicates what each partner expects to be the future of e-mobility in the next 15 - 20 years. This includes the evolution of technical aspects, users’ needs & behaviours and PAs’ role, activities and organization.

In order to gather inputs from the partners, a specific questionnaire was circulated on this topic, including one main question:

With respect to e-mobility, which of the following characteristics will be included in the future mobility system in 15 - 20 years?

The partners were asked to “rate” some pre-provided answers according to the following scale:

1. unrealistic;
2. slightly probable;
3. probable;
4. very probable;
5. for sure.

The possibility to add new answers was also given. All the partners were involved and 24 questionnaires were filled-in. The results are summarized in Table 2.

TABLE 2 - QUESTIONNAIRE RESULTS FOR THE LONG-TERM COMMON VISION

Integration of EVs charging infrastructure with renewable energy generation and storage systems.	107
Widely diffused e-roaming based on B2B agreements among operators	102
Implementation of new mobility solutions based on the concept of “mobility as a service”, as multiple vehicle-sharing, on-demand services, intermodal systems and others.	101
Predominance of domestic/private charging with respect to public charging.	89
Development of innovative “Integrated charging stations” that will include ultrafast EV charging stations (very high power), H2 refuelling, storage systems and other.	84
Diffusion of electric vehicles with autonomous drive, allowing new functionalities for the owners.	81
Widely diffused e-roaming based on the adoption of a unique and common platform for access and payment	74
Diffusion of wireless charging, both “static” and “dynamic” (charging while driving).	70

According to the results, the participants of the questionnaire believe that, in the e-MOTICON long-term vision, a core aspect of the future mobility system should be the integration of e-mobility in a virtuous energy and transport system. The possibilities offered by renewable energies and storages will boost the benefits of electric traction, while e-mobility will be part of a new transport framework based on sharing economy and intermodality. In order to provide the best driving and charging experience, e-roaming solutions should be present, with a preference for B2B agreements among operators.

It can be noticed that in a long-term vision less importance is given to technological solutions, as wireless charging, ultrafast charging or autonomous drive.

2.5.2 Project-term vision and e-MOTICON objectives

In parallel with the definition of a long-term vision, for the purpose of the project a “project-term vision” was looked for, in order to commonly identify the most important issues to be directly tackled by the project.

The “project-term vision” indicates what each partner wants to be the future of e-mobility in the Alpine Space in the next 3 years. This vision describes the desired features and framework at the end of the project and is strongly related to the e-MOTICON objectives (which should cover, at least, a relevant part of the vision).

As for the long-term vision, the general e-MOTICON objective is well known: “contribute to the homogeneous diffusion of electric mobility throughout the Alpine Space, providing a transnational strategy for seamless use of electric vehicles and charging spots with an integrated approach supported by PAs”.

To better specify it, all the partners were asked to provide their inputs on e-mobility expected developments and on the most important aspects that had to be tackled by the project, in order to achieve the project own view on e-mobility development in the Alpine Space.

Another part of the questionnaire was therefore circulated, focused on the “project-term vision and objectives” and divided into two different questions:

1. considering the processes of planning and framework setting on a local or regional level: what are the most critical aspects to be dealt with by public authorities, i.e. what are the topics for which e-MOTICON should give advice?
2. considering the final user needs and driving experience: what are the most critical aspects to be dealt with by operators, public authorities and other supporters of electric mobility, i.e. what are the topics for which e-MOTICON should give advice or provide tools?

It can be seen that the first question considered aspects more related to Public Administrations’ role and processes, while the second was more related to “final users” perspective. In this case, also provided answers had to be “rated” according to the following scale:

1. irrelevant;
2. slightly relevant;
3. relevant;
4. very relevant;
5. essential.

The results are summarized in Table 3 and Table 4.

TABLE 3 - QUESTIONNAIRE RESULTS FOR THE SHORT-TERM VISION CONSIDERING THE POINT OF VIEW OF PUBLIC AUTHORITIES

Defining the role of PAs in the development of the infrastructure	99
Creating short term plans (time range up to 5 years) for positioning of E-CS	97
Establishing instruments and offices to provide assistance to small Municipalities interested in e-mobility	94

Cooperative planning of PAs with enterprises and private operators of E-CS	92
Introducing e-mobility in Green Public Procurement	89
Establishing incentives for the use of e-vehicles (e.g. specific parking place or road lanes)	78
Agreeing on rules for the compulsory adoption of “planning documents for sustainable mobility” in the reference area	78
Creating long term plans (time range beyond 5 years) for infrastructure for electric mobility (going beyond existing technology, i.e. for example integrated facilities to fast charge many vehicles including H2 storage)	74
Defining uniform supra-regional authorization procedures for E-CS installation	70
Defining uniform supra-regional rules to manage electric vehicles parking and charging areas	65
Defining uniform supra-regional rules to limit/enable access of electric vehicles to urban centres or controlled traffic zones	64

TABLE 4 - QUESTIONNAIRE RESULTS FOR THE SHORT-TERM VISION CONSIDERING THE POINT OF VIEW OF THE FINAL USER

E-CS supra-regional mapping tool to find and/or reserve a charging spot	103
Multimodal hubs to integrate e-mobility with local transport and railways	97
E-CS access without the need of a contract with any service provider;	95
Direct roaming and payment systems among service providers in order to charge with a single contract	94
Widespread charging network, covering also low-populated areas (E-CS with low number of charging events but crucial to allow particular routes)	86

Platform for locals and guests to find E-CS and get information on terms of use	86
Roaming among service providers through a common platform/marketplace (also to compare and select different prices from different providers);	78
Provisions of additional non-mobility services at E-CS (food, bank, recreation, etc)	67

With regards to the “PAs’ point of view”, it can be observed that an “essential” aspect is to better define which should be the role of Public Authorities, consistently with what already stated in section 2.4.1. The interaction with small Municipalities, as “on-field” public entities, is considered crucial too, as well as the need for a short-term plan to localize the charging stations. Less relevant is instead considered the adoption of traffic and parking management schemes in order to encourage the diffusion of EVs.

Moving to the “Final users’ point of view”, the results show the importance of having tools and solutions to easily find a charging station, to access to it and to pay for the service without the need of a contract. Simplicity looks as a key solution for the e-MOTICON partners, together with a good integration with local transport service according to the long-term vision of intermodality.

2.5.3 Alpine Space agreement/disagreement

The results of the questionnaires can be disaggregated according to the home country of the participants. This way, a picture of the most relevant aspects in the different countries was obtained and, above all, a comparison performed among five involved countries. A detailed analysis goes beyond the scope of this document, but an example of comparison is reported in Figure 1.

The graph shows for all the countries, the “percentage of importance” of each proposed topic for the “Project-term vision” from the point of view of the final users. When five bars have a similar height, it can be said that there was a good agreement among the countries. It is the case of the “supra-regional mapping tool”, which gathered high rates in the whole Alpine Space.

If we consider the three “top-rated” issues (mapping tool, multimodal hubs and no-contract), it can be seen that they were the top-rated in Italy, Austria and Slovenia, but not in France and Germany. This underlines again, the importance of a transnational strategy, focused on the most important aspects for the whole Alpine Space and not directed to specific issues of a single country. Only this way, a consistent framework can be created, with remarkable benefits for the final users.

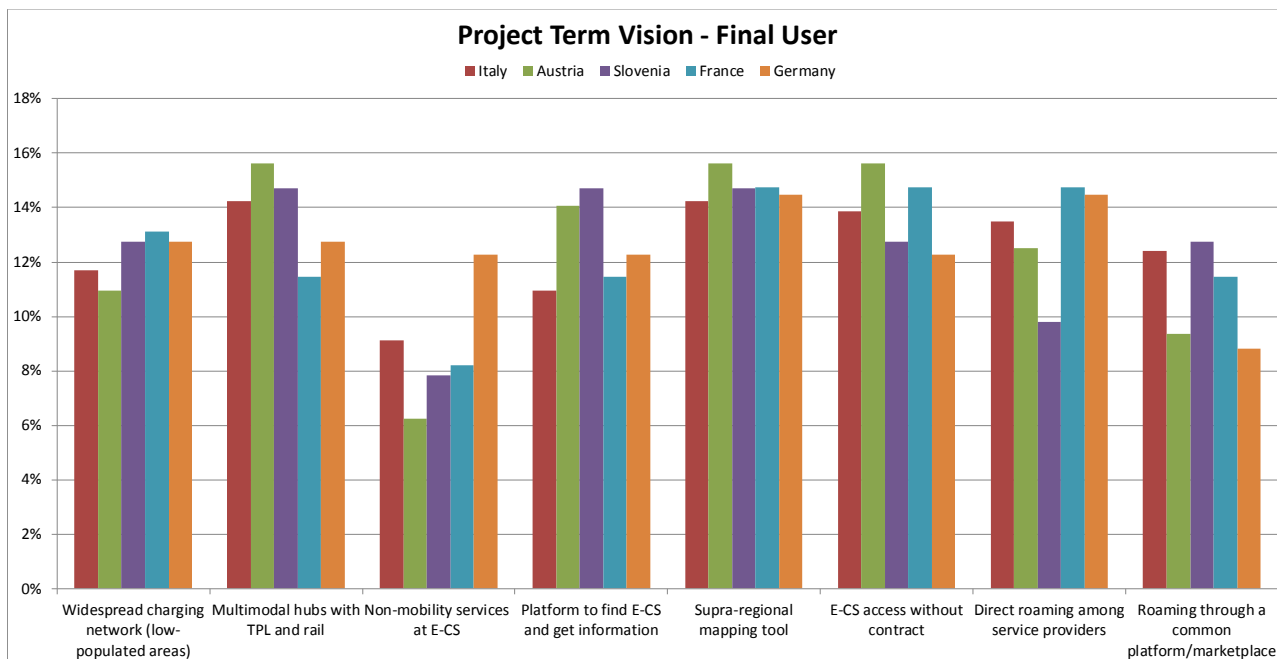


FIGURE 1 - COMPARISON OF THE QUESTIONNAIRE RESULTS (SHORT TERM VISION, FINAL USERS POINT OF VIEW) IN DIFFERENT COUNTRIES

2.5.4 Key principles for Strategy design

It has to be mentioned that together with the “visions” and the “objectives”, identified through partners’ debate, some key principles of the e-MOTICON project needed to be considered when designing the transnational strategy. These are more general principles, staying in the background of the whole project activity and also of EUSALP and other strategies for the Alpine Space. They can be summarized in the following bullets:

- public Authorities are a key actor to lead the infrastructure development;
- the Alpine Space is made of different realities, from metropolitan areas to isolated rural/mountain areas. The optimal solutions for transport can be multiple:
 - local Public Transport in urban, peri-urban and congested areas
 - rails for freight and passenger transport especially for long-range and cross-country trips
 - low emissions private transport (mainly electric) for small cities, towns and mountain communities
- technologic solutions are ready and mostly available. It is now important to choose common solutions, set up common rules and respect them;
- goals can be reached according to a “priority approach”;
- a set of few, focused and coordinated actions would be sufficient to reach the goals;
- communication, education and training are sometimes more important than technical aspects.

2.5.5 The e-MOTICON objectives and the strategic pillars

The just described process led to building of a common vision on the evolution of e-mobility and, above all, on the most important aspects that had to be tackled by the e-MOTICON project in order to accelerate e-mobility diffusion in the Alpine Space in a short-term period. The “top-rated” aspects were easily transposed into short-term objectives. Considering the aim of this document, mainly targeted to “high-level” policy makers withing Public Authorities, a further transposition was made, expressing the objectives as “strategic pillars”. Six pillars were identified, representing a set of priorities commonly agreed by 15 partners in five countries, and are presented as a core part of the e-MOTICON transnational strategy.



2.6 STRATEGIC PILLAR #1: Define the best possible roles of PAs

Within the Alpine Space, Public Authorities play many different roles with regards to charging infrastructure deployment. In order to guarantee a coherent environment for e-mobility diffusion and to limit the presence of different rules and levels of infrastructure deployment in Alpine Space areas, the e-MOTICON partners agreed on the importance that all the involved PAs should act homogenously, at least on a minimum number of aspects and topics.

While addressing this issue, it was reminded that the intervention of public bodies in the deployment of the charging infrastructure must respect the general concept stated by the Alternative Fuels Infrastructure Directive (AFID) (2014/94/EU) [13]:

“The establishment and operation of recharging points for electric vehicles should be developed as a competitive market with open access to all parties interested in rolling-out or operating recharging infrastructures.”

According to AFID, the intervention of Public Authorities cannot therefore create limits or inhibit the development of a free and competitive market.

Public Authorities can be divided into three main categories, with different roles and areas of intervention:

- national institutions (Ministries and Government);
- regional/territorial PAs;
- municipalities.

According to the scope of the project, the target audience of the present transnational strategy covers all three categories, with a special attention to Regional/Territorial PAs. As already recalled in section 2.4.1, due to different administrative divisions, different administrative organs exist within five countries of the Alpine Space, with different powers and responsibilities. A unique case is Slovenia, where no intermediate organs are interposed between National Institutions and Municipalities. For this case, it can be considered that role and responsibilities of the Regional/Territorial level are covered directly by National Organs.

While respecting the variety of roles currently existing in Alpine Space countries, the experience gathered within the e-MOTICON project shows that all the Regional Authorities and Municipalities should act, at least, in order to facilitate and coordinate the deployment of a homogenous and effective infrastructure inside their territories and with a strong attention to neighbouring areas.

Regional Bodies should therefore, at least:

1	Set minimum technical rules on infrastructure deployment
WHY	Despite the presence of some international and national rules on charging infrastructure development, many aspects are still “uncovered” and the rules themselves can be open to different interpretations. Without a set of clear rules or boundaries set up by a regulator, e-mobility service providers can therefore adopt many different solutions while developing the charging infrastructure. This could lead to a fragmented infrastructure composed by many small networks with different characteristics in terms of: charging power (time needed to charge the vehicle), accessibility, identification and billing systems, connectivity and availability of additional services. The absence of minimum common rules could create hurdles to EV drivers, which cannot properly plan their trips and related charging events [27].
HOW	Regional bodies should identify a set of technical rules according to the most effective technological solutions, the international regulation and the local characteristics and should transpose them into a “Guideline” document or directly into a “Territorial Law”, to be used as a reference by the operators. The e-MOTICON partners strongly suggest that each Regional PA in the Alpine Space adopts and transposes in its area the technical rules presented in the following section “set supra-regional common minimum rules on infrastructure access”.
2	Set infrastructure requirements for new buildings and new fuel stations
WHY	In the vision of a remarkable e-mobility diffusion in the next years, new buildings and new fuel stations should be equipped from now on to answer to next-future charging needs. The additional cost related to these interventions could detain the building contractor from realizing the charging facilities that should be therefore required by law.
HOW	Regional bodies should analyse the potential diffusion of e-mobility in their territory and the traffic fluxes from/to neighbouring areas and identify a coherent percentage of needed charging points in new buildings and new fuel stations. While imposing the percentage, also a specific attention to technical requirements has to be paid, following the rules set according to the previous section.
3	Funnel economic resources (European, National, Regional) to “market failure areas”
WHY	As stated by AFI Directive, the charging infrastructure should be developed as a competitive market, leaving to private operators the opportunity to invest on its deployment and management [13]. On the other side, it is also a shared vision that EV charging stations are a key enabler to e-mobility diffusion and could be seen as a “public service” provided to citizens [28]. In the middle of these two visions, the actual situation shows that private operators are investing in the infrastructure, but only in some specific areas, considered most profitable both from an economic or a “green image” point of view (e.g. metropolitan areas). It is a duty of Public Authorities to stimulate the installation of charging points also in areas that are neglected by private operators, but that are relevant in order to ensure driveability in the whole regional area. The possibility to travel easily across the whole territory is indeed a crucial motivational aspect for new potential EV users.
HOW	Regional PAs can quite often rely on funding coming from European or National plans. PAs should choose to use these resources favouring (in public tenders) projects focused on still neglected and “market failure” areas, in order to guarantee a full coverage of the territory. The presence of the co-financing should smooth out the economic disadvantage for the involved service provider.

4	Organize information and education programmes and coordinate the actions of different stakeholders and operators in the regional territory
WHY	E-mobility is nowadays a multi-dimensional topic and only a small part of it is related to technical aspects. A huge importance has instead to be given to education, social aspects and governance. To increase final user's trust in this new technology, education and formation activities have to be carried out [29]. At the same time, education is also needed by smaller public entities (e.g. small Municipalities) that have to set up a fruitful framework to foster the charging infrastructure deployment, in strong correlation with operators and other PAs. Last but not least, the interest in e-mobility could come from many different actors (e.g. tourist centres, taxis, Local Public Transport companies, airports and multimodal hubs managers, commercial operators, etc.) and it is a duty of Regional PA to maintain a systemic view and to promote synergies among all the involved stakeholders.
HOW	Regional PAs should organize educational events both public and specifically reserved. They should present themselves as a "connection hub" for many different stakeholders and as facilitators and catalysts of e-mobility activities within the regional boundaries. In order to support PAs in this complex task, e-MOTICON proposes the specific tools and solutions developed in the e-Hub pilot, presented in deliverable e-HUB pilot report (D.T 3.2.1) [30].
5	Coordinate the different planning activities within the Regional/Territorial Public Authority, creating synergy among territorial planning, urban planning, traffic planning, environmental planning and more
WHY	As stated before, e-mobility is nowadays a multi-dimensional topic, which can find multiple expressions in the regional framework. It can affect traffic management and urban planning, but also air quality and environmental planning, as well as economic development, education and new jobs creation. Within the internal structure of Regional PAs, these topics are commonly addressed by different divisions (e.g. Environment, Infrastructure, Mobility, Economic Development, etc.) that are in charge of their own planning activities. The lack of coordination can create a non-homogeneous environment, with the risk of taking overlapping or contradictory decisions and missing important synergies.
HOW	Regional PAs should create a dedicated sub-structure devoted to e-mobility, able to monitor the activities of different divisions and able to detect possible synergies. A constant communication should be pursued and periodic plenary meetings should take place, in order to obtain a systemic and constantly updated view.

Municipalities should instead, at least:

1	Act as a stimulus for the infrastructure deployment, without a direct intervention on realization and management
WHY	The presence of a charging infrastructure within the territory of a municipality is crucial in order to provide the needed services to EV drivers. The PA should act so to create a favourable context and to involve private operators in order to realize a charging infrastructure with public access. As the realization and management costs of the infrastructure is still quite relevant and its planning and design require technical skills, the e-MOTICON partners consider generally inefficient the direct involvement of the Municipality as infrastructure owner or as e-mobility service provider. Exceptions can exist, as in the case of the very first stages of the network development (where municipality could be the only actor to invest on it) or in the case of public funding legally reserved only to public bodies.
HOW	Municipalities should perform spatial planning activity, with preliminary studies on e-mobility demand in their area, including the identification of key points that could be optimal to serve a high number of EV drivers. They should then involve potentially interested service providers that could develop the infrastructure at their own expenses but with the benefit of PA agreement and coordination. While giving public-ground usage permission, the Municipality can also foster technical solutions and specific localizations, as a condition for the service providers to obtain the permission and possibly fee discounts. When being directly involved as network owners (see the exceptions before), Municipalities should carefully identify a private operator that would take the role of e-mobility service provider for the public infrastructure.
2	Facilitate the installation of charging stations both in public and private areas (permissions, public-ground usage regulation, technical support)
WHY	In many cases, the authorization process for charging stations installation could be critic. It could involve, indeed, authorization for the use of public areas, for the installation of electric equipment, for construction work and more. This could create hurdles and blocks to private operators' installation plans, as involves additional costs and additional time for the infrastructure set-up. Technical aspects also, as grid connection, energy measuring and correct billing can need a complex interaction among operators, Distribution System Operators (DSOs) and public bodies (especially if the municipality is the owner of the infrastructure).
HOW	Perform an analysis to identify the most important problems that investors and operators are facing during the installation process. If needed, simplify the administrative procedures, identifying special rules and requirements for the charging infrastructure. It has to be considered, for example, that the charging infrastructure serves as a "public service" and the use of public ground should therefore be privileged with respect to other potential uses. Moreover, technical offices within the public body should be well prepared to answer to service providers' questions and should give easy and exact references to the "in force" regulation.
3	Include e-mobility and infrastructure development in the planning activities, leveraging on Sustainable Urban Mobility Planning instruments
WHY	The European Commission, starting from the Action Plan on Urban Mobility (2009) [31] and the Transport White Paper (2011) [11], is widely promoting the adoption of Sustainable Urban Mobility Plans, which aim to represent a new planning concept able to address transport-related challenges and problems of urban areas in a more sustainable and integrative way. In contrast to traditional transport planning approaches, the new concept places particular emphasis on the involvement of citizens and stakeholders, the coordination of policies between sectors (transport, land use, environment, economic development, social policy, health, safety, energy, etc.),

	between authority levels and between neighbouring authorities. Sustainable urban mobility planning is therefore a challenging and complex task. Planners are asked to manage many requirements, sometimes conflicting, mainly based on the local level, but linked to national and international targets on climate and environment. It is crucial that e-mobility and EV charging infrastructure are considered as a relevant aspect in this new planning process, in order to find the best synergies with the overall urban mobility evolution [32], [33].
HOW	Follow national rules on Sustainable Urban Mobility Planning and consider, in a well-structured and concrete way the topic of e-mobility and infrastructure development. Create a cooperative framework among different technicians and offices within the municipality and promote events including e-mobility as a relevant aspect in urban planning. Take advantage also of international reference documents, as the Guidelines "Developing and Implementing a Sustainable Urban Mobility Plan" proposed by ELTIS, Europe's main observatory on urban mobility (financed by the European Commission) [32].
4	Keep constant attention to regional regulations, guidelines and suggestions and actively answer to the requirements
WHY	In some countries it is quite common to have a wide production of laws and regulations, both on national and regional level. It is often difficult for Municipalities (especially small ones) to have a constantly updated and complete view of the in-force rules, including laws, regulations, guidelines, plans and more. In this decisive moment for the creation of a homogenous and interoperable charging infrastructure within the Alpine Space, it is fundamental that Municipalities comply at least with the Regional regulations, in order to guarantee continuity and coherence of the service in the whole regional territory. If Regions properly acted, this coherence will also be guaranteed outside the local borders and internationally. Moreover, it is essential that Municipalities quickly comply with the duties imposed by Regional bodies (e.g. the adoption of SUMP's or the modification of rules on authorizations procedures).
HOW	It is necessary that both by the side of Municipality and of the Region, an effective communication is created (see the previous section). In order to do that, the instruments proposed by e-HUB pilot could be extremely useful, as well as the clear identification of a devoted structure/office within the Municipality organization.
5	Intervene on traffic/parking management and green public procurement to increase EV adoption and generate more profitable conditions for e-mobility service providers
WHY	The realization of the charging infrastructure actually creates the "offer" of a service. Despite the importance of having the infrastructure already in place, in some Alpine Space countries the demand for that service is today quite low. This could easily ingenerate a vicious cycle where the infrastructure deployment does not generate revenues and is therefore blocked. The absence of the infrastructure, on the other hand, limits EVs usability and therefore creates additional obstacles to their diffusion. In this complex "chicken or egg" situation, Municipalities should try to stimulate the "demand" for charging, creating an urban environment which calls for the adoption of electric vehicles and creates profitable conditions for e-mobility service providers [34].
HOW	Municipalities can leverage many instruments in order to stimulate EV adoption. The most commonly used are related to traffic and parking management, where EVs could benefit of special permissions or special discounts (including free parking) [35]. In addition to that, a good way to create the "demand" is to adopt a "Green Public Procurement" approach and to progressively convert public (and public-related) fleets to e-mobility [36].



2.7 STRATEGIC PILLAR #2: Set supra-regional common minimum rules on infrastructure

In the last years, several public and private actors are paying attention to e-mobility and are starting developing first samples of EVs fleet and charging infrastructure, also in the Alpine Space. According to the e-MOTICON vision and objectives, it is really important that in this moment of “development”, all the initiatives are seen as a part of a much more complex and integrated “system”: EVs need to cross borders and the infrastructure has to be able to charge them.

As already mentioned in section 2.6 some international and national rules on charging infrastructure development have been established in the last years. Despite that, many technical aspects are still “uncovered” and the rules themselves can be open to different interpretations. In order to avoid the development of a fragmented infrastructure, the e-MOTICON partners consider crucial to set some supra-regional common minimum rules that PAs should put in place while facilitating and regulating the deployment of the charging infrastructure. Next sections are therefore thought to give an overview of high-level technical rules and suggestions, with a special attention to access/interoperability/roaming issues. If all the PAs in the Alpine Space follow at least these indications, an easy and seamless driving and charging experience would be offered to EV owners.

2.7.1 Power Level and uni/bi-directional energy flow

There is no need to set up a unique rule on the power level, as its choice depends on the aim for which the infrastructure is set up. It can be said that two levels are nowadays widely adopted:

- “Normal power”: 22 kW AC (32 A – 3 phases);
- “High power”: 50 kW DC.

The first power level implies quite long stops and can be considered mainly as an alternative to home/work charging for users that do not have availability of a private box. An infrastructure with this power level should be planned according to several parameters typical of the urban environment [27]. Among others:

- number of inhabitants;
- private parking spots/total parking spots ratio;
- number of cars for inhabitants;
- foreseen e-mobility market penetration;
- mean daily mileage.

The second solution, commonly referred as “high power charging” (or “fast charging”), will instead have as main objective to allow longer daily mileage to the vehicles. The chargers will be used mostly as “fuel stations” during mid-range missions and their localization should therefore be planned according to that (highways, city rings, etc.). Most of the present EVs accept 50 kW fast charging and this could be seen as a reasonable power almost in the mid-term. Despite that, some high-level brands are already installing more powerful chargers (up to 125 kW) and 350 kW chargers are under development [37] [38] [39].

A reasonable public infrastructure should include both the power levels (22 kW and 50 kW) localized after a careful planning and taking into consideration the different aims.

While setting up rules about the electrical characteristics of the charging stations, it is worth keeping a particular attention on the development of “bi-directional” DC chargers. These solutions, able to perform the so-called “Vehicle-to-Grid” (V2G) providing energy back from the vehicle battery to the electric grid, are today available in Japan and are starting to spread in some European countries [40]. V2G development is not yet mature in the Alpine Space, as it still requires some work both on technical and (especially) on regulatory level, with a lack in business-models definition too [41]. Considering the interesting opportunities provided by V2G solutions, it is recommended to support pilot activities and to monitor the evolution of bi-directional charging stations and of the related regulation, so to possibly include these systems in successive medium period technical rules.

2.7.2 Connectors and communication between vehicle and charging station

The topic of connectors has been highly debated in the last years, but the already mentioned 2014/94/EU Directive finally identified a common choice and gave clear recommendations [13]:

- type 2 connector (EN 62196-2) for AC normal and high-power charging;
- Combined Charging System (CCS) Combo 2 connector (EN 62196-3) for DC high power charging, preferably coupled with a CHAdeMO connector for a “multistandard approach”.

An open point is still existing only in the field of Light Electric Vehicles (LEVs) with on-going work on European Community IEC level [42]. In order to charge LEVs, a different socket could be added to the E-CS, but the 2014/94/EU Directive does not specify a common solution. Due to that, different standards are adopted across Europe (e.g. Schuko socket in Germany and Type 3A socket in Italy) and it is still difficult to set common rules on this aspect. The e-MOTICON suggestion is to identify a unique solution in order to get a complete transnational interoperability.

Once the vehicle is plugged-in, an effective communication between the vehicle and the charging point is fundamental to allow a safe and controlled charging process. On this aspect, also European standards are now well-established. All the charging stations installed in the Alpine Space should adopt one of the following standards that cover the three most common charging technologies:

- AC charging: PWM communication according to IEC 61851-1 (mode 3);
- DC CCS Combo 2 charging: PLC communication according to DIN SPEC 70121 (ISO 15118);
- DC CHAdeMO charging: CAN communication according to IEC 61851-24.

2.7.3 Communication charging station – backend

The communication between the charging station and its backend is still an open issue, as no definitive choices have been made on the protocol to be used. At present, many manufacturers adopt proprietary solutions as they often represent both the charging station and the backend sides. In a future more complex environment, it will be advantageous to have a common standardized solution and many efforts are on-going to develop and identify a common protocol. In particular, some standardization groups gathered in the last years, and industries, operators and research centres proposed interesting solutions. An example, now widely recognized around Europe, is the so-called OCPP (Open Charge Point Protocol) by OCA (Open Charge Alliance) [43].

In absence of a univocal standard, it is anyhow recommended that the communication between the charging system and the control system takes place through a protocol that is as open, flexible and shared as possible and that already has a significant market diffusion, so as to facilitate the progressive implementation of a fully interoperable infrastructure. Moreover, the control system should perform at least the minimum following functions in real-time:

- verification of correct functioning;
- verification of availability (free/occupied);
- user identification;
- activation / inhibition of the charge;
- measure and reading of electrical parameters during charging.

2.7.4 Access, identification and payment: interoperability and roaming

It can be easily said that the issue of access, identification and payment is today one of the biggest open points with regards to EV charging infrastructure [44]. Even if most of the charging processes will probably happen at home through domestic apparel, the possibility to charge at public stations while traveling long

distances is indeed a key enabler for e-mobility diffusion. To perform a charging process, a procedure of access, (identification) and payment needs to be executed.

The complete absence of regulation on this aspect, especially till the AFI Directive, generated a proliferation of different solutions and technical means to perform these phases. As already mentioned in section 2.4.3, considering that hundreds of providers exist in the Alpine Space, it is easy to understand how variable and multifaceted the situation can be with regards to access and payment systems. Due to this, it is still extremely common to have many networks in the same area, each based on different access methods and very often on the need to enter into contracts with the providers. EV drivers would so need to plan very carefully their trips, actually studying their possibilities to access to one or another part of the infrastructure and considering the time and effort to sign up to different schemes and services. The difficulties increase when crossing borders and moving to other countries.

In order not to hinder the drivers' experience, and therefore the EV market development, it is crucial to simplify this process and to make sure that drivers can easily access to all charging points. This is what is commonly referred to as 'interoperability', the ability to access charging points without restrictions or discrimination (for a more technical definition please refer to Deliverable D.T 2.1.1, "E-CS interoperability model", available on project website, section *Project Results/Deliverable*).

Two main solutions have been proposed in the last years and are presented in the remainder of this section [45]:

1. "ad-hoc" access, according to 2014/94/UE;
2. roaming among e-mobility operators.

2.7.4.1 The "ad-hoc" access solution

The already mentioned 2014/94/EU Directive tried to intervene on this aspect for the first time, clearly stating that [13]:

"All recharging points accessible to the public shall also provide for the possibility for electric vehicle users to recharge on an ad hoc basis without entering into a contract with the electricity supplier or operator concerned."

Ideally, that means that to access and use any charging station it would be sufficient to reach it and to follow the instruction to launch the charging process, without worrying about who is the owner and who is the provider. In practice, the fact of avoiding a "contract" considerably simplifies the usability, but still some effort could be required to the driver, depending on the technical solution chosen to provide the "ad hoc" access. On the other side, the need to provide a compulsory alternative to classic "contract based" solutions, could create a cost increase for the E-CS operators, which could be critic especially for "low usage" charging stations. The still open challenge is to identify the best methods, which are both customer friendly and cost effective for operators [45], [44].

Analysing more in detail the different possibilities:

- the simplest solution for the driver is to use something that he already possesses and commonly uses, without the need to download nor fill-in anything;
 - money
 - credit/debit cards
 - SMS

A reference example for this kind of access/payment systems are the machines commonly installed in self-service fuel stations or in big parking lots, which include both the possibility to use cash and credit/debit cards. Given the low economic volume of each transaction for EV charging, these systems are addressed as too expensive by the operators, both as capital and operational costs. The use of money, in particular, requires efforts to physically recollect it, while credit card readers could suffer from high costs both for the equipment and for bank transactions. The SMS, despite being quite used in some countries, are suffering from being linked to a somehow already "old" technology and, besides, from being often unusable by travellers from foreign countries.

An interesting innovation in this field is coming from the diffusion of Near-field communication (NFC) technology, allowing “contactless” payment. The cost of credit card contactless readers is lower than the one of traditional “POS” and they also allow payment with “mobile-based” payment solutions as Apple pay or similar by Samsung, Google and other providers;

- slightly more “complex” for the user but also more innovative is the possibility to pay through “mobile based” solutions that works not on NFC, but on “peer-to-peer” or “peer-to-business” money transfer. Many examples are starting to spread, based on the possibility to have a personal “wallet” connected to the bank account and to transfer money to other users simply entering their phone number or scanning a QR code. The number of apps and services providing this possibility is continuously increasing, including both smaller players (Satispay, Jiffy, QRpay) and well-known societies (PayPal, Facebook, Google, international banks, etc.). The advantage for the user is the ability to pay with the only requirements to have a smartphone, an internet connection and one single app for all the networks. From the operators’ point of view, it would be possible to avoid any “card reader” at the E-CS, replacing it with a simple QR code. Some transaction costs could anyway be applied by the “payment providers”;
- a third option, also based on a QR code, is the one actually proposed by some European providers (e.g. Freshmile). In this case, the QR code is not directly used to perform the payment, but is used as a link to the website of the E-CS operator, where drivers can activate the charging and pay by their credit cards. This solution can guarantee a small cost for the operators (no card readers) and implies a medium effort by the user, which needs every time to access the website and perform a typical on-line payment, providing its data. No download is anyway required by this solution;
- probably the preferred solution by the operators, but also the worse for the user, is the one becoming common in this period: paying using the credit card through a dedicated app developed by the service provider. Today, most of e-mobility service providers already have an app, used to provide services to their own customers, as well as to perform marketing. Given the “ad-hoc” requirement introduced by AFID, providers are progressively including in their app the possibility to perform the payment without entering into a contract with them. Despite completely fulfilling the AFI requirements, allowing access and charging to everyone, this solution could be not comfortable for the user, that would need, for any operator they come across, to download the specific app and (very often) to fill in registration forms.

2.7.4.2 Contract based solutions and roaming platforms

The need for “ad-hoc” payment invites to parallel EV charging to traditional “refuelling”, performed as a “spot” service and accordingly paid “on-site”. Another vision, very strong in the e-mobility field especially in the first years of development, considers EV charging as a “continuous” service that has to be provided to drivers, similarly to mobile phone services. In order to use this service, the best solution is to enter into a contract with a preferred provider and to pay periodically (e.g. monthly) after the emission of a comprehensive bill. The selected provider will then propose different means to access the charging station and to be identified, from simple Radio-frequency identification (RFID) cards/tokens to mobile-based solutions.

Considering this vision, where the driver is connected to a single service provider, to have access to the charging stations of different networks will require agreements and money compensations among the service providers. There must be created a “roaming” scheme that allows customers of “provider A” to easily access and use the network of “provider B”, avoiding any contact with B and maintaining the normal billing system with A. Again borrowing the mobile phone example, is the typical scheme of mobile phone services when travelling to foreign countries.

The creation of “roaming” can happen through two main options [45]:

- bilateral agreements between providers;
- “roaming platforms”.

In the first case, each operator must get in contact with all the others and define the technical and economical details of the roaming process. It is exactly the case of telephonic industry, where the low number of operators makes this scheme feasible.

Given the high number of operators in the e-mobility field, this scheme would need thousands of B2B contracts and is progressively being abandoned, in favour of the second option.

The so-called “roaming platforms” are digital platforms that work as “market place” and enable mobility operators to easily build partnership among them. In practice, by connecting to the platform, one operator includes its charging stations into a broader network, allowing its own customers to use the E-CS of all the other connected operators. The platform itself is able to perform “clearing” services, managing the billing process and the economic compensation among operators. No direct contacts or agreements are therefore needed among operators. As a payment for the service, a fee is required to each operator, which can be fixed as a percentage of the transaction, as a periodic fee or as a “registration fee” depending on the platform.

Today in the Alpine Space a few numbers of roaming platforms exist, with different sizes. In particular, two German platforms (Hubeject and Plugsurfing) have reached a remarkable dimension, becoming the first examples of “international platforms”, together with the French Gireve and Freshmile. The number of operators connected to these platforms is continuously increasing, even if the cost for the operators can be considerable [46] [47] [48] [49].

It has to be noticed that practically putting in place this scheme is not trivial, as it requires a thorough communication among operators and the sharing of sensitive amounts of data, expressed with a common protocol. A first challenging issue is to identify and agree upon the technical requirements needed to make the system fully operational across Europe, in this “roaming” vision. Among others, the following requirements need to be considered [50]:

- equipment of charging points with communication capability to be able to share dynamic data and commercial information;
- adoption of common protocols for roaming between commercial entities and between charging Point and Software Backend;
- standardization of the ID handling and setting up of a European framework for these commercial entities IDs (Service Provider ID, Operator ID);
- identification of a single technology for RFID access.

2.7.4.3 e-MOTICON suggestion on interoperability and roaming

Within the project development, many debates and discussions were carried out about the issue of access and payment, directly related to interoperability and roaming. The analysis of the actual situation in the Alpine Space (and in all Europe) and the practical experience of both the PAs and the operators involved in the discussion, led to identify the following key points, agreed by the e-MOTICON partners:

- “ad-hoc” access/payment systems will have to be present in all the charging stations, as required by law. This, coupled with a reliable mapping system (see Section 2.9), will guarantee a total and immediate accessibility to the complete network installed in the Alpine Space;
- the technical solution chosen to perform the ad-hoc payment should carefully consider both the additional cost for the operator and the comfort for the user. It is suggested to look for the most up-to-date technologies, as mobile-based universal payment solutions, avoiding the need to download specific apps or fill-in complex registration forms;
- e-mobility service providers can maintain the possibility to offer “contract-based” solutions to their customers, including premium services or special rates. What requires a special attention is that the deployment of the contract-based systems is done in good harmony with the “ad-hoc solution” and without unnecessary duplication of efforts and costs. The prices must be fair in both cases;
- in order to allow wide network accessibility to their customers, e-mobility service providers are suggested to adopt a “roaming” scheme, at least on a local level. The use of a roaming platform (and of which one) is a free choice of the providers;
- it will be in interest of e-mobility service providers to look for agreements on technical solutions and standards needed to perform roaming (e.g. OCPP, different RFIDs, common ID handling, etc.);

- EV drivers will be free to judge whether the contract-based service is in line with their usage patterns and expectations, and then decide if they want to go through the expense of purchasing it or if they want to simply perform charging with ad-hoc payment;
- all the charging stations must be equipped with comprehensive connectivity, essential to fulfil access/payment procedures both in “ad-hoc” and in “contract based” schemes;
- as the access/payment process could require the exchange of a sensitive amount of data, it is recommended to put a particular care in “protecting” the drivers, developing/applying an effective privacy legislation and providing user education about this issue.



2.8 STRATEGIC PILLAR #3: Complete the minimum infrastructure

The data collection carried out in the e-MOTICON State of the Art analysis showed that in this moment over 10,500 public charging points are installed within the Alpine Space area [20].

The number is not irrelevant and points out a certain interest in the infrastructure deployment, with an increasing trend in the next years. Despite that, it has to be noticed that the diffusion of charging points is not homogenous around the Alpine Space and that relevant differences exist, both from one country to another and from different areas in the same country. This leads to the existence of areas with a high density of charging points (mainly urban and metropolitan areas), but, at the same time, to the existence of completely unequipped areas where EV drivers could have hurdles in driving and charging, especially in rural and mountain areas of some countries.

In order to let EV drivers easily travel along the Alpine Space, it is mandatory to cover these “black areas” as soon as possible. As already mentioned in section 2.4.3, these parts of territory often represent “market failure” areas, where traffic is too low and the number of charging events could unlikely create interesting revenues for a service provider. According to the e-MOTICON partners, Public Authority should focus on this problem and provide EV charging as a “public service”, in order to let everybody travel in the whole regional territory without any limits and to allow accessibility also to rural and mountains area, often linked to touristic attractions (skiing, wellness, lake sailing, trekking, hiking).

The e-MOTICON partners therefore agree that Regional Public Authorities of the Alpine Space (National in the case of Slovenia) need to:

- conduct a census to exactly identify number and density of charging stations in their territory;
- cross-check charging infrastructure data with mobility data and regional road structure;
- identify and locate the minimum infrastructure in order to ensure drivability in the whole regional area;
- put a specific attention to guarantee continuity across regional and national borders.

Once this analysis is performed, it is a task of Regional PAs to guarantee a fast coverage of the unequipped areas. In order to do that, PAs should act as already stated in section 2.6, by funnelling economic resources to solve this specific criticism.



2.9 STRATEGIC PILLAR #4: Adopt an integrated, supra-regional mapping tool

The need to find a charging station while driving or while planning a trip is a common issue for any EV driver in the Alpine Space. Nowadays, different solutions are co-existing:

- mapping tools provided by each e-mobility service provider, listing their own infrastructure via web or via mobile-app;
- mapping tools provided by car manufacturers and available on vehicles navigation systems;

- mapping tools provided by third parties (mainly private companies or no-profit organizations), collecting data of multiple service providers also thanks to crowd-sourcing;
- mapping tools provided by networks of operators linked through “roaming platforms” (e.g. Plugsurfing, Hubeject or Freshmile);
- official national mapping tools provided by Ministries or National Institutions.

None of these solutions yet represents the perfect answer to EV drivers’ needs, as they commonly include only a partial representation of the complete infrastructure or partial/not verified information. Most of them also lack “real-time” information. While planning a long and international trip along the Alpine Space, EV users will still have to adopt and compare different instruments.

The e-MOTICON partners agree that important benefits could come by fostering the adoption of more structured solutions, which could provide EV drivers a sure and reliable source of information for the whole area, including real-time data.

The best way to obtain a complete and reliable mapping tool is to create an official “National Register” and to compel each operator to provide real-time data of their infrastructure, at least with regards to publicly accessible EV charging points. These national databases will provide EV drivers with the location of the charging points and possibly indicate whether they are free or occupied, out of order, or momentarily not accessible, for each country in the Alpine Space. Similar databases already exist in some European countries (e.g. U.K., Norway and Germany [51] [52]), even if their characteristics are different and none of them can be used as a perfect reference (e.g. some real-time features are missing or some kind of E-CS are not mapped). In many other countries national registers are still missing or under development (e.g. in Italy) [53].

The e-MOTICON partners agree on the need that PAs, both on local and national level, highlight the importance of this issue and put some political pressure on National Bodies responsible for the realization of the National Registers. The e-MOTICON partners suggest to quickly proceed in order to publish tender notices for the creation of the Registers, which could be owned by the Public Authority but run by a private operator under specific contracts.

It has to be noticed that the exchange of real-time data by many operators to one single database requires a particular attention to technical aspects and mainly to the communication protocol. In absence of clear rules or indications coming from European regulation, the e-MOTICON partners strongly suggest to avoid “new” or “proprietary” protocols, and to adopt a solution that is already existing and well diffused, preferably open-source, flexible and widely shared. An example could be the so-called “Open Charge Point Interface” (OCPI), an independent and open protocol developed by a group of Dutch companies starting from 2014 and now adopted by almost 30 operators, including big players as Freshmile [54].

A second crucial issue is to identify a proper legal instrument to force operators to contribute to the national register providing their real-time data. This can be a compulsory requirement when benefitting from public funds, but should be officially required also for private operators using completely private funds. A solution could be to include this aspect within the administrative/bureaucratic procedures to obtain authorization for installing and connecting an E-CS.

Once National official register is available and reliable data are accessible to third parties, it will be a natural consequence to aggregate them into a “transnational map”. This will be probably done by actors that are already mapping systems for EV infrastructure, till now using unofficial data. The presence of official data will increase the reliability of many mapping instruments, providing an effective service for drivers and allowing an easy traveling around the Alpine Space.

In this framework, crowdsourcing and the use of feedback provided by users could be valuable to identify failures and database errors and also to add the localization of E-CSs installed by private business like restaurants, shops or others. Information platforms can be seen not only as a “provider of information” but also as a “receiver”, getting daily valuable user feedback that would be lost otherwise and that can be used to improve operations.



2.10 STRATEGIC PILLAR #5: Empower communication among public authorities

More than thirty “Regional” PAs and thousands of Municipalities are present in the Alpine Space. It is immediately clear that in order to create a favourable and homogenous environment for e-mobility development, there is a strong need of communication and coordination among them. In particular, communication is needed in order to:

- commonly identify minimum technical requirements for the infrastructure among different Regions;
- share knowledge and experience about “best practices” among different Regions;
- share information about “specific choices” made by Regions which could have some impact on neighbouring Regions;
- transmit, from Regions to Municipalities, information about tenders and funding opportunities;
- transmit, from Regions to Municipalities, information about rules, guidelines, best-practices on infrastructure deployment;
- transmit, from Regional technical offices to small Municipalities, general and technical knowledge about e-mobility and charging infrastructure, in order to educate and train non-expert employees in smaller realities;
- transmit, from Municipalities to Regions, on-field information about final users’ needs, requests of operators, potential synergies with other issues in the territory (e.g. public transport, multi-modal hubs, point of attractions, etc.).

As visible also in this brief list, according to the e-MOTICON experience the most active body should be the Regional PA. Given its bigger dimensions and the possibility to leverage internal technicians and to have a wider view on national and international developments, the Region should be designated as the reference point for gathering, and consequently spreading the most relevant information. In particular, according to what stated also in section 2.6, within the Regions a dedicated sub-structure devoted to e-mobility should exist, able to monitor the activities of the different divisions, to detect possible synergies and to take care of communication activities towards other Regions and Municipalities. It has to be underlined that while giving the necessary importance to “internal” communication among PAs, Regions and Municipalities must not disregard also “external” communication with citizens and final users, crucial for e-mobility development [55]. Many possible solutions exist in order to foster communication and to spread knowledge, such as workshops, seminars, conferences, training courses, video tutorials, newsletters, social medias, forums and web communities, etc. Specific tools and suggestions have been provided within e-MOTICON e-HUB pilot activity and can be found in the related document D.T 3.2.1 “e-HUB pilot report” [30], available on project website, section *Project Results/Deliverable*.



2.11 STRATEGIC PILLAR #6: Guarantee synergy among private and public transport

Private transport dramatically represents the biggest component of urban traffic and urban pollution and is therefore a crucial aspect on which to intervene through more sustainable solutions, as e-mobility. Nevertheless, it has to be taken into serious consideration that local public transport (LPT), especially within metropolitan areas, is one of the most effective modal solution and that a sensible shift from private to public transport would have a very effective impact on sustainability of urban mobility. More in particular, a wider adoption of public transport could guarantee [56] [57]:

- environmental benefits;
 - reduction of pollutant emissions
 - reduction of greenhouse gases emissions
 - reduction of noise pollution
- social benefits;
 - increase of road safety

- decrease of road congestion (and related personal stress)
- increase of accessibility for disabled and elderly people
- economic benefits.
 - decrease in global transportation costs
 - decrease in cost of living
 - decrease in sanitary costs
 - value increase for properties in cities

The best option for PAs in this moment is therefore to find and exploit the best possible synergies between e-mobility and public transport. A good planning of EV charging infrastructure could indeed sensibly affect the interactions and the integration of the two sectors. The e-MOTICON partners indicate some priority actions that should be put in place especially around bigger cities of the Alpine Space:

- 1 equip with a proper number of charging stations the parking areas located outside the urban centre and dedicated to park-and-ride schemes. This will let home-office commuting by intermodal EV+LPT solutions and will guarantee to EV users a daily charge for their vehicle. From a technical point of view, this infrastructure should be based on low-power charging points, possibly provided with power management systems in order to optimize the energy flow;
- 2 equip with a proper number of charging stations the most important transportation hubs like railway stations and airports. In this case, the best solution would be “high power” charging stations which could allow charging for:
 - 2.1 electric vehicles coming from surrounding areas with pick-up/drop-off purpose (both private vehicles and dedicated vehicles)
 - 2.2 electric vehicles under “vehicle sharing” scheme, commonly used for last-mile purpose
 - 2.3 electric Taxis performing short-time parking;
- 3 encourage public transport companies and e-mobility service providers to integrate their services. The access to charging infrastructure and LPT could be obtained by a unique system (card or smartphone App). A common application could provide integrated information about public transport timetables and charging stations position and availability. Moreover, special discounts and fidelity packages could be offered in order to promote intermodality and sustainable transport. Vehicle-sharing solutions (both two-wheelers and cars) should be also seen as a part of the LPT and be included in this integrated service.

A reference example of integration of EV charging and LPT services has been developed in Austria within e-MOTICON e-TRAIL pilot activity and can be found in the related document D.T 3.3.1 “e-TRAIL pilot report” [58], available on project website, section *Project Results/Deliverable*.

2.12 Conclusions

The Alpine Space is characterized by a multifaceted situation with regards to e-mobility and EV charging network. As detected by the e-MOTICON “State-of-the-art” analyses, a good number of E-CS is installed in the area and issues of “physical interoperability” (as the shape of plugs and connectors) are practically solved. Despite that, EV drivers could still experience many hurdles while traveling in the Alpine Space, with the need to carefully plan the trip and still accepting the risk to detour and re-plan according to the infrastructure availability (and accessibility). By the side of e-mobility service providers also, the general framework could yet be considered troublesome, including difficulties in getting information by Public Authorities, complex procedures for authorization and the need for a constant care to the infrastructure cost, due to the low income in this “start-up” phase of e-mobility.

The objective of this part of the e-MOTICON work was to find a common understanding among all the Alpine Space countries about the current situation, the most important criticisms and the possible answers in order to create a favourable framework for e-mobility diffusion in the whole area.

The results, reported in the present document, are outlined in a “transnational strategy” that identifies six main aspects, defined as six “strategic pillars” mainly targeted to Public Authorities, considered as crucial actors:

1. define the best possible roles of PAs;
2. set supra-regional common minimum rules on infrastructure;
3. complete the minimum infrastructure;
4. adopt an integrated, supra-regional mapping tool;
5. empower communication among Public Authorities;
6. guarantee synergy among private and public transport.

Within the project development, some of the pillars were more debated than others, as different points of view came out by different partners. Two aspects in particular gathered a lot of attention, i.e. the role of PAs and the best way to obtain a complete network accessibility. The final and agreed vision of the e-MOTICON partners is reported in the previous sections; a “hands-on” synthesis can be anyhow expressed with the following bullet points:

- regional Authorities and Municipalities should act in order to facilitate and coordinate the deployment of a homogenous and effective infrastructure inside their territories and with a strong attention also to neighbouring areas. Exceptions can exist, as in the case of the very first stages of the network development (where municipality could be the only actor to invest on it) or in the case of public funding legally reserved only to public bodies;
- both the existing solutions to allow E-CS accessibility (“ad hoc” and “roaming platforms”) will continue to exist in the next years. “Ad-hoc” is mainly driven by EU rules, while roaming platforms are mainly driven by market evolution;
- e-mobility service providers can maintain the possibility to offer “contract-based” solutions to their customers, including premium services or special rates. What needs special attention is that the deployment of the contract-based systems is done in good harmony with the “ad-hoc solution” and without unnecessary duplication of efforts and costs. The prices must be fair in both cases;
- the technical solution chosen to perform the ad-hoc payment should carefully consider both the additional cost for the operator and the comfort for the user. It is suggested to look for the most up-to-date technologies, as mobile-based universal payment solutions, avoiding the need to download specific apps or fill-in complex registration forms;
- in order to allow wide network accessibility to their customers, e-mobility service providers are suggested to adopt a “roaming” scheme, at least on a local level. The use of a roaming platform (and of which one) is a free choice of the providers;
- all the charging stations must be equipped to have comprehensive connectivity, essential to fulfil access/payment procedures both in “ad-hoc” and in “contract based” schemes;
- in order to obtain a complete and reliable mapping tool, it is suggested to create an official “National Register” and to compel each operator to provide real-time data of their infrastructure, at least with regards to publicly accessible EV charging points;
- the availability of official data accessible to third parties, will easily allow the creation of a reliable “transnational map”. In this framework, crowdsourcing and the use of feedback provided by users could be valuable to identify failures and database errors and also to add the localization of E-CSs installed by private business, like restaurants, shops or others;
- as the access/payment process could require the exchange of a sensitive amount of data, it is recommended to put a particular care in “protecting” the drivers, developing/applying an effective privacy legislation and providing user education about this issue.

The e-MOTICON partners firmly believe that a coordinated and synergic action by the Alpine Space Public Authorities on the just recalled issues could sensibly speed-up the diffusion of an effective and accessible charging network. If the proposed measures are implemented together with other European initiatives and in particular with EUSALP actions, they will guarantee a significant step towards a wider e-mobility diffusion and more sustainable transportation evolution.

3 Regional Action Plan (RAP)

3.1 Introduction

The e-MOTICON project supported the realization of five RAPs, one in each Alpine Space country, in order to foster the transnational strategy and adapt it to local needs enhancing the Public Administrations' capabilities in building an interoperable infrastructure for charging electric vehicle, complying with the AFID¹ transposition.

The actions proposed in each Regional Action Plan (RAP) are coherent with EU and Alpine Space area policies (EUSALP², Alpine Convention³, EUREGIO⁴, iMonitraf!⁵ objectives) for a common long-term vision of a sustainable transport system in the Alpine Space. The common short and mid-term targets defined in the strategy as common target, are translated into ranked actions to be used as a development path. The proposed measures will lead to a more harmonised transport system, including the use of new steering instruments.

The RAPs will remain as a living document, which can be used to continue the path towards the long-term objectives, after the e-MOTICON project.

3.2 Objective

The e-MOTICON project developed five Regional Action Plans for each involved country (Austria, France, Germany, Italy and Slovenia). The main objectives of the RAP are to provide a common strategy in each area in order to enhance the PAs' capabilities in building an interoperable infrastructure (electric charging station - E-CS) for charging electric vehicle (EV) in the Alpine Space, considering that low and inhomogeneous deployment of electro mobility (e-mobility) characterises Alpine Space (AS). One of the reasons of this inadequate diffusion is low interoperability of E-CS often due to the limited integration of planning instruments used by Public Administrations and their lack of knowledge in technological innovation and business modelling. If at all, PAs address the issue in an isolated way and leave the investments to private non-coordinated initiatives. Therefore, there is a need of capacity building for regional administrations and integrated transnational approach.

3.3 What are the RAPs for?

The e-MOTICON Regional Action Plans are intended to:

- help in defining coherent actions to achieve common objectives (Long Term & Medium/Long Term objective) in the Alpine Space Area;

¹ Directive 2014/94/EU of the European parliament and of the council: <https://eur-lex.europa.eu/legal-content/en/TXT/?uri=CELEX%3A32014L0094>

² EU Strategy for the Alpine region: <https://www.alpine-region.eu/>

³ www.alpconv.org

⁴ "Refers geographically to a section of the Dutch-German border area covering parts of the Dutch provinces Gelderland, Overijssel, and Drenthe as well as parts of the German federal states Nordrhein-Westfalen and Niedersachsen." <http://www.europaregion.info/it/default.asp>

⁵ "iMONITRAF! project (2009 - 2012), representatives from seven regions have signed a common resolution and strategy in May 2012. The strategy sets the framework for a sustainable transport system in the Alpine Space – reducing negative traffic impacts and preventing distributional impacts." www.imonitraf.org

- help on implementation of a common Alpine Space strategy (e-MOTICON strategy) at Regional/Local level;
- support the transportation choices of Public Administrators to:
 - allow more people to use e-mobility;
 - implement interoperable E-CS;
 - increase mobility options;
 - improve safety;
 - address climate change;
 - improve public health;
 - create more eco-friendly accessibility in fragile ecosystem areas.

3.4 What are the RAP's Target Groups?

The e-MOTICON RAP target groups are mainly represented by the administrator responsible for spatial planning (usually regional bodies and national or local ones, depending on National rules) and Public Administrations involved in planning and supporting the deployment of infrastructure networks for charging electric vehicles.

3.5 Methodology

With Regional Action Plans, the e-MOTICON project aims to provide a transnational approach, coherent with supra regional policies and plans, in deployment of an interoperable infrastructure for electric vehicles, to Public Authorities. This work was done on a solid review of the existing situation (State of the Art). The RAPs propose actions to be implemented to reach short, medium and long-term objectives, based also on transnational pilot actions, designed and implemented in order to check solutions proposed by the partnership.

The scenario analysis of each Alpine Space region revealed a remarkable diversity of approaches in terms of promotion and development of e-mobility. The analysis made by the e-MOTICON project partners and in other AS projects (e.g iMONITRAF!) provided a broad overview on existing policies, on their background and related actions.

3.5.1 RAP's Guiding Principles

The main guiding principles used in RAPs elaboration are represented by:

- environmental & energy goals achievement (at EU, national level and local measurements);
- transport policies that should be managed together with the environmental capacities of the sensitive mountain areas and should not put at risk the health of citizens;
- search for a sustainable transport system:
 - LCA⁶ approach to assess the environmental value of transport system/solution;
 - externalities methodology⁷ for measuring impact of transport solution/system;
 - mobility with less externalities (as e-mobility) could be locally advantaged because its minor impact on health & environment;

⁶ Life Cycle Assessment - JRC "ILCD Handbook. General guide for Life Cycle Assessment: detailed guidance", EUR24708 EN (2010).

⁷ Externalities methodology - <https://academic.oup.com/oxrep/article-pdf/6/2/.../6-2-61.pdf>

- public participation and stakeholders' involvement to create awareness about the problem and ensure a sense of public ownership in order to gain support for relevant measures;
- integration: an interoperable E-CS network is an integral part of the mobility environmental energetic policies for European countries and the whole EU;
- E-CS planning should be closely linked to spatial planning and economic promotion policies to better meet mobility demands in passenger and freight transport to ensure regional development;
- sustainable consumption and production: the use of goods and services that respond to basic needs and bring a better quality of life, while minimising the use of natural resources, toxic materials and emissions of waste and pollutants over the life cycle;
- best available knowledge and socioeconomic effectiveness: actions and operational targets should be based on available knowledge and take-into-account social and economic costs of pollution compared to the cost and benefits of proposed measures.

3.5.2 Intervention Line

The main intervention lines were represented by:

- enhancement of the public administrations' capabilities in building an interoperable infrastructure for charging electric vehicle in the Alpine Space;
- support to local public administration in fulfilling health and environmental goals;
- contribution to a shared policy that involves the contribution of investors and operators.

3.5.3 Analytical Tools: KPI

The methodology used by the e-MOTICON project suggested a list of actions ranked according to local needs and vocation. The actions were described through the use of a list of KPIs⁸ (Key Performance Indicator). This approach implied a deep analysis to understand both the present state of the art and what is relevant. Moreover, it focused on key activities, associated with the selection of performance indicators. The use of KPI:

- assured a simple monitoring of the effect of the actions;
- gave feedback for the evaluation;
- gave a simple scheme on which develop a communication/information strategy, supporting a governance model, of which administrators and general public can easily understand goals, costs and progression of the actions.

The use of KPI also supported a prioritization of the actions based on MultiCriteriaAnalysis⁹ (MCA) proposed in the following chapters. The ranking of the actions considered contribution of many different features, such as impact, costs and duration.

3.5.4 Coherences with European Rules and Vision on Transport, Energy & Environment

The RAPs aim to support regional and local Public Administrations in their planning and developing duty. These RAPs were developed in coherence with the other supraregional vision and policies.

⁸ A **Key Performance Indicator** is a measurable value that demonstrates how effectively the process is achieving key objectives.

⁹ MultiCriteria Analysis explicitly evaluates multiple conflicting criteria in decision making

- Paris agreement (April 21, 2016)¹⁰;
- Climate and Energy Package 2030¹¹;
- Effort Sharing, COM (2016) 482 final¹², July 20, 2016;
- European Directive 2009/28/EC¹³;
- Regulations 510/2011¹⁴ and 333/2014¹⁵ on CO₂ emissions;
- World Harmonized Light Vehicle Test Procedure¹⁶ (2017);
- White Paper¹⁷ 2011 on Transport;
- Green Paper on urban mobility¹⁸, 2007;
- 2014/94/UE Directive on Alternative Fuels Infrastructure;
- New rules and reports;
- "Towards clean and smart mobility"¹⁹, EEA Signals 2016;
- "European Strategy for Low-Emission Mobility"²⁰ COM (2016) 501 with its SWD (2016) 244 final annex²¹;
- European Framework;
- TENT²² - The Trans-European Transport Network (TEN-T) European Commission policy;
- ALPINE CONVENTION - the international territorial treaty for the sustainable development of the Alps;
- EUSALP - EU Strategy for the Alpine Region - the Macro regional strategy²³;
- iMonitraf! - A common transport strategy for the Alpine regions and action plan for implementation²⁴.

3.5.5 Prioritization Action

The strategic objectives were translated into strategic actions leading to the achievement of the objective, and the action list needed a prioritization, deriving from the directions based on selected items as Area of Intervention: they translated in operative words the relevance that the Region defined for each action. The e-MOTICON proposed a Strategic Action Prioritization scheme based on participation-based governance models. The technical tool proposed for managing the multi objective complex theme was a Multi-criteria analysis. The e-MOTICON partnership needed a number of different criteria to evaluate local actions and they applied the multi-criteria analysis (MCA) with a common approach to define the action prioritization.

As a first step the e-MOTICON partnership selected the following KPIs to measure action prioritization:

- action impact on homogeneous distribution of interoperable E-CS;
- economic impact of the action on local territory (e.g. industrial sector);
- action environmental impact (e.g. local pollution, GHG emission);
- action planned time duration;

¹⁰ https://unfccc.int/sites/default/files/english_paris_agreement.pdf

¹¹ European Council (23 and 24 October 2014) - Conclusions on 2030 Climate and Energy Policy Framework, SN 79/14, October 23, 2014.

¹² https://eur-lex.europa.eu/procedure/EN/2016_231

¹³ <https://eur-lex.europa.eu/legal-content/EN/ALL/?...32009L002>

¹⁴ <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A32011R0510>

¹⁵ https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv%3AOJ.L_.2014.103.01.0015.01.ENG

¹⁶ <http://wltpfacts.eu/what-is-wltp-how-will-it-work/>

¹⁷ https://ec.europa.eu/transport/themes/strategies/2011_white_paper_en

¹⁸ https://ec.europa.eu/transport/themes/urban/urban_mobility/green_paper_en

¹⁹ <https://www.eea.europa.eu/highlights/towards-clean-and-smart-mobility>

²⁰ <https://ec.europa.eu/transparency/regdoc/rep/1/2016/EN/1-2016-501-EN-F1-1.PDF>

²¹ <https://ec.europa.eu/transparency/regdoc/rep/10102/2016/EN/10102-2016-244-EN-F1-1-ANNEX-1.PDF>

²² https://ec.europa.eu/transport/themes/infrastructure_en

²³ EUSALP - EU STRATEGY FOR THE ALPINE REGION, [Online]. Available: <https://www.alpine-region.eu/eusalp-eu-strategy-alpine-region>

²⁴ <http://www.imonitraf.org/>

- action planned cost.

The second step was to select a proper score range for the evaluation of the actions. The range selected went from 1 to 3, with the following description:

Score	Description
1	highest impact evaluation, shortest time, lowest cost
2	medium impact evaluation, medium time, medium cost
3	lower impact evaluation, longest time, highest cost

The procedure for score assignment was applied by the e-MOTICON partnership in close cooperation with the local administrators of their reference territories. This approach was chosen according to the fact that great relevance was given to all the bodies involved in interoperability and e-mobility. PAs' involvement is essential because they know better the area of reference, and all the tools for the local implementation of the strategy. For this purpose a series of interviews and meetings involving the target groups and the stakeholders of the project partners' areas were carried out and the results are reported in the action description. At the end of the analysis, the priority actions are listed in five RAPs. Each action is connected to the fact sheet (table), which shows the main features.

A common approach was shared between project partners in order to select "weight" to get a score for each action. The weights also came from a shared approach between partnership and local target group/stakeholder.

KPI	Weight prop.#1	Weight prop.#2
Action impact on homogeneous distribution of interoperable E-CS	20	17
Economic Impact of the action on local territory (e.g. industrial sector)	20	12
Action Environmental Impact (e.g.: local pollution, GHG emission)	20	16
Action planned time duration	20	30
Action planned cost	20	35

The e-MOTICON partnership selected Weight proposal #1. This choice reflects the public administration high relevance to action impacts (that accounts for 60%), and less relevance to time, duration and costs of the action (that accounts for 20% each). The actions are also linked to the e-MOTICON strategy pillar they account for, according to their functional feature (administrative, implementative, communication, planning, financial).

3.6 Synergy between five RAPs

The e-MOTICON RAPs represent a national and regional/local transposition of a common strategy. They are all related and linked one to another by a common methodology and common objectives. Tools and solution could be different, according to the local needs and regulations, but the selection criteria are uniform. Inside these national frameworks more than eight different focuses on specific areas were performed.

The e-MOTICON partners strongly interacted with their territories in order to share their vision and collect their needs. They also discussed the e-MOTICON strategy that accounts for a common feeling and purpose for all the Alpine Area. The discussion drove to the identification of proper actions for each territory.

3.7 The e-MOTICON RAPs in short

3.7.1 Italy



3.7.1.1 National Context

The Italian national context is characterized by a complex scenario in which ICE (Internal Combustion Engine) mobility has the most part of the overall transport framework. Recent developments in the regulatory framework for the national planning of mobility aspects introduced new planning tools, infrastructure planning and settlements deemed of particular importance for the development of the country. These instruments aim at establishing a national framework of infrastructure system that is unified and shared as much as possible. Strategies for transport infrastructures, in which e-mobility is included, represent the first step, constituting the premise on which national infrastructure will be defined. The second step is represented by identifying the priorities that depend on the utility and feasibility of the available resources. This implementation approach is part of the definition of objectives and strategies, which draw the medium to long term vision within national transport policy.

The National State-of-Art gave an overview of the current state of electro-mobility in Italy: starting with electric vehicles followed by charging infrastructure. It also dealt with different fields: electric cars, vehicle models, Electric Car Sharing, Public Charging points in Italy. With reference to the national policies, a very important series of guidance documents related to sustainability in the transport sector have been drawn. The most important are the “National Plan for Electric Charging Infrastructures” (PNIRE), the “Roadmap for a Sustainable Mobility”, the “Legislative Decree 257/2016 Directive Alternative Fuels Initiative” (DAFI), the initiative of the Ministry of Transport “Connettere l’Italia”, the National Energy Strategy and finally the Senate resolution on sustainable mobility. Currently no direct incentives to purchase EVs are available but they are exempt from the annual circulation tax (ownership tax) for a period of five years from the date of the first registration. After this period, the electric vehicles benefit from a 75% reduction of the tax rate applied to the equivalent petrol vehicles. Moreover, many insurance companies offer discounts on insurance up to 50%. Some initiatives at regional or municipal level consider a reduction or exemption from tariffs of parking, toll, or access on low emission zone. At regional level there are some incentives for Emilia Romagna, Lombardy and Bolzano Province. In other regions such as Sardinia and Trento the Mobility Plan has been implemented with allocated investments.

3.7.1.2 Po Valley (Supraregional Area)

Orographically the Po Valley (in Italian: Bacino Padano) area is bounded to the North and to the West by the Alps and to the South by the Apennines, therefore mountains surround the territory on almost all sides. This orography defines weather conditions often unfavorable for the pollutants’ atmospheric dispersion: the average wind speed in the plain is one of the lowest in Europe, with average values below 1.5 m/s in the plain area of Piedmont or Lombardy. In winter thermal inversion conditions are frequent; during these periods the temperature doesn’t decrease with the altitude; the lack of air mass mixing generates stagnation of pollutants emitted at soil level (traffic, residential heating, etc.). The mixing height (that esteems the altitude within the pollutants mix because of mechanics and thermodynamics turbulences) during cold season in the Po Valley, is limited (at around 200 - 250 m). Accumulation occurs in long periods with pollutants. In addition to the orographic conditions, it has to be considered that Po Valley is not only one of the highly urbanized area in Europe, but also one of the most productive and industrialized areas in Europe, testified by the high average of GDP/capital registered and by the fact that the entire basin is representing the bottom of the so called “blue banana” influence area.

Attractiveness of such area is also reflected in terms of transport and infrastructures: the area is in fact crossed by four out of nine European TEN-T Corridors, and in particular by the Mediterranean, the Baltic Adriatic, the Scandinavian-Mediterranean and the Rhine-Alpine Corridors. Additionally, it has to be considered that northern Italy hosts some of the most important maritime hubs (Genova, Trieste, Venice, ...) receiving freights from all over the world and in particular from far-east countries. The Po Valley area is therefore including some of the most representative core nodes building-up the core and comprehensive networks prioritized at European level through the EU Regulation 1315/2013.

From an administrative perspective, the Po Valley area extends for more than 125,000 km² and it includes six regions and two autonomous provinces. The population of Po Valley exceeds 26 million inhabitants (more than 40% of the Italian population) mainly distributed in plain areas and in the valleys bottom. The population density of the agglomerations of Lombardy is, for instance, more than 1,500 inhabitants/km² that rise over 3,600 inhabitants/km² for the Milan area, significantly higher than the national average of less than 200 inhabitants/km².

In the last decade the administrative bodies of the Po Valley feel they need to share their policies in order to get them stronger and more effective. On December 19, 2013, has been signed the Program Agreement for "the coordinated and joined adoption of measures to improve the air quality in Bacino Padano (Po Valley)" among all the Po Valley Regions, the autonomous Provinces, the main Ministries (Environment, Health, Economic Development and Agricultural Ministries). 212 Municipalities were involved, accounting 13,000 Km² and 10,278,000 inhabitants. The Agreement was intended as a tool to identify strategies and specific actions to reduce the atmospheric pollution; 9 working groups have been set up inside the Agreement.

"The New Agreement of Bacino Padano to implement joint Measures to improve Air Quality in the Po Valley" was signed in Bologna, most recently, during the Environment Council G7 in June 9, 2017, by the Transport Minister and the President of Lombardy, Piedmont, Veneto and Emilia-Romagna. The principal aim of the new agreement is to renew the spirit of the regions involved to operate according shared reflections and in particular through a coordinated or joint action in sectors most responsible for polluting emissions. This goal is to improve the air quality and to oppose the atmospheric pollution. The structural and temporary joint measures of Bacino Padano identified in this agreement, are mainly directed to the traffic sector (restrictions for diesel vehicles) domestic heat sources such as wood, outdoor combustions and limitations of ammonia emissions from farming, zootechnical activities.

3.7.1.3 Piedmont

The Piedmont Region is an Italian region with a surface area of 25,387 km². The region can be divided into 3 concentric areas: the mountains (43%), the hilly (27%) and the Po Valley (40%). The city of Turin is the most populated Municipality, having 886,837 inhabitants.

In October 2017 the number of electric vehicles registered in Piedmont was 785, of which only 579 classified in the category cars. In Piedmont there are 177 E-CSs with the average power of 22 kW.

Piedmont Region has defined a two-step vision, according the time line:

- the Piedmont Region wants to be a relationship facilitator in the short-term: The Piedmont region, a dynamic community where public administrations, private companies, academia and citizens can easily cooperate to the integrated and harmonized development of electric mobility;
- the Piedmont Region wants to be a "smart territory" in the long-term: A Region placed in the Padano context, where EV-users (citizens, workers, tourists) travel everywhere easily using public, private and shared means of transport, access to all the trip information and pay with user-friendly, interoperable and secure systems.

The main areas of intervention to address the RAP objectives were identified as:

- governance: the absolute lack of a common direction is evident. In order to develop the Piedmont network of charging infrastructures and to foster transnational mobility it is important to identify common strategy and guidelines for all PAs;
- territorial coverage: in Piedmont there is not an adequate network of charging infrastructure and recharging points are concentrated in the regional capital. It is necessary to set up a network of E-CSs that fits the specific needs of the e-mobility which interests the region. The infrastructure network must allow EV-drivers to move smoothly within the regional territory and in trans-regional and cross-border trips;
- interoperability of services: the interoperability of the electric charging services is not a priority for most of the E-CS operators in Piedmont: currently each operator has its own access system and there is no roaming for payments. It is necessary to reach the maximum interoperability for a global E-CSs network;
- communication: there is an undeniable lack of knowledge and communication. It is necessary to put the demand in contact with the supply and to set up a structural connection between stakeholders and PAs, to inform the various types of users facing the electricity market, to educate the next generations towards more sustainable habits; to create information campaign to communicate the social and environmental effects of behavioural choices.

The vision and the identified area of intervention were declined into strategic objectives and specific actions. In the following table the relation of each action with the prioritization index derived from a multicriteria analysis is listed:

Priority Index	Action Title/Description°	PA ROLE
1	Obtain the political mandate at regional level	Commitment; Co-financing
1	Define and adopt regional technical specification for performance and	Design; Adoption; Promotion; Governance
21	Reinforce the Smart Mobility working group	Commitment; Coordination
21	Criteria and standards for setting up the ECSs regional network	Design; Governance
21	Ensure communication with the PUN	Design; Governance; Co-financing
31	Setting up of electric recharge HUBs (EC-HUBs)	Promotion; Governance
41	Identification and mapping of potential locations for ECSs	Promotion; Design; Coordination; Co-financing
41	Integration between ECS network and other mobility services	Design; Promotion; Coordination
50	Address and optimize the available funds	Design; Governance
50	Implement a regional ECSs map	Design; Coordination; Co-financing
70	Support to the development of electric car sharing	Promotion; Coordination
80	Regional e-mobility community	Promotion; Coordination; Simplification

The monitoring of the achievement of the action goal will be done with about 40 indicators, which aims to verify the action progresses, the action result progresses and, where possible, the environmental impacts.

As soon as the Piedmont Region receives the political mandate to implement the e-MOTICON RAP (probably in the second half of 2019), the Regional administration will start with the planned activities to foster the transnational strategy.

3.7.1.4 Lombardy

Lombardy has a territorial extension of 23,863.65 km², divided between the flat land and the mountainous areas, with a population of 10,038,688 inhabitants. It is the first Region in Italy for number of Municipalities, 1,516, and population. In the Region a total of 2,805 electric vehicle are registered in 2017. According to ChargeMap, in Lombardy there are n. 646 charging spots and about 10 main E-CS operators, with a charging tariff that is 5 EUR / month – all-inclusive service – for the 52% of operators.

Lombardy Region has defined a two-step vision, according to the time line:

Regional Short-term vision - Lombardy Region, through the governance of local authorities, as Province of Brescia, and regulatory provisions, reaches the minimum charging interoperable infrastructure installed on its territory and it guarantees homogeneous development even in areas with weak demand or where the market does not develop the E-CS. Region collects all information regarding the E-CS that are installed in the territory.

Regional Long-term vision - E-mobility is increasingly gaining ground both in public transport and in private transport and last-mile logistics. Lombardy Region is one of the first regions in Italy for number of electric vehicles, for the diffusion of interoperable charging infrastructure and e-mobility services. E-CS are guaranteed on all the main road axes, at the interchange nodes, in areas with weak demand and in the

border areas. An interactive map on the location of the E-CS, with information in real time according to the provisions of PNIRE, is available to citizens and users.

The main areas of intervention to be addressed in the RAP are identified to be:

- mobility governance and infrastructure - Area of intervention: Update of laws and regulations, Territorial infrastructures, Localization of E-CS, Public and private fleets, industrial sector, tertiary sector, Tourism. Target: Municipalities, Industrial sector, fuel distributors, Citizens, Local Public Transport Agencies, Sectoral Agencies (i.e. ARPA), Regional Associations;

- education, training and information - Area of intervention: awareness on environmental issues, professional training, information, communication. - Target: Municipalities, Industrial sector, Citizens, students, sectoral agencies;

- research and Innovation - Area of intervention: innovation in e-mobility infrastructure, smart grid and city focused on sustainable mobility, energy efficiency and emission reduction in transport sector. Target: Industrial sector, University, Research center.

The vision and the identified area of intervention are declined into strategic objectives and specific actions. In the table on the left the relation with the supraregional pillars from the transnational strategy and the prioritization index derived from a multicriteria analysis are listed.

The monitoring of action goal achievement will

Priority Index	Action Title/Description ^o	PA ROLE
31	Introduction of regional standards on mandatory minimum requirements for E-CS.	Planner
31	Update of current Regional Guidelines	Planner
31	Preparation of calls for funding for the installation of E-CS in areas of "market failure".	Planner
31	Provide incentives for the implementation of interoperability for existing E-CS.	Co-financer
31	Provide incentives or rewarding rules for providers that make available real time information.	Co-financer
31	Co-financing the installation of E-CS dedicated to charging LPT electric vehicles.	Co-financer
41	Preparation calls for funding to finance innovations in the field of interoperability of E-CS.	Planner
41	Update of current Regional Strategy on electric mobility	Planner
41	Provide economic incentives for companies that use electric vehicles in the TPL.	Co-financer
50	Funding for infrastructure managers (roads, railways, metropolitan and car parks) of E-CS in interchange nodes.	Co-financer
50	Create information brochure on benefits of e-mobility to be updated annually.	Planner
50	Create a specific social channel / virtual helpdesk for information and dissemination of news regarding e-mobility in general and the activation of new charging infrastructures.	Planner
60	Tailored meetings on the regional and provincial levels.	Planner
60	Structuring a regional information platform that contains the PUN (National Unique Platform) requirements.	Owner
70	Participation to the Lombardy mobility cluster working tables.	Stakeholder
70	Set-up of a "Control Room" on sustainable mobility in Lombardy Region.	Planner
70	Co-financing of experimentations and industrializations in the field of interoperability of E-CS	Co-financer
70	Establishment of annual specific training courses.	Planner
80	Promote research programs on electric mobility and interoperability	Co-financer

be done with progress indicators which aims to verify the action progresses, the action result progresses and, where possible, the environmental impacts.

3.7.1.5 Veneto

According to open data updated at 10/2017, e-Vehicles registered in Veneto are almost 500, mainly (75%) represented by passenger cars (in particular Nissan Leaf, Tesla Model S, and Renault). In 2017, e-Vehicles therefore represented a tiny share of the total number of cars (0.01%), even if in rapid growth.

In Veneto there are 136 active E-CS, with a total of 236 connectors with a prevalence of Type 2 connector (Mennekes), mainly representing providers such as ENEL, TESLA and GOELECTRICSTATIONS.

Picture emerging from this region, which should be likely similar to perspectives of other regional authorities of northern Italy, can be clearly drawn up according to some main keywords:

- policy/regulation - this is in particular evident when considering that, despite a general framework regulation represented by PNIRE which include also generalized guidelines about how to deal with e-Mobility development, several “practical” guidelines allowing the concrete implementation of plans within the territory are missing and left to autonomous initiatives;
- multidisciplinary/synergies - considering the different disciplines involved in e-Mobility development, a wider approach should be considered compulsory thus suggesting to work on such topic through working groups which should include experts and competent authorities from different fields (e.g. ranging from planners, engineers, logistics, energy manager etc.);
- information - despite the spreading of information on e-Mobility in general, the flow of information isn't unique and tends to come from different sources with different perspectives, thus allowing misunderstandings, uncomplete acquisition of concepts as well as understanding of potentialities and limits of e-Mobility both from citizen and authority sides;
- knowledge/competence - considering the average knowledge on e-Mobility topics by responsible of the offices in minor Municipalities, the lack of competences could represent a true obstacle to a reasoned planning of the future development of e-Mobility at local level. Such lack should be overcome by improving information flows as to allow them in providing constructive feedbacks.

Veneto Region has adopted a two-stage vision according to the timeline:

Short Term Vision - Veneto Region will manage to assess addressees and guidelines in agreement with other region, thus encouraging the development of eMOB on common basis.

Long Term Vision - Veneto Region will represent a context where people will easily fulfil their mobility needs thanks to the adoption of a comprehensive approach to mobility options with particular attention to sustainable transport solutions.

The main objectives to be addressed in the RAP are identified from the state-of-the-art analysis and the SWOT analysis. The corresponding themes are listed:

- provide guidance to the Pas - Aiming at delivering relevant information for Public Authorities as to provide all the necessary knowledge to address and support future orientations of eMobility implementation/diffusion and encouraging contacts between with other stakeholders as to provide efficient services to users;
- achieve complete interoperability of electric charging services - Aiming at ensuring that the E-CS network is expanded according to common and shared rules verified by PAs, where possible, at supra-regional level. The infrastructure network must be as homogenous as possible;
- reach an adequate territorial coverage - Aiming at spreading homogeneously the E-CS network within the region thus allowing smooth mobility of e-Drivers also taking into consideration trans-regional and cross-border trips;
- make the information on the charging network available to regional, national and transnational users - Aiming at delivering relevant information for citizens as to support eMobility knowledge implementation and diffusion.

Priority Index	Action Title/Description*	PA ROLE
41	Define and adopt regional technical specification for performance and interoperability of E-CS in accord with specifications set out by other regions.	Design; Adoption; Promotion; Governance
50	Support a shared definition of criteria and standards for setting up the E-CSs regional network	Design; Governance
50	Address and optimize the available funds at different levels	Design; Governance
50	Delivering a platform with interactive database on E-CS availability, characterization and distribution in Veneto Region dialoguing with PUN and which will include further relevant POI (infrastructures, commercial areas, fuel stations...), thus supporting the identification of potential locations of E-CS	Active: design, implementation, confront and promotion
50	Delivering a repository including relevant information (documents/reports/sources) for Public Authorities as to provide all the necessary knowledge to address and support future orientations of eMobility implementation/diffusion;	Active: design, implementation, confront and promotion
50	Delivering a repository including relevant information (documents/reports/sources) for citizens as to supporting eMobility knowledge implementation and diffusion.	Active: design, implementation, confront and promotion

The vision and the identified area of intervention are declined into strategic objectives and specific actions. In the table on the left the relation with the prioritization index derived from a multicriteria analysis is listed. The Regional Action Plan could be considered synergic with some of the main planning instruments highlighted (e.g. Transport Regional Plan, Regional Plan for Air Quality...) and therefore its implementation will be subjected to the parallel development of such plans and with the relative available resources and can be considered to be implemented during the period 2019 - 2030. Additionally, it will take in consideration also the implementation of local measures as well as point of view of relevant stakeholders at different level. Furthermore, the Regional Action Plan will admit periodical reviews according to the outcomes of new/updated EU policies, of EUSALP development strategy, as well as on the achievement of prospected results.

3.7.1.6 Common Findings among Po Valley RAPs

Italian e-MOTICON partners focused on the following common actions between three RAPs, based on common needs and approach:

- communicating needs among PAs, at different level, thus ensuring homogeneous distribution of knowledge as well as spreading of best practices;
- assuring the interoperability of E-CS in the Po Valley through the adoption of common rules (open protocols, acting towards an interoperable transport ticket, etc.);
- structuring a single reference information point with updated details, documentation and source of intelligence on e-Mobility;
- structuring regional information platforms upon common requirements that are dialoguing each other. Despite regional customization, such platforms are part of a federated architecture that will contribute to the PUN (National Unique Platform), thanks to the use of standard open protocols, using the Po Valley Agreement to increase the awareness on the E-CS network;
- supporting and steering funds for E-CS network development on prioritized areas of intervention according to common standards. This will be ensured by focusing interventions on particularly dense areas of traffic (e.g. stations) as well as in "market failure" areas by actively involving a wide range of public and private stakeholders (e.g. infrastructure manager).

3.7.2 Slovenia



3.7.2.1 National Context

European Directive 2014/94/EU is transposed into Slovenian legislation by National Alternative Fuels Strategy (Strategy) that was adopted in October 2017. The national ecosystem for electric mobility is well developed.

In 2016 there were 228 E-CS with 553 sockets, 449 EVs and 111 plug-in hybrids. In particular 97 E-CS $\leq 3,7$ kW, 92 E-CS $\leq 7,5-22$ kW and 39 E-CS ≥ 43 kW. Interoperability level of E-CSs surpasses 50% on national level. There are up to seven larger E-CS operators in the country. The public stakeholders involved in the definition of the electric mobility policies in Slovenia are the Ministry of Infrastructure with its Energy Directorate, the Ministry of the Environment and spatial planning, the national Energy Agency of Slovenia, the national Energy Chamber linked to the Chamber of Commerce and industry. In Slovenia, low-tax rate measures (0.5%) are already in place for motor vehicles with emissions of up to 110 g/km CO₂, which include electric vehicles. Electric vehicles are further exempt from the payment of annual tax on the use of road vehicles. Co-financing the purchase of energy-efficient vehicles is carried out within the framework of the Slovenian Environmental Fund (Eco Fund).

According the issue of National Policies, and the prescriptions contained in the Directive 2014/94/EU, the Slovenian Government has announced its quantitative objectives in terms of E-CS and EVs in its National Alternative Fuels Strategy. Optimistic scenario sketched by the Slovenian Government:

- by 2020, the Government plans the installation of 1,200 E-CS throughout the country;
- by the same year, 5,311 registered EVs are previewed by the Government.

The most important national regulations concerning the development of electric mobility are the following: Energy Act (2014), Decree on renewable energy sources (RES) in transport (2016), The Transport Development Strategy (2015), The Resolution on transport policy, The Spatial Development Strategy (2004). According to the Strategy, after 2025 Slovenia is going to limit the first registration of passenger cars and light-commercial vehicles of categories M1 and MG1 and N1, which, according to the manufacturer's declaration, have CO₂ emissions above 100 g/km. Five years latter (after 2030) this limit will drop to 50 g/km. The Strategy proposes sets of measures for each alternative fuel, on the basis of which a detailed Action plan for 2018–2020 was drawn up. Priority is given to measures that establish a charging infrastructure for EVs and for vehicles using compressed and liquefied natural gas. Measures are envisaged for all areas, from financial incentives, co-financing of the construction of alternative fuels infrastructure and amendments to legislation, to the promotion of innovative solutions, the acceleration of economic development, public information and the removal of administrative barriers. Action plan will be updated every two years. Measures listed in National AF Action Plan 2018–2020:

- promoting the development of technologies and the economy;
- charging infrastructure co-financing;
- financial and tax incentives;
- amendment of legislation and elimination of administrative barriers;
- alternative fuels in public transport;
- promotional and educational activities;
- recommendations to local communities.

Value of measures altogether for 2018 amounts²⁵ to EUR 12.3 M (EUR 11.1 M is already guaranteed). For 2019 the estimated value of the measures amounts to EUR 34 M (EUR 20.2 M is already guaranteed) and for 2020 to EUR 54 M (EUR 30.3 M).

²⁵ Source: Alternative Fuels Strategy Action Plan 2018 - 2020, June 12, 2018.

3.7.2.2 Gorenjska Region

Gorenjska is the fourth largest Slovenian region by the number of residents and the sixth by the area. The area is 2,137 km². Gorenjska lies in the north-western part of Slovenia and borders with Austria (Carinthia), north, Italy (the Friuli-Venezia Giulia region), west, Goriška region on the south-west and in the south to south-east it opens towards the Central Slovenia region. Gorenjska is an Alpine region. The geomorphologically dynamic surface is characterized by 70% of the mountain world, only 30% of the surface lies in the valley and flat part of central Slovenia. At the end of 2017 there were 600 of BEV category M1. M1 means vehicles with up to 8 passenger seats beside the driver seat. Out of these 600, there were 30 registered in Gorenjska. There is by the available data at the end of September 2018 28 E-CS with 1 Tesla, set up in Gorenjska region, however they are 12 new public E-CSs predicted just in Bled. The main actions addressed in the RAP valid from 2019 - 2030 are identified from the State-of-the-Art analysis and the SWOT analysis:

- facilitate acquisition of financial incentives supporting municipal actions in diffusion of e-mobility;
- building knowledge capacity concerning E-CS infrastructure, operation and e-mobility;
- initiate and support installation of E-CS according to EU standards enabling interoperable connection;
- support and initiate actions creating interoperable networks;
- increase in number of E-CS on the public parking areas;
- increase number of E-CS for e-charging of e-vehicles for public passenger road transport (or on alternative fuel) and e-vehicles for business use;
- reinforce the electricity grid by cooperation of local, national public and private stakeholders
- utilize regional RDA of Gorenjska e-HUB platform for mapping;
- municipalities acting as promoters of e-mobility (informing users about novelties, promotion of usage) – utilization of e-HUB platform;
- support and initiate creation of national informational platform for e-charging infrastructure under the management and control of the national public body;
- facilitate contacts between PAs and stakeholders (companies, private investors, private citizens);
- transit of vehicles for public passenger road transport, public and private business fleets into electric ones or run on other alternative fuels;
- provision of infrastructure for public transport interchange, P&R systems, business zones, airport area.

It is envisaged that RAP is updated and revised again until the end of 2021.

SWOT analysis as a part of the RAP identified improvements to mitigate the threats and weaknesses in Gorenjska and broader:

- joint informational platform: if the interests of the existing operators could come to a common position, the provided information to the users could be improved and the quality of service to the user could be only higher. Local public administration has the power to demand the cooperation on the level of a joint promotion and provision of information for technical specification and operation on the joint informational platforms. Even better solution would be forming national informational platform which would give an overview of all operational E-CS in Slovenia. The role of the public administration to support implementation of E-CS interoperable infrastructure is needed as well as the support of the national public administration also in regard to public e-vehicle diffusion. Public administration on all levels should be prepared to build on their knowledge capacity to support technological development giving terms of condition to the private investors setting up and operating E-CS. Public administration should therefore be proactive in policy implementation supporting e-mobility. Unique national informational platform can be an opportunity to inform users all over the world about the growth of E-CS network in Slovenia, eliminating all private issues preventing the sharing of basic data about E-CS. Integrated E-CS networks in Slovenia could become a part of the European network;
- models of financing and policy incentives: local public administration should seize every opportunity from non-refundable financial resources to build on the regional economic competitiveness in the future as well join forces in purchasing e-vehicles or hybrid vehicles in order to negotiate a better price. In case of no other options also combined financing models should be used. Financial or policy incentives for the change to e-mobility are one of the driving forces of e-mobility diffusion;

- e-mobility infrastructure: with a critical mass of users the investments in the e-mobility infrastructural networks will become even more appealing. The energy part of the network is quite slowly following the development and needs of the e-mobility network, which could be new opportunity for investments. Financial means are needed for improving the capacity of the grid in Gorenjska region;
- interoperability and e-roaming: an alternative to e-roaming platforms are other business models, a more cost effective and equally successful. The business model saving cost is well known B2B model. Example of increasing the network is signing a contract with customer providers like abroad ChargeEU where one may get immediately 6,000 customers or Plug Service;
- e-charging payment solutions: currently prevalent payment solutions are done by APPs, RFID card and on ad-hock basis. RFID card is more useful than an APP for payment system since it can be used even if the power is down and if the line is broken. The E-CS stores the data from the RFID card chip and forwards them to the main office when possible. For RFID cards only a block of numbers is needed and with this also the privacy can be protected a bit more, since there is no need for the owners or operators to deal with customers, if are not present in one business entity - electricity distributor - in 1 area. This could reduce the security threats and privacy issues. Ad-hock payment solution by credit cards, already imbedded in some E-CS, is upon research the best choice to ensure easy charging for all drivers regardless of their origin. The cost may be even lower than the cost using the RFID or APP system. Payment by credit card eliminates dependency on e-roaming service providers channelling profits to companies abroad;
- managing e-infrastructure: operators of interoperable networks have the opportunity to improve their approach of integrating new E-CS into existing networks. The same can be said for marking on the field as a part of marketing approach. Lack of restrictive options for the abusers of the parking E-CS places could be solved by adopting a good practice from Austria, where e-vehicles have different registration plates than conventional cars, being easily identified. Restrictive measures can be then applied by the responsible public organs;
- lack of interest from PAs for implementing e-mobility: a few solutions to tackle lack of PA's interest in e-mobility:
 - waiting for a critical mass of users to put pressure on demand which may be a driver for private investors and public administration
 - national level preparing directive, policy for local administration with a set of minimum requirements to be met by each of the Municipalities
 - national level preparing financial incentives (calls) to which all Municipalities can apply for purchasing e-vehicles for public transport of specialized vehicles for transporting tourists
 - keeping the national subventions for setting up E-CS and connected infrastructure and for the purchase of e-vehicles and hybrid cars
- innovation capacity: small market gives also more flexibility for correcting errors with low costs, therefor opportunity for innovation can be higher.

Gorenjska Region has defined a two-step visions, according the time line:

- by 2023 Gorenjska region will have 80% of Municipalities covered by E-CS interoperable network infrastructure supported by public administration financial incentives and policies, using the available resources and will have knowledge empowered public administration in regard to e-mobility;
- by 2040 Gorenjska region will have an extensive user-friendly e-mobile infrastructure and services according to European standards, enabling a complete transition to electrical mobility and higher quality of life.

The vision and the identified area of intervention are declined into strategic objectives and specific actions. In the following table actions the relation with the prioritization index derived from a multicriteria analysis is listed:

Priority Index	Action Title/Description°	PA ROLE
11	Increase in number of E-CS on the public parking areas Municipality <u>Bled</u>	Investor:, coordinator, owner
21	Increase in number of E-CS on the public parking areas Municipality <u>Kranjska Gora</u>	facilitator
21	Support and initiate creation of national informational platform for e-charging infrastructure under the management and control of the national public body. <u>Gorenjske elektrarne, RDA of Gorenjska</u>	facilitator
21	Support and initiate actions creating interoperable networks <u>RDA of Gorenjska, BSC, Ltd, Kranj</u>	facilitator
31	Increase in number of E-CS on the public parking areas Municipality <u>Kranj</u>	facilitator
31	Increase in number of E-CS on the public parking areas Municipality <u>Bled</u>	facilitator, coordinator
31	Increase in number of E-CS on the public parking areas Municipality <u>Bled</u>	Investor:, coordinator, owner
31	Municipalities acting as promoters of e-mobility, utilization of e-HUB platform. Municipality <u>Cerklje na Gorenjskem</u>	coordinator
31	Utilize regional RDA of Gorenjska Regione-HUB platform for mapping	facilitator
41	Increase in number of E-CS on the public parking areas Municipality <u>Žirovnica</u>	coordinator, owner
41	Provision of infrastructure for public transport interchange, P&R systems, business zones, airport area. Municipality <u>Bohinj</u>	Investor:, coordinator
41	Provision of infrastructure for public transport interchange, P&R systems, business zones, airport area. Municipality of <u>Cerklje na Gorenjskem</u>	coordinator
41	Municipalities acting as promoters of e-mobility, utilization of e-HUB platform. Municipality of <u>Jesenice, Radovljica</u> and <u>Bohinj</u> :	coordinator
50	Facilitate acquisition of financial incentives supporting municipal actions in diffusion of e-mobility. RDA of <u>Gorenjska, BSC, Ltd, Kranj</u>	promotion, implementation
50	Building knowledge capacity concerning E-CS infrastructure, operation and e-mobility - Building knowledge capacity concerning E-CS infrastructure, operation and e-mobility - RDA of <u>Gorenjska, BSC, Ltd, Kranj</u>	promotion, implementation
50	Increase in number of E-CS on the public parking areas - <u>Municipality Bohinj</u>	Investor:, coordinator
50	Increase in number of E-CS on the public parking areas Municipality <u>Cerklje na Gorenjskem</u>	coordinator
50	Reinforce the electricity grid by cooperation of local, national public and private stakeholders Municipality <u>Cerklje na Gorenjskem, Kranjska Gora</u>	coordinator
50	Transit of vehicles for public passenger road transport, public and private business fleets into electric ones or run on other alternative fuels. Municipality <u>Kranj</u>	facilitator
60	Initiate and support installation of E-CS according to EU standards enabling interoperable connection. RDA of <u>Gorenjska, BSC, Ltd, Kranj</u>	facilitator
70	Increase in number of E-CS on the public parking areas Municipality <u>Žiri</u>	Investor:, coordinator, owner

3.7.2.3 Goriška Region

Goriška region lies in the western part of Slovenia. The Julian Alps, the Soča River and the Vipava Valley are the most recognizable geographical features. The majority of the region is mountainous and rural with low population density (average 51 inh/km²). The total number of all existing E-CSs in the Goriška region is 31 (227 E-CSs on national level in 2017). It was calculated, that the regional goal would be achieved with 76 E-CSs by 2020, considering the national plans of 1,200 E-CSs. There is no data on the number of EVs on a regional basis. Estimation is that there were approximately 40 EVs in Goriška region in 2017. Through the analysis it has been shown that Municipalities and other key stakeholders have already gained some experience in implementing measures and activities in the field of e-mobility. On the other hand, low numbers of EVs are a fact although they are noticeably increasing year by year. Experts expect the boom of e-mobility between 2025 and 2035. At the wider level, it is worth highlighting the lack of international coordination at EU level and the fact that interoperability communication protocols are not developed. Business opportunities are thus in favour of the automotive industry and SMEs in the region as well as wider.

Goriška Region has defined a two-step vision, according to the time line:

- short term vision: by 2025 Goriška region will provide efficient and adequate charging infrastructure network that will comply with set national goals in the field of e-mobility and foster favourable environment for business and industry;
- long term vision: by 2035 Goriška region will foster green mobility solutions in the field of research, innovation, industry and transport with an emphasis on e-mobility. We suggest the slogan "GREEN GORIŠKA".

This slogan invites citizens to consider choosing the right mobile solutions in the future. It is also related to the Green Tourist Scheme initiative – SLOVENIA GREEN.

The main actions to be addressed in the RAP are identified from the State-of-the-Art analysis and the SWOT analysis. The corresponding themes are listed:

- coverage of the territory with E-CSs - E-CSs will be located and installed gradually. In the first phase, in more interesting locations (such as: town centres, parking lots along major public buildings -e.g. university, sports, cultural and recreational facilities- multi-apartment buildings, garage houses, shopping centres, tourist facilities and hotels, low settlement areas). There are practically no public E-CSs in the low settlement areas, with the exception of private E-CSs. According to the Alternative fuels Strategy Action Plan, Slovenia will ensure that the number of charging stations will maintain the optimal ratio between the number of electric vehicles and the number of charging stations, i.e. 7 vehicles per public charging station. It will also be necessary to provide an adequate network of E-CSs in rural areas, however, lower interest of managers and charging service providers in the investment in the infrastructure is expected due to lower consumption. The municipality, as a public entity, pursues the interest of local population and, consequently, the public interest for placing E-CSs in low settlement areas;
- interoperability of systems for EV charging - Operators that charge the charging service do not show any interest in joining an interoperable system. Each operator has different card for e-charging. Systems are not uniform. As a result, users can have multiple ID cards for charging. In accordance with the AFS, it is ensured that simplified payment methods for charging of EVs will be introduced and ad-hoc charging will be possible for users who do not have contracts with suppliers under favourable conditions that will ensure non-discriminatory treatment;
- increasing the number of EVs - We estimate that 40 EVs were registered in the Goriška statistical region in 2017. According to the Statistical Office of the Republic of Slovenia, in 2017, there were 779 registered EVs in Slovenia. The number of electrically powered cars is gradually increasing over the years. In the AFS Action plan, the goal is to have at least 10,000 EVs by 2020;
- raising stakeholder awareness of social and environmental benefits of e-mobility and alternative ways of transport - Raising the awareness about environmental effects, energy use, etc., raising

the culture of energy efficiency. The latter is achieved when people make deliberate decisions that lead to an increase in energy efficiency because of their desire and not because they have to. To the point when people understand the value for them as individuals and for the common good. The vision, and the identified area of intervention are declined into strategic objectives and specific actions. In the table on the left the relation with the prioritization index derived from a multicriteria analysis is listed. The e-Mobility Regional Action Plan for the Goriška region is planned to be developed for the period 2018–2025. RAP should be revised in 2021 and a new action plan should be drawn up in 2025.

Priority Index	Action Title/Description ^o	PA ROLE
50	Identifying locations for interoperable E-CSs	Promotion, coordination, co-financing
60	Stimulating investment in E-CSs	Promotion, coordination, co-financing
50	Strengthening communication between municipalities, private and public transport service providers and other stakeholders, other promotion	Promotion, coordination
50	Defining parking regime	Promotion, management
50	Procurement of EVs for use in municipal administrations and other municipal public institutions	Promotion, implementation
50	Ensuring the interoperability of services between private and public transport service providers	Promotion, coordination
100	Placement of E-CSs in low settlement areas	Promotion, implementation

3.7.3 France



3.7.3.1 National Context

In France:

- 30,920 BEVs and 10,803 PHEVs have been registered in 2017;
- 145,733 BEVs (largest fleet in Europe) and 31,794 PHEVs have been registered between January 1, 2010 and June 30, 2018;
- 10,062 publicly-accessible E-CS totaling 26,390 charge points as of June 30, 2018 (5.5 BEVs for each charge point).

The main national policies regarding electromobility in France were reaffirmed in the document named “Contrat stratégique de la filière automobile” signed between the French government and the representatives of the French automotive industry on March 22, 2018.

- Aim for a 5-fold increase of BEVs until 2022;
- 1 E-CS for 10 registered BEVs, i.e. 100,000 E-CS in 2022 if the industry reaches its assigned target of 1 million PEVs in 2022;
- Foster a French and European industry for batteries (4th generation);
- Create a French competitive hydrogen industry and develop its usages in mobility;
- Bonus for electric cars from the French Government: EUR 6,000 for the purchase of a new electric vehicle + additional grant for the scrappage of a (very) old ICE car;
- Financial incentives for E-CS installation thanks to the public eco-fund scheme: Programme ADVENIR;
- Covers purchase and installation costs up to 40% for private companies and public administrations, and 50% for collective housing, depending on overall ceilings for each user target;
- Additional bonus of EUR 360 for E-CS with smart energy management.

3.7.3.2 The Auvergne-Rhône-Alpes

With 7.9 million inhabitants, 70,000 km² and EUR 241,000 M GDP the Auvergne Rhône-Alpes region is the second French region. The cars are still dominant with at least 55 % of modal split of transport and more than 4 M cars in the region. The production of renewable energy represents 31 % of regional energy production. GHG emissions from the road transport sector amounted to 16.8 Mt CO₂ in the region, one third of total emissions, first emitting sector. Despite of this electric vehicles stay currently at a low level with around 11,000 electric and hybrid vehicles, 1,700 publicly E-CS and 13,000 private E-CS (2016). Auvergne Rhône Alpes, second French region for the number of electric vehicles has the vision to be a leader with its ZEV (Zero Emission Valley) project, deployment of hydrogen vehicles. e-MOTICON pilot actions has demonstrated the importance to involve mobility users and electric car owners in the choice and deployment of E-CS. For this purpose a questionnaire was sent in France (during spring 2018) to all subscribers in different energy syndicates (SYANE partner of AURA-EE in the framework of e-MOTICON) with the aim to strengthen the operating of E-CS, their location and access. The main to be addressed in the RAP are identified from the State-of-the-Art analysis and the SWOT analysis. The corresponding themes are listed:

- define minimum technical characteristics for the deployment of infrastructure in the region;
- accompany and reinforce building equipment in E-CS and encourage the installation of new stations;
- ensure the role of coordinator of the electric mobility on its territory;
- set up awareness and communication actions for electric mobility;
- set up a parking policy, order electric vehicles and incentives to do so;
- guarantee the interoperability of E-CS;
- simplified contracts and new mobility solutions;
- strengthen knowledge and equipment;
- achieve equipment and links between private and public actors;
- up-to-date information.

The vision, and the identified area of intervention are declined into strategic objectives and specific actions. In the table below the relation with the prioritization is shown.

Priority Index	Action Title/Description°	PA ROLE
21	Facilitate the implementation of E-CS	owner
21	Interoperability as a prerequisite	owner, facilitator
41	Order electric vehicles and Electric vehicles incentives	owner, facilitator
41	Finish equipping publicly E-CS in prior white areas (especially in rural or mountain), borders and prior locations	owner
41	Rely on the eCS deployment plans to achieve a true electromobility scheme	owner
50	Capitalization of knowledge and exchanges about E-CS equipment	owner
50	Strengthen communication and coordination between local authorities Joint communication campaign	owner
50	Set up a up-to-date census of publicly E-CS and Support the national mapping of E-CS	owner
60	Publish a regional and standard eCS specifications	owner
60	Tools and tips, best practices	owner
60	Set up a parking policy	owner, facilitator
60	New mobility services linked to E-CS	investor
60	Achieve equipment and integrate emobility and transport services	owner, facilitator, investor
60	Continuously update of information about emobility to share with private companies	facilitator
70	E-CS joint projects	owner
70	Define E-CS equipment objectives on a territory	owner
70	Ensure articulation between E-CS projects and planning tools	owner
70	A watch role about a moving market	owner
70	Ease the use of E-CS	facilitator

6 actions are currently on going and 13 of them must be done. They concern mainly energy syndicates in France who are the main actor of E-CS in their role of leader and to develop incentives to other public or private actors in region. Price, new increasing autonomy of vehicles and low number of electric vehicles in France are currently huge breaks to support a significant publicly E-CS development plan.

The monitoring of action goal achievement will be done with progress indicators which aims to verify the action progresses, the action result progresses and, where possible, the environmental impacts.

The vision, and the identified area of intervention are declined into strategic objectives and specific actions. In the table above the relation with the prioritization index derived from a multicriteria analysis is listed.

3.7.3.3 Franche-Comté and Alsace Region

Franche-Comté is located in the East of France and in the North-Western area of the Alpine Space. The territory covers four French departments, Doubs, Jura, Haute-Saône and Belfort Territory, with a total surface of 16,202 km². The Franche-Comté extends to about 170 km from south-west to north-east, and to about 110 km from north-west to south east. 152 BEVs have been sold in the Doubs, 71 in the Jura, 49 in the Haute-Saône and 20 in the Belfort Territory department in 2017, totaling up to 292.

Franche-Comté/Bourgogne-Franche-Comté Region has defined a two-step visions, according the time line:

- short-term: Remove the barriers to electric mobility by making sure that there is a minimum number of publicly-accessible E-CS in every grouping of Municipalities, and by attaining network coherence from a patchwork of separate small networks;
- long-term: Reach regional emissions targets through a massive deployment of EVs.

The main barriers are clearly the costs both of EVs and of setting-up and operating an E-CS network. On these two aspects we are not on market-ready situations. Technically-speaking, EVs are well adapted to a territory rather sparsely-populated, where there is some room to install E-CS, and where people drive long distances (inside the territory or to go to work in Switzerland). But as EVs were initially marketed as city cars, there is some additional communication to be done. Second-hand EVs are an opportunity for rural areas with limited available cash. The 4 energy syndicates provide a good coordination framework, all the more so as they chose the same operator (Freshmile) to manage their networks. Regional users are then able to navigate smoothly around the territory without any interoperability issues. The Strasbourg-based information platform Chargemap, which has developed to become the European leader for E-CS information, helps EV users take the most out of the additional very small networks (usually only one or two E-CS for example on supermarket parking lots...), providing up-to-date exhaustive information (both crowd-sourced and retrieved by operators) and an access means where needed. Electric public transport is still in its infancy on the territory, with no EV car-sharing and only a very limited number of small electric buses (with the exception of some tramways and trains, however). Bourgogne Franche-Comté Mobilité Electrique, as the first-established regional branch of AVERE France dedicated to networking, cooperation and information exchange, has a strong background, but as it has only recently been extended to Franche-Comté, there is still some significant room left to increase its footprint on the territory.

The main to be addressed in the RAP are identified from the State-of-the-Art analysis and the SWOT analysis. The corresponding themes are listed:

- promotion of EVs - Make sure that people slated to benefit most from EV usage are aware of EV advantages;
- interoperability - Improve interoperability and coordination among networks;
- prepare for charging demand increase: business models and investors - Make sure that the planned EV fleet increase does not lead to charge problems.

Priority Index	Action Title/Description°	PA ROLE
41	Use Bourgogne-Franche-Comté Mobilité Electrique as a channel to broadcast e-MOTICON training material and best practices	User
41	Implement role of Région -Franche-Comté as regional leader for mobility	owner
50	Creation of a region-wide association for the promotion of electromobility : Bourgogne Franche-Comté Mobilité Electrique	Participant
50	Pilot action on low-density territory -Franche-Comté	owner
50	Take advantage of the single operator of public E-CS in -Franche-Comté	owner

The actions are linked to a larger action plan on the territory of the whole region (not only the part that belongs to Alpine Space), in coherence with other plans for natural gas and hydrogen, and clean mobility in general. They address different levels from local to strategy, and are consistent with the policies of the regional stakeholders, being public or private. All the actions have already been started in a way or another, and are expected to produce results through 2019 and 2020.

3.7.3.4 The Alsace/Grand Est Region

Alsace is located in the Northeast of France, between Germany in the East, the Vosges Mountains in the West and Switzerland in the South. Its capital is Strasbourg. The Region covers two French departments, the Upper-Rhine (Haut-Rhin) and the Lower Rhine (Bas-Rhin). At 190 km in length and 50 km wide, Alsace covers a surface area of 8,280 km². 531 BEVs have been sold in the Bas-Rhin and 337 in the Haut-Rhin

department in 2017, totaling up to 868 for the former Alsace region. Alsace/ Grand Est Region has defined a two-step visions, according the time line:

- short-term: Remove the barriers to electric mobility by making sure that there is a minimum number of publicly-accessible E-CS in every grouping of Municipalities, and by attaining network coherence from a patchwork of separate small networks;
- long-term: Reach regional emissions targets through a massive deployment of EVs.

Alsace as a territory is an early adopter of eMobility, and EVs are everywhere to be seen. It is densely populated, with a fragmented but quantitatively strong network of E-CS operated by local public authorities and private businesses (supermarkets, EDF corridor...). The Strasbourg-based information platform Chargemap, which has developed to become the European leader for E-CS information, helps EV users navigate the intricacies of the many very small networks, providing up-to-date exhaustive information (both crowd-sourced and retrieved by operators) and an access means where needed. People are generally environmentally-conscious, and city officials are under pressure to improve air quality. There is nevertheless an issue with first-generation E-CS, that are not compatible with up-to-date interoperability procedures. There is currently no real coordination between cities and groupings of Municipalities as far as E-CS are concerned, and each one has its own policy. Region Grand-Est, with the help of Grand-Est Mobilité Electrique, is willing to improve this situation. Unlike personal electric mobility, electric public transport is still in its infancy on the territory, with no EV car-sharing and only a very limited number of small electric buses (excepted the numerous tramways and trains, however). The creation of Grand Est Mobilité Electrique in June 2018, with Pôle Véhicule du Futur in charge of coordination in Alsace, is the opportunity for a new impulse thanks to renewed work with Région Grand Est. The main to be addressed in the RAP are identified from the State-of-the-Art analysis and the SWOT analysis. The corresponding themes are listed:

- promotion of EVs - Make sure that people slated to benefit most from EV usage are aware of EV advantages;
- territorial coverage - Help local public authorities find the right information and partners;
- interoperability - Improve interoperability and coordination among networks;
- prepare for charging demand increase: business models and investors - Make sure that the planned EV fleet increase does not lead to charge problems.

The vision, and the identified area of intervention are declined into strategic objectives and specific actions. In the following table the relation with the prioritization index derived from a multicriteria analysis is listed.

Priority Index	Action Title/Description°	PA ROLE
41	Use Grand Est Mobilité Electrique as a channel to broadcast e-MOTICON training material and best practices	User
41	EV action plan for Strasbourg	owner
41	Implement role of Région as regional leader for mobility in Alsace	owner
50	Creation of a single regional association for the promotion of electromobility : Grand Est Mobilité Electrique	Participant
50	Study "Regional Decision tool for charging infrastructures" - Alsace	owner

3.7.4 Germany



3.7.4.1 National Context

While the number of electric vehicles is growing in Germany, its share in the total amount of cars is still small. In the beginning of 2017 there were 98,280 electric or plug in hybrid cars in Germany, 53,861 of them exclusively electric and 44,419 with a plug-in-hybrid-technology. This results in a share of around 1 % of all the German passenger cars (46.5 million) even though the distribution varies in Germany. Most of the public charging points can be found in Bavaria, followed by North Rhine-Westphalia, Baden-Wuerttemberg, Hessen, Hamburg, Berlin and Lower-Saxony.

Until today, the number of charging points grew to 13,500²⁶.

Germany aims at being lead supplier and lead market in the field of electromobility until 2020. Until today, the number of charging points grew to 13,500²⁷.

The federal cabinet approved the national strategy framework for the deployment of infrastructure for alternative fuels (Nationaler Strategierahmen für den Aufbau der Infrastruktur für alternative Kraftstoffe, NSR) on November 9, 2016. This national framework formulates and lays down federal goals and measures for the setup of infrastructure for the alternative fuel technologies electricity, hydrogen and natural gas. By doing this Germany fulfilled one major requirement of the EU-directive 2014/94/EU.

Central goal of the German federal government concerning charging infrastructure for electric vehicles is the setup of a demand-driven nationwide net of public charging points.

Different measures and funding programmes have been set in place to support the growth of electromobility in Germany. Since 2011 monetary measures such as exempting battery electric vehicles from the vehicle tax or establishing a loss compensation have been in place. Legal measures, especially the electric mobility law is being established since 2015. As of July 2016, the environmental Bonus of 4,000 euros for battery-powered electric vehicles and 3,000 euros for plug-in hybrids was released for private users, companies, foundations and associations. In the public procurement program, the aim is to replace 20 % of the public fleets with electric vehicles until 2017. Publicly accessible charging infrastructure will be funded with 300 million Euros worth of public investment until the end of 2020²⁸.

3.7.4.2 The Landkreis Berchtesgadener Land and Landkreis Traunstein

The districts Berchtesgadener Land and Traunstein are in the south of Bavaria, Germany, close to the Austrian border, consisting of 4 cities and 32 Municipalities, covering 2,370 km². The rural area with a population density of 119 inhabitants per km² has a low unemployment rate and interesting touristic destinations. With 804 vehicles and 623 passenger cars per 1,000 inhabitants the vehicle and car passenger density are higher than the German average. There is a total of 120 charging points at 69 locations, 65 charging points at 41 locations are publicly accessible.

National rules and policies such as free parking for EV, access to environmental zones (Umweltzonen) and national and regional subventions for electric vehicles and charging infrastructure are a strength of the region. Parking facilities (P&R) exist but car-sharing and parking zones for electric vehicles in the commuter zones are not yet established and are still part of the e-mobility concept. Within the region, several enterprises have been early adopters in the field of electric mobility. They can serve as best practices and flagships. Infrastructure providers, the regional authority and chambers are dedicated to promoting e-mobility in the region and support enterprises on their way to establish it. Furthermore, environment friendly tourism

²⁶ <https://www.electrive.net/2018/07/25/bdew-register-zaehlt-13-500-ladepunkte-in-deutschland/>

²⁷ <https://www.electrive.net/2018/07/25/bdew-register-zaehlt-13-500-ladepunkte-in-deutschland/>

²⁸ <http://nationale-plattform-elektromobilitaet.de/en/background/the-measures/>

and respective green mobility options are important topics in the region, with two cities, Bad Reichenhall and Markt Berchtesgaden, being part of the Alpine Pearls network. The deployment of an expansive charging infrastructure can further increase the attractiveness of the area. In the German e-MOTICON area one can find a great number of operators for E-CS. Mostly those operators are public utilities. The majority of those small operating companies are organized in a greater network of operators which allows them to have a very strong interoperability for their stations among the European charging network.

The first established E-CS do not in all cases hold up to fulfill transnational requirements and will have to be reformed or updated. Still with the new funding schemes and the regional e-mobility concept which considers standards, backend, paying methods, signature etc. the future development is already heading to fulfill transnational requirements. The responsibilities who will build and maintain the E-CS to fulfill the set goals are still debated partially. The number of registered e-vehicles in the districts is still low, with 0.5 percent (hybrid, plug-in-hybrid or electric vehicle). Public transport mainly focuses on combustion vehicles. There are small initiatives to establish car sharing based on e-mobility but so far e-mobility does not play a big role in transport in general. This excludes the railway system and boat lines but there are no trams and the buses are powered conventionally. No universities/research institutions which deal with e-mobility within the region but in the neighboring regions with whom a connection is established.

The pre-requisites of the funding schemes for public E-CS can help a lot in technical harmonization when promoted and used by the interested stakeholders in the region. Also, the resolution on the e-mobility concept in the region will support and provide the development of a regional back-end and technical harmonization intentions. Local enterprises (particularly the hospitality industry and craftsmen) not only display a lot of potential concerning the transition to e-mobility, but also a growing interest in the topic and willingness to invest in e-vehicles and a semi-public charging infrastructure on their grounds. The concept how many E-CS are adequate was already researched for the e-mobility concept. This concept can be a basis for the advocacy of E-CS establishment and the definition of concrete actions to realize the E-CS in the suggested areas. In Germany there are different ways of funding for the development of an electrified public transport system. Therefore, local bus systems often work as a role model for new mobility solutions.

High acquisition costs of electric compared to combustion vehicles and a missing second-hand market still prevent citizens and companies from a transition to e-mobility. Especially the high costs of fast charging E-CS and the unsure usage and return of investment due to still missing functioning business cases can threaten the willingness to invest. Energy providers as well as PAs are therefore still reluctant to carry the responsibility for the deployment of an infrastructure and rely on the support of third parties (e.g. companies, shops, hospitality industry). Private companies are often aiming for private use only E-CS and thus are not interested in interoperability tasks.

The main areas of intervention to be addressed in the RAP are identified from the State-of-the-Art analysis and the SWOT analysis. The corresponding themes are listed:

- territorial coverage - Reach an adequate territorial coverage as suggested in the e-mobility concept in cooperation with local enterprises and hospitality industry;
- interoperability of services - Achieve interoperability of electric charging services;
- provide support to local PAs - Facilitate contacts between PAs and stakeholders.

In the table below the strategic objectives and the specific actions identified for the two district Landkreise Berchtesgadener Land and Traunstein are listed. The relation with the prioritization index derived from a multicriteria analysis is shown.

Priority Index	Action Title/Description°	PA ROLE
31	Elaboration of E-CS locations based on the suggestions in the e-mobility concept – generate detailed site list with information on coordinates/real estate /ownership/potential operator/potential financing)	Active collection/provision of information
41	Initiate cooperation meetings for public private partnership (with owners of real estate and potential operators)	Active involvement
41	Encouragement of and aid (including business Models) to target groups outside PAs for E-CS investments: Target Group Tourism Industry	Involvement, active communication
41	Encouragement of and aid (including business Models)to target groups outside PAs for E-CS investments: Target Group Municipalities	Involvement, active communication
41	Encouragement of and aid (including business Models)to target groups outside PAs for E-CS investments: Target Group Manufacturing Industry and Crafts	Involvement, active communication
41	Encouragement of and aid (including business Models) to target groups outside PAs for E-CS investments: Target Group Retail Industry	Involvement, active communication
41	Joint tender for all PAs of the region for the backend	Procurement, active involvement
50	Aid to target groups for E-CS investments: Planning of new buildings - focus on requirements of charging infrastructure	Involvement, active communication
50	Awareness, sharing of funding schemes and respective guidance (Lotse) to public, PA and companies	Involvement, active communication

3.7.5 Austria



3.7.5.1 National Context

On December 31, 2017, there were in total 3,178 normal charging points and 528 fast charging points in Austria. Around 75% of the E-CS that are publicly accessible throughout Austria are already interoperable²⁹, in accordance with guideline 2014/94/EU.

Some data on EV market in Austria³⁰: In 2010, only 112 electric vehicles were newly registered in Austria, in 2017 already 5,433 BEV (and 1,721 PHEV). In 2017, there was a rise in new registrations of approximately 1,600 BEV and 500 PHEV compared to the previous year 2016. The proportion of electric vehicles compared to the total number of new registrations of vehicles type M1 is 2.02% in 2017.

Exemplary Austrian policies:

- “Federal law for the definition of common standards for establishing infrastructure for alternative fuels”³¹;
- instructions for practitioners “How will mobility in my tourism destination become sustainable?”³²;
- guideline “Sustainable mobility in tourism”³³;
- implementation plan for e-mobility in and from Austria³⁴;
- national strategy frame work “clean energy in transport”³⁵.

Exemplary Austrian actions:

- purchase support³⁶ from the Federal Government as well as some of the federal states for electric vehicles for private persons, companies, Municipalities, and associations as well as support for the implementation of charging points (funding initiative for period 2019/2020);
- tax incentives for electromobility³⁷, e.g. exemption from motor-related insurance tax;
- specific license plate³⁸ (with green font) for electric vehicles (BEV and FCEV); incentives can be implemented without requiring additional labelling of electric vehicles, e.g. reduced parking fees.

3.7.5.2 The Klagenfurt Municipality

Carinthia is the southernmost province of Austria. Politically, Carinthia is divided into 8 districts and 132 Municipalities. Klagenfurt am Wörthersee is the Carinthian capital with its own statute.

The city has a population of about 100,000 inhabitants, and an area of 120 km². Its urban area is located exactly between the mountains of the Karawanken that are the boarder to Slovenia/Italy and is university-city, school-city, sports-city, leisure-city, garden-city on the Wörthersee, IT center and much more. In Klagenfurt, there are currently two main providers of Charging Infrastructure. The KELAG – “Kärntner Elektrizitäts-Aktiengesellschaft” and the IAM – “Institute for Technology and Alternative Mobility”. Both providers offer different charging options (fast and normal charging) with various payment options.

²⁹ https://www.bmvit.gv.at/verkehr/elektromobilitaet/downloads/oesterreich2017_de.pdf, March 29, 2018

³⁰ https://www.bmvit.gv.at/verkehr/elektromobilitaet/downloads/oesterreich2017_de.pdf, March 29, 2018

³¹ <https://www.ris.bka.gv.at/GeltendeFassung.wxe?Abfrage=Bundesnormen&Gesetzesnummer=20010261>

³² https://www.bmvit.gv.at/verkehr/gesamtverkehr/tourismus/downloads/destination_nachhaltig_mobil.pdf

³³ https://www.bmvit.gv.at/verkehr/gesamtverkehr/tourismus/downloads/leitfaden_mobilitaet.pdf

³⁴ https://www.bmvit.gv.at/verkehr/elektromobilitaet/downloads/emobil_umsetzungsplan.pdf

³⁵ <https://www.bmvit.gv.at/verkehr/elektromobilitaet/downloads/strategierahmen.pdf>

³⁶ <https://www.umweltfoerderung.at/> (Aktionspaket E-Mobilität)

³⁷ <https://www.bmvit.gv.at/verkehr/elektromobilitaet/downloads/factsheet.pdf>

³⁸ <https://www.bmvit.gv.at/verkehr/elektromobilitaet/downloads/factsheet.pdf>

Klagenfurt am Wörthersee has currently released the new Mobility Concept 2035 which is based on the 2014 mobility plan and the mission statement of the city. Both, mobility plan 2014 and mission statement provide the basis for the measures developed in the Mobility Concept 2035. The main message of the concept is the claim, to provide all people in the city and in the region with a high-performance and attractive transport

system for coping the daily routines, while at the same time keeping an eye on the holistic sustainable development of the city and region.

Klagenfurt am Wörthersee has set itself the goal of being CO₂ neutral until the year 2050. In addition, Klagenfurt wants to become a Smart City, saving 40% of greenhouse gas emissions by 2030 and at least 90% by 2050.

The basic orientation of the mobility concept of Klagenfurt am Wörthersee follows the following guidelines: compact and attractive, efficiently networked, fair and social, safe, environmentally friendly and resource-saving and healthy. From the framework described above, three main goals have been defined:

Priority Index	Action Title/Description°	PA ROLE
21	communication via e-car	observer
31	open interfaces	co-ordinator
31	webmap which displays different mobility offers and charging opportunities	creator, owner and operator
31	interactive webmap gives information on charging stations, bus connection, bike rental systems, train connection, and car sharing offers	creator, owner and operator
41	free parking for e-vehicles in the short-term parking zone	planner and responsible for implementation
41	obligation to establish E-charging stations for private investors	planner and co-ordinator
41	Uniform tariff for time and consumption	planner
50	uniform access by RFID or NF	co-ordinator
50	Central coordination and operation by a single platform	planner and coordination
60	Energy supplier as operator provides RE and flat rates for permanent user	co-ordinator
70	development of 16 mobility points with various mobility services and charging opportunities	planner, implementation, owner
80	fast and normal charging stations	planner, lender

- increase of the modal split towards ecomobility;
- reduce transport-related greenhouse gas emissions, air pollutants and noise;
- increasing traffic safety - making school way safe as a cycle path.

The main issues to be addressed in the RAP are identified from the State-of-the-Art analysis and the SWOT analysis. The corresponding themes are listed:

- territorial Coverage - Network of fast-charging stations on high-ranked roads, Normal charging stations for longer stays in public spaces;
- interoperability of services - Uniform access for different providers;
- communication of the social and environmental effects of behavioral choices - Public relations and integration of charging stations in routing systems.

In the table above the strategic objectives and the specific actions identified for Klagenfurt am Wörthersee are listed. The relation with the prioritization index derived from a multicriteria analysis is shown.

3.7.5.3 Alpine Pearls

The RAP focuses on some communities in the Alpine Pearls network. The touristic relevant Alpine villages located in South Tyrol in Italy (Moos, Mals, Ratschings and Villnöss) as well as in Austria (Neukirchen am Großvenediger, Mallnitz and Werfenweng) and Switzerland (Interlaken, Arosa and Les Diablerets) are

included³⁹. In total, in the 10 selected Alpine Pearls Municipalities there are about 41 charging stations with a total of about 103 charging points available (as from July 2018) ⁴⁰.

It can be stated that the Alpine Pearls Municipalities, with their long-term focus on the promotion of sustainable mobility in tourism and previous activities in the area of e-mobility, are clearly predisposed to the expansion of the charging station network. Some of the Alpine Pearls communities have many years of experience with the use of e-mobility, especially in the sector of tourism.

One major risk is that e-mobility is sometimes not supported by key local actors (political representatives, car dealers, etc.), but is rather tackled. Awareness raising and expert advice play an important role here. Above all, local knowledge about e-mobility is needed by all relevant stakeholders. The presence of local pioneers / multipliers in individual communities is seen as an essential strength in promoting e-mobility. The project e-MOTICON is intended to make a significant contribution to providing detailed information for the various (touristic) stakeholders of the Alpine Pearls communities that also can be passed on independently to further stakeholders. In this regard, the project partner Alpine Pearls developed a checklist for the implementation of charging infrastructure for electric vehicles within the Alpine region as well as a tourist e-mobility concept for the electromobile journey in / through the Alps which will be passed on to tourist stakeholders within the Alpine Pearls communities.

The long-term vision is to create a transnational, interoperable and nationwide network of charging stations in tourist communities and regions of the Alpine region. Guests should be provided with a consistent and easy-to-use network of charging infrastructure, which they can use as part of their emission-free journey through the Alps. The charging activities in tourism should take place predominantly at the tourist establishments (for example hotels), where the charges can take place slowly and coordinated overnight. Day guests and transients should have public charging points available, which in some cases offer higher charging power.

The short-term goal is to communicate and inform the key stakeholders about the topic of e-mobility and in particular the (need for) implementation of e-charging infrastructure in tourism.

The main areas of intervention to be addressed in the RAP are identified from the State-of-the-Art analysis and the SWOT analysis. The corresponding themes are listed:

- nationwide tourist charging station network - The tourist charging station network in the Alpine Pearls communities is currently still expandable;
- interoperability of tourist charging infrastructure - The interoperability of the charging stations is currently not given in all charging options or is not actively forced when implementing new charging stations;
- use of "green electricity" for the operation of the tourist charging infrastructure - Only when using electricity produced from renewable energy, the charging infrastructure can be operated sustainably;
- suitable communication of the existing charging infrastructure, information of the guests (in advance) - Existing as well as new offers must be communicated accordingly in order to make both local stakeholders and tourists aware of them and to inform them about the functionality / advantages;
- creating a holistic e-mobility offer for guests in the holiday destination - In addition to the tourist charging infrastructure, other tourist mobility offers in the holiday destination should be offered in an environmentally friendly (electric) manner and a holistic concept should be pursued.

³⁹ The RAP focuses on concrete recommendations for some communities of the Alpine Pearls Network (in total 25 communities) which was due to the great interest of these communities in an exchange and in intensifying cooperation. The remaining communities from the Alpine Pearls network were nevertheless considered within E-MOTICON project in one of the regional action plans of the other project partners.

⁴⁰ No guarantee for completeness or correctness of the information. The information is based on an in-depth analysis within the project (WPT1) and on supplementary information from various online platforms (for example, goingelectric.de or Lemnet) as well as information provided by representatives of the communities.

In the following tables the specific actions identified for the touristic Alpine Region (Alpine Pearls Municipalities) are listed. The relation with the prioritization index derived from a multicriteria analysis is shown below.

Priority Index	Action Title/Description°	PA ROLE
41	detailed information to potential guests about where they can recharge their car as they travel to Arosa , and where Arosa itself has charging facilities (communication of the information should start as early as possible in order to inform potential e-drivers about the charging options and the e-mobile accessibility of the location ; Information on the homepages, for example from the tourism association or the accommodations or their own advertising campaigns can be purposeful)	Communication, information
50	exchange of personal experience from practice in Neukirchen (companies that are already successful in taking appropriate measures could be seen as important multipliers here and could take away possible fears from other hoteliers)	Communication, dissemination, promotion, information
60	include services for e-charging stations in the mobility card in Neukirchen (Nationalpark Sommercard) - cooperation with the providers / operators of the charging stations is necessary	Coordination, communication
60	the developed checklist is to be used as assistance, in order to be able to support the tourism companies in Werfenweng regarding technical and other requirements	Communication, dissemination, promotion, information
60	A bundled and controlled dissemination of practice-relevant knowledge could be accelerated in Werfenweng (for example in the form of an information evening for hoteliers similar to the event conducted in the context of the project in June 2018 ; Werfenweng Aktiv GmbH has a lot of practice-relevant knowledge in terms of vehicles, their charging specifications and any technical features due to the rental of the electric vehicles)	Communication, dissemination, promotion, information
70	Motivation/information of Alpine Pearls hosts in Neukirchen regarding implementation of charging infrastructure (checklist developed in the project can be used to assist in the implementation of e-charging infrastructure on site)	Communication, dissemination, promotion, information
70	existing e-car sharing offer, which can currently only be used by locals, is to be expanded, for tourist use in Mallnitz	Coordination with provider, communication
70	Alpine Pearls hosts in Mallnitz are to be informed about the simple and cost-effective option of implementing charging stations à further implementation of charging stations at Alpine Pearls hosts and other tourist businesses	Communication, dissemination, promotion, information
70	further implementation of charging stations in Les Diablerets , especially in tourist businesses à information and consultation of businesses; in the course of the further expansion of the charging station network in the destination, care must be taken to ensure that these are interoperably accessible	Information, communication, dissemination
70	assembling of tourist packages in Les Diablerets , which include accommodation, as well as charging at the local charging stations (and e.g. ski equipment for the whole family)	Information, coordination, communication

Priority Index	Action Title/Description°	PA ROLE
70	expansion of the charging network in tourist businesses in Moos in Passeier . Pioneers can also be the Alpine Pearls host companies here à information and consultation of businesses (Especially from a safety point of view, the integrated technical facilities in professionally implemented charging stations but also the possibility of load management or billing are a major advantage for the hotels, but also for the guests.)	Information, communication, dissemination
70	Action in the area of marketing and communication of the existing charging infrastructure in Ratschings (e.g. inclusion of charging at charging stations in the Aktivcard's mobility services and the development of tourism products)	Communication, marketing, information
70	Organisation of e-mobility events in Ratschings in cooperation with specific providers (details on the implementation of charging stations and the use of these in the tourist sector could be passed on, but also the guests will be informed about the local offers)	Communication, organization
70	The tourism companies in Villnöss and above all the Alpine Pearls hosts are to be motivated by means of further information events or individual advice to implement their own charging stations for their guests (As support to this, the checklist developed in the project for the implementation of charging stations in tourism can be used.)	Information, communication, dissemination
70	A few of the larger tourism businesses in the area of Villnöss are already very active in providing e-bikes and are generally very interested in e-mobility. These establishments should be familiarized with the details of the implementation of charging stations for their guests, for example with the help of the checklist developed in the project.	Information, communication, dissemination
80	Organisation of e-mobility events in Mallnitz (can be used to create a "wave of enthusiasm" among the population and businesses, where they can experience electromobility up close and literally "electrify" themselves ; fear and reservations can be reduced and the fascination for electromobility aroused by the lively exchange of experiences with people interested in mobility)	Communication, organization
80	In Interlaken there are many short-term parking lots. Due to the large number of possible locations, it must be weighed in particular which locations would be suitable in detail for the construction of charging infrastructure and would also be accepted by guests.	Location evaluation (possibly in cooperation with experts)
90	Especially in the context of an extension of the charging station network in Interlaken , but also when upgrading the existing charging station, a direct billing option must always be considered (In this regard, it must be ensured that the charging stations are interoperable, ie that the charging stations can be used barrier-free (eg by means of a credit card) without having to conclude a membership with the provider in advance)	Coordination
90	In cooperation with the external charging station providers, billing options could be created as part of a service fee or included in the (reduced) services of the local "Vinschgau" mobility card in Mals	Cooperation, designing

The key indicator for achieving / meeting the actions and the basic objectives is to what extent the network of tourist interoperable charging infrastructure in the Municipalities continues to grow, and to what extent the existing charging network is being upgraded for interoperability. The tourist Alpine Region (respectively the Alpine Pearls communities) is already very active in terms of driving forward the subject of e-mobility in tourism, and further measures in the area are to be taken in the short to long term. As part of the e-Hub meeting in Werfenweng at the beginning of October 2018, a large number of the participating stakeholders already announced that they are very interested in disseminating the checklist for the implementation of e-charging infrastructure in tourism locally to further tourist representatives.

3.7.6 Comparison among Local SWOT Analysis

The strengths/ weaknesses/ opportunities/ threats (S.W.O.T) analysis for each area covered by the study, was identified on the basis of the results of the current situation analysis. The SWOT analysis was chosen because it provides information on a specific theme in systematic and useful way. The validity of the SWOT analysis in terms of completeness is linked in a direct manner to the quality of the preliminary stage: the identification of SWOT indicators. The effectiveness of the analysis depends on the ability to carry out a cross-reading of the main identified project elements. To make an easier reading, the results of the analysis are presented as summary in a diagram that highlights the elements able to promote or hinder the achievement of the objectives. The final result of this activity is a matrix, organized in four sections containing the critical elements of the intervention and of the territory.

3.7.6.1 e-MOTICON Methodology for local SWOT

The e-MOTICON SWOT analysis was developed through a participatory approach, which means that a proposed conceptual framework was discussed with all partners' regions to integrate their experiences and interests. The final results is thus influenced by the context and the needs of the partners' regions.

The e-MOTICON local SWOT methodology:

- a. SWOT topics drawing up draft - the activity was based in a first phase on the drafting of plausible topics, derived from other similar Interreg projects, taken as models (eg. Project REZIPE);
- b. SWOT topics draft proposed to all PPs by survey - the activity involved the submission of a questionnaire to all project partners through the application SurveyMonkey, the assessment of individual draft of the topic with a score from 1 (lowest in liking) to 5 (highest in liking) and collection of comments in no particular order. Survey results are shown in following figure;
- c. best topics selection merging partners' contribution - the phase involved the selection of five best topics for each category (S, W, O and T), possibly supplemented by topic derived from individual comments deemed to be of particular relevance;
- d. final SWOT scheme definition - the activity was implemented to prepare the following final scheme;
- e. compilation phase by each partner - drafting of each contribution by individual partner;
- f. discussion phase by each local target group – open discussion within each local target group for refinement;
- g. cross checking among local SWOT final versions - final verification of homogeneity and consistency between individual local versions of SWOT analysis.

Final SWOT topics:

STRENGTH	WEAKNESS
<ul style="list-style-type: none"> ▪ National rules and policies (i.e. incentives, pollutant emission reduction targets etc.); ▪ Local knowledge and academic research in e-mobility; ▪ Local enterprises and players in the area of e-mobility; ▪ Shared business, technical aspects and overall experience between operators for interoperability; ▪ Former experiences about e-mobility infrastructures (e.g. E-CS), implementations and coverage in the area AS; ▪ High quality parking facilities at central commuter stations. 	<ul style="list-style-type: none"> ▪ Transnational coordination at EU level (e.g. different standards in E-CS etc.); ▪ National / local framework for development of e-mobility and E-CS; ▪ Financial aspects (i.e. different budget, difficult operation in the market, currency issues etc.); ▪ Public E-CS concentration & related reserved public parking; ▪ E-mobility in public transport; ▪ Knowledge at local level.
OPPORTUNITIES	THREATS
<ul style="list-style-type: none"> • Legislative & technical harmonization in interoperability; • Presence of local companies potentially Involved (e.g. automotive industries, DSOs, fuel distributors, prosumers etc.); • e-mobility parking facilities (by companies and Local Authorities) & public E-CS number; • Local / regional test fields for e-vehicles & E-CS; • E-mobility in public transport; • Spatial dispersion. 	<ul style="list-style-type: none"> • Local / regional automotive industry lobbies against e-mobility; • E-vehicles high cost; • Interest from operators towards interoperability; • E-CS high cost; • Political and administrative fragmentation turnover; • Attitudes about e-mobility & charging issues.

Comments on Strengths detected in the territories

The strengths that have been highlighted refer in particular to the implementation of national and local rules and policies concerning primarily the aspects of financial incentives or behavioral aspects, air quality and traffic regulation and access to restricted areas. Differently, “other strengths”, as “the presence of local companies willing to promote electric mobility” is perceived as critical in many areas; this is really far to be a true strength, and it drives to manage the infrastructure locally without a real wider scheme, in national or transnational approach. This is also reflected in shared aspects of technologies and experiences among local operators. In more than a half of the monitored areas no sharing of initiatives is evident and appears mostly isolated and disconnected from the general context. A similar situation was detected also for the parking facilities for electric vehicles: it generally occurs as initiatives by local authorities in order to implement and extend experiences occurred elsewhere.

Comments on Weaknesses detected in the territories

Among the identified weaknesses, the most critical issue regards the will to extend the experience from the private e-mobility and its infrastructure to public transports, and to inform citizens on these topics. Another particularly critical point highlighted is the coordination between EU authorities, through legislation, and local

ones, through the application of the transnational rules. Among the points seen as more favorable, there are financial aspects, seen as significant when related to incentives in certain areas.

Comments on Opportunities detected in the territories

Among the opportunities, the e-MOTICON partnerships detected in their territories as most relevant, legislative and technical harmonization able to promote effective interoperability in certain areas. Moreover, several other aspects gradually emerged, such as initiatives related to local companies in terms of promotion and involvement in the field of electric mobility, the presence of test areas for electric vehicles, subsidized parking and adequate numbers of the charging infrastructure.

Comments on Threats detected in the territories

The e-MOTICON partnership highlighted as the most challenging threat the cost associated to E-CS both from the point of view of its use and from the purchase and installation for the operator. In many local policies prices are prospected. The partnership also highlighted as challenging the lack of interest of private operators to provide autonomously forms of interoperability; this approach was justified by the possible loss of customers, advantaging other companies.

3.7.6.2 General Comments on e-MOTICON partnership's Local SWOT

A comparison between SWOTs of different territories was performed.

Identified differences between the partners' countries are:

- SWOT applied by four Italian partners gives more relevance to the strenghts, according to the fact that regional bodies have started the E-CS networking planning recently; and they have not focused on threats yet;
- SWOT applied by two Slovenian partners sharply selects crucial strenghts and weaknesses; this could be addressed to the fact that Slovenia is recently approaching to E-CS planning;
- SWOT applied by French partners shows relevance given to strenghts;
- SWOT applied by Austrian partners shows relevance given to the strenght and a strong focus on the opportunities;
- SWOT was locally applied by German partners to the area of Landkreis Berchtesgadener Land and Landkreis Traunstein, and gives a different feature from the other countries; the high German sensitivity about influencing factors should be addressed to the mature E-CS planning scheme in Germany; it puts higher score to selected strenghts (former experiences about e-mobility infrastructures and high quality parking facilities at central commuter stations) and opportunities (the existance of legislative&technical harmonization in interoperability; e-mobility in public transport; spatial dispersion and the existance of adequate local/regional test fields for e-vehicles & E-CS); the main selected threat was the lacking attitudes about e-mobility & charging issues.

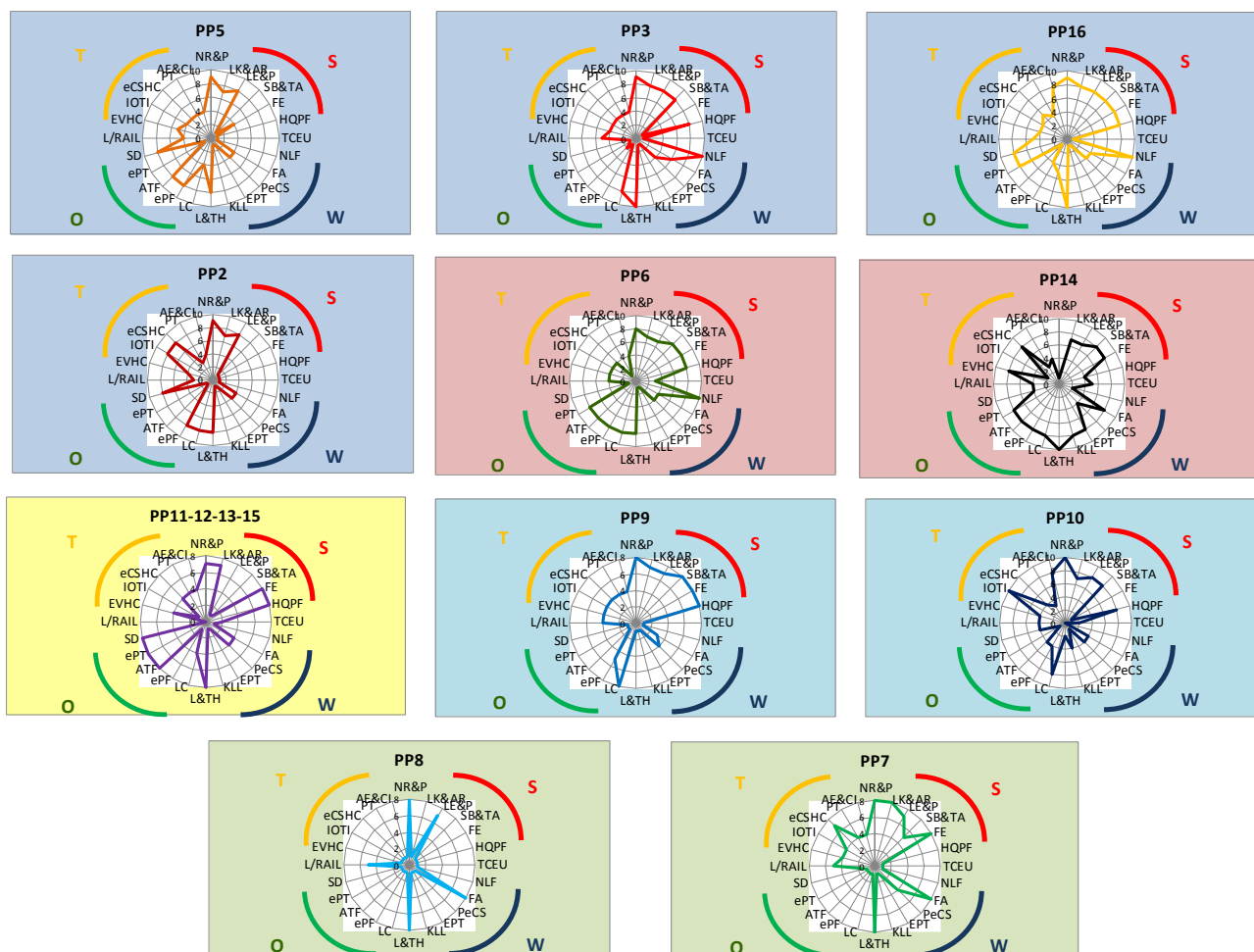
If we compare local SWOT from the same country we can find common features, a sort of "national feature", but also differences:

- SWOT applied by Italian partners (Lombardy, Piedmont, Veneto Regions and Province of Brescia) to their area of competence gives a clear scheme;
- very uniform results come from the analysis applied to regional scale (Piedmont, Veneto, Lombardy); the most relevant comments on the issue where relative to strenght, that region are looking to count on for development of its planning role for the interoperable E-CS network. Lombardy and Piedmont account for the same weakness (low National/local framework for development of e-mobility and E-CS), while Veneto adds to the common scheme a similar issue, but as opportunity (the relevance of Legislative & technical harmonization in interoperability);
- Province of Brescia, which applied the SWOT to a smaller context, inside Lombardy region, and includes a sub group of items than the regional scheme;
- SWOT applied by two Slovenian partners to their area of competence (Goriška and Gorenjska Region), gives very different approach: as BSC, Business Support Center, in Gorenjska region sharply defines two major strenghts (National rules & policies and Local enterprises and players of e-mobility in area), one major weakness (Financial aspects), a major opportunity (legislative

efforts for technical harmonization in interoperability), BSC, Business Support Center, in Goriška region complete the similar approach of Soča Valley Development Centre with more strenghts (Local knowledge & academic research in e-mobility and Former experiences about e-mobility infrastructures) and one more threats (e-vehicles high cost);

- SWOT applied by French partners to their area of competence (Auvergne-Rhône-Alpes, Franche-Comté and Alsace), produces similar patterns, only some minor differences are shown: they are relative to a greater score for IOTI (Lack of Interest from operators towards interoperability) and a smaller score for FE (former experiences about e-mobility infrastructures implementations & coverage in AS area) for PP10 (AURAE) respect to PP09 (PVF); the strenghts evaluation of PP09 looks very similar to Italian scheme;
- SWOT applied by Austrian partners to their area of competence (the Municipality of Klagenfurt and the Alpine Pearls of: Moos in Passeier, Mals, Ratschings and Villnöss (Italy), Interlaken, Arosa and Les Diablerets (Switzerland) and Werfenweng, Neukirchen am Großvenediger, Mallnitz (Austria) shows differences: the evaluation was really different between the two partners; we consider that the difference was due to the different sensitivity of the PA that accounts for different features of the two areas, PP06 applied the analysis to a big municipality, while PP14 to a network of small municipalities in mountain areas, mainly focused on tourism. The big town gave relevance to the strenght and opportunities, while the smaller turistic centre added to this analysis relevance also for weaknesses (Financial aspects, E-mobility in public transport and Knowledge at local level) and threats. This issue results already faced by Klagenfurt.

In the following figure the results of SWOT analysis divided per individual proposed topic (in clockwise order and recognizable by initial letters) are shown for each partner. It was decided to assign a weight from 0 to 10 depending on the criticality highlighted (value 0) or displayed favourable situation (value 10). In determining criteria it has been preferred to cover wider areas and entire national territories.



Legend: Similar color accounts for same nation: light blue: Italy, light red: Austria, "light light blue": France, yellow: Germany, green: Slovenia

Partners acronyms: PP02: Brescia Province (ITA); PP03: Piedmont Region (ITA); PP05: Lombardy Region; PP06: Klagenfurt Municipality (AUT); PP07: PRC (SLO); PP08: BSC (SLO); PP09: PVF (FRA); PP10: AURA EE (FRA); PP11-12-13-15 (German Partners: BAUM, HKE, BI, BGLW); PP14: AP (AUT); PP16: VS (ITA)

Item acronyms:

NR&P	National rules & policies (by regional point of view, i.e. incentives, pollutant emission reduction targets etc.)
LK&AR	Local knowledge & academic research in e-mobility
LE&P	Local enterprises and players of e-mobility in area
SB&TA	Shared business, technical aspects & overall experience between operators for interoperability
FE	Former experiences about e-mobility infrastructures (e.g. E-CS), implementations & coverage in AS area
HQPF	High quality parking facilities at central commuter stations
TCEU	Transnational coordination at EU level (i.e. different standards in E-CS etc.)
NLF	National / local framework for development of e-mobility and E-CS
FA	Financial aspects (i.e. different budget, difficult operation in the market, currency issues etc.)
PeCS	Public E-CS concentration & related reserved public parking
EPT	E-mobility in public transport
KLL	Knowledge at local level
L&TH	Legislative & technical harmonization in interoperability
LC	Presence of local companies potentially involved (e.g. automotive industries, DSOs, fuel distributors, prosumer)
ePF	e-mobility parking facilities (by companies and local authorities) & adequate public E-CS number
ATF	Adequate Local / regional test fields for e-vehicles & E-CS
ePT	E-mobility in public transport
SD	Spatial dispersion
L/RAIL	Local / regional automotive industry lobbies against e-mobility
EVHC	E-vehicles high cost
IOTI	Lack of Interest from operators towards interoperability
eCSHC	E-CS high cost
PT	Political turnover and administrative fragmentation
AE&CI	Lacking Attitudes about e-mobility & charging issues

3.7.7 Analysis of RAP Actions

A cross analysis among the action presented in different territories was performed in order to highlight the main features common to all countries, and the local needs effect.

3.7.7.1 RAP Actions: Analysis according e-MOTICON Strategy Pillars

The e-MOTICON partners believe that the development of a transnational strategy is a key factor in order to commonly face the still existing problems and to identify the best solutions that should be adopted jointly by all the involved countries and Public Authorities. Refer to a common view and a common strategy will help Public Authorities to make the best decisions for all potential EV users of the Alpine Space (and not only). A transnational and commonly agreed strategy would guarantee synergy and consistency among different actions undertaken in the considered area.

The transnational strategy is mainly expressed through six “strategic pillars”, which represent the most important areas of intervention that public bodies should focus on. Following the strategic pillars, decision makers inside the PAs will generate a favourable framework for e-mobility development and will actually set-up an effective and optimized charging infrastructure.

The actions derived in each of ten areas studied by the project partnership indeed refer to the strategic pillars.

The action list of a single territory was not built on the e-MOTICON strategy, but on local vision, objectives and area of intervention. Indeed a link among single area actions and pillars was not planned from the beginning. This result (matching pillars and local actions) is a really good result and accounts for the strategy coherence not only with supraregional policies, but also with local needs.

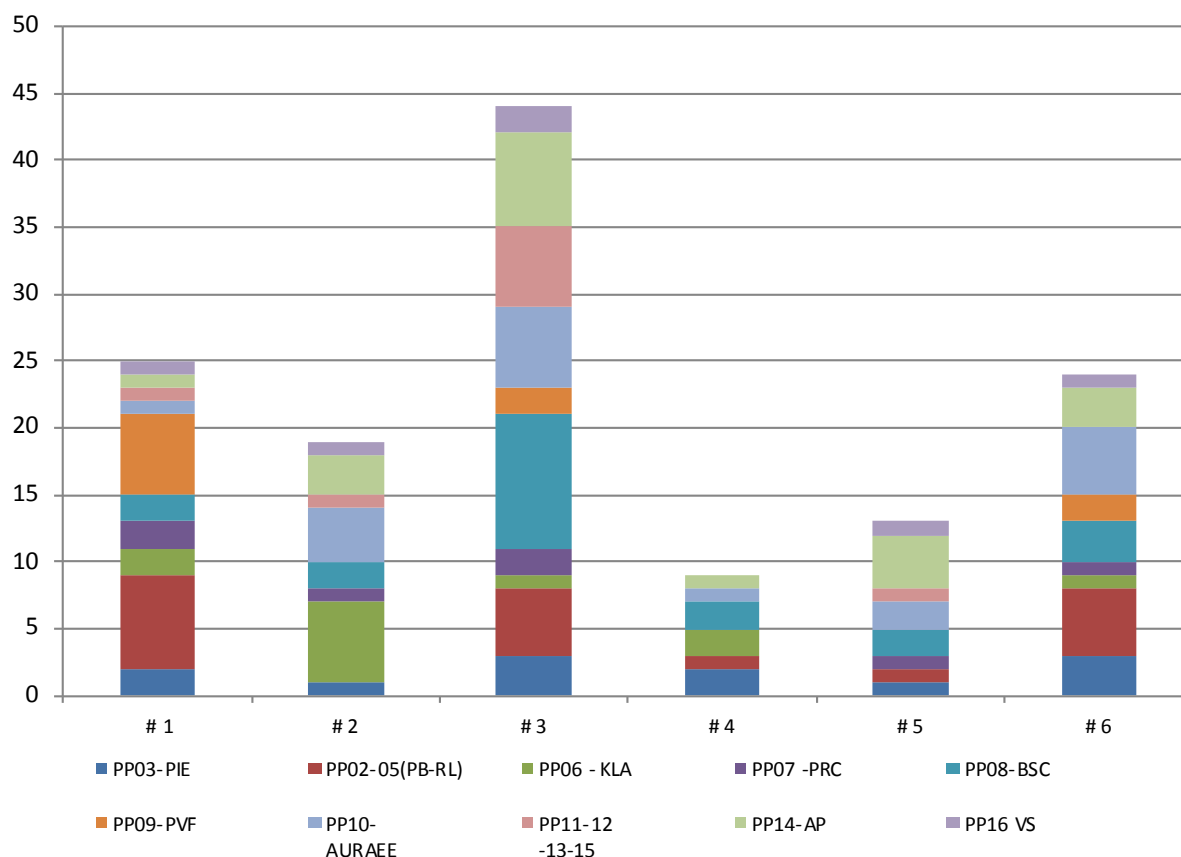


FIGURE 2: RAP ACTIONS DISTRIBUTION ACCORDING STRATEGY PILLARS – SINGLE TERRITORIES CONTRIBUTION

As from the figure 2, most of the selected actions refer to Strategic Pillar #3, which is still a crucial item in all the Alpine area: it refers to “COMPLETE THE MINIMUM INFRASTRUCTURE”, or, more generally, improve it. The data collection carried out in the State of the Art showed that in this moment over 10,500 public charging points are installed within the Alpine Space area [20]. The number is not irrelevant and points out a certain interest in the infrastructure deployment, with an increasing trend in the next years. Despite that, it has to be noticed that the diffusion of charging points is not homogenous in the area. A high attention to this issue can be found in BSC, AURA EE, German Lands, Alpine Pearls and Lombardy Region RAP.

Many local actions refer also to Strategic Pillar #1 (“DEFINE THE BEST POSSIBLE ROLES OF PAS”) and Strategic Pillar #6 (“GUARANTEE SYNERGY AMONG PRIVATE AND PUBLIC TRANSPORT”), accounting for PA feeling that:

- there are a variety of roles now existing in different Alpine Space countries, according to local needs and financial issue, but the experience gathered within the e-MOTICON project shows that all the Regional Authorities and Municipalities should act, at least, in order to facilitate and coordinate the deployment of a homogenous and effective infrastructure inside their territories and with a strong attention also to neighbouring areas;
- private transport dramatically represents the biggest component of urban traffic and urban pollution and is therefore a crucial aspect on which to intervene through more sustainable solutions, as e-mobility. Nevertheless, it has to be taken into serious consideration that local public transport (LPT), especially within metropolitan areas, is one of the most effective modal solution and that a sensible shift from private to public transport would have a very effective impact on sustainability of urban mobility.

3.7.7.2 RAP Actions: General Rank

The first analysis presents the relative positioning of the prioritization score of each partner in a general rank that includes 134 action that the project partnership derived for the territories.

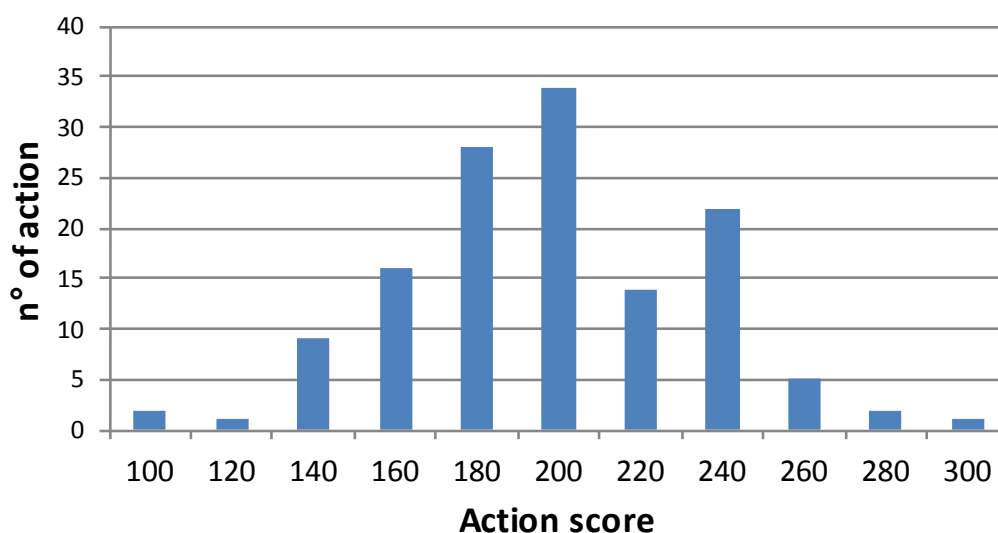


FIGURE 3: NUMBER OF RAP ACTIONS DISTRIBUTION ACCORDING TO ACTION SCORE - GENERAL RANK

As from the Figure 3, the distribution has an average score of 197, a minimum score of 100 and a maximum score of 300. The distribution could be approximated with a Gaussian with a standard deviation of 36. The figure also parts the actions in three main categories, with similar population:

- GREEN one, that accounts a low score, and that corresponds to HIGH PRIORITY;
- YELLOW one, that accounts a medium score, and that corresponds to MEDIUM PRIORITY;
- RED one, that accounts a high score, and that corresponds to LOW PRIORITY.

This description indicates that territories focus on medium range priority action, only few actions have a significant different priority.

Considering the role of each territory in this general picture, we can list the action according the reference partners, as from Table 5:

PP name	Action score										
	100	120	140	160	180	200	220	240	260	280	300
PP03-PIE	2		3	1	2	2		1	1		
PP 02-05 (PB- RL)				6	3	3	2	4	1		
PP06 - KLA			1	3	3	2	1	1	1		
PP07 -PRC						5	1				1
PP08-BSC		1	3	5	4	6	1	1			
PP09-PVF					5	5					
PP10- AURAE			2		3	3	6	5			
PP11-12 -13-15				1	6	2					
PP14-AP					1	1	3	10	2	2	
PP16 VS					1	5					
Total	2	1	9	16	28	34	14	22	5	2	1

TABLE 5: RAP ACTIONS DISTRIBUTION ACCORDING TO ACTION SCORE AND REFERENCE PARTNER - GENERAL RANK

The differences about project partners' actions are sometimes relevant, as shown in the following figures.

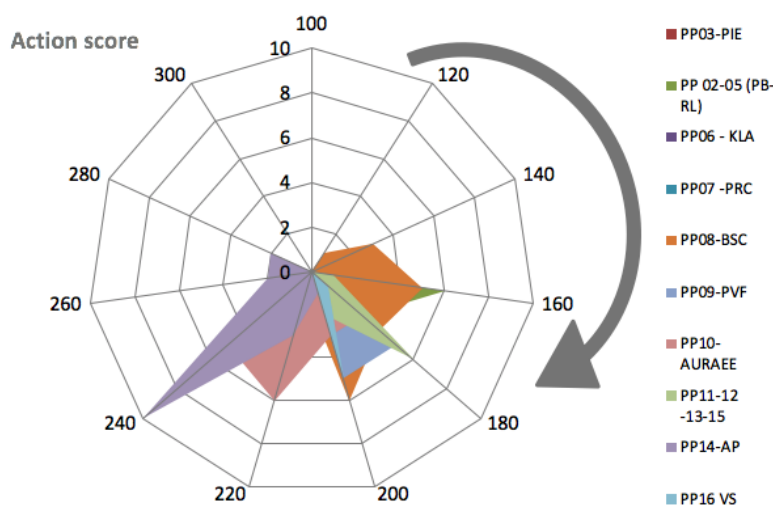


FIGURE 4: RAP ACTIONS RADAR DISTRIBUTION ACCORDING TO ACTION SCORE – GENERAL RANK

The graph shows:

- similar patterns among the actions coming from small alpine touristic town (the Alpine Pearls) and Slovenian PRC area (Goriška region); they both focus on many low priority actions, working for expensive and/or long-term results;
- German Lands (Berchtesgadener Land and Landkreis Traunstein) and some French Regions (both for Alsace/ Grand Est Region and Bourgogne-Franche-Comté) accounts pattern focused on medium range actions, describing a mature framework, in which action have a balanced mix of positive impact, cost and time schedule;
- French AURAE accounts for Auvergne Rhone Alpes a similar pattern than the other French partner, but it also adds action with lower prioritization index, working for expensive and/or long-term results (similarly to AP);

- Slovenian BSC, Ltd, Kranj, RDA of Gorenjska (Gorenjska region) add to a pattern similar to PRC more action with medium or low priority, working for expensive and/or long-term results;
- Klagenfurt Municipality accounts for a really balanced mix of action, with a distribution similar to Italian regions.

Piedmont presented the higher priority action among the whole partnership.

3.7.7.3 RAP Actions: “Type Analysis”

A second analysis was performed in order to identify the prevalence of actions. Five features were selected:

- administrative – action mainly focused on the implementation of administrative procedures;
- communication – action mainly focused on the implementation of communication;
- financial – action mainly focused on the financial needs;
- implementative – action mainly focused on the implementation (HW and SW);
- planning – action mainly focused on the implementation of planning procedures;

The following graph describes the result of the analysis:

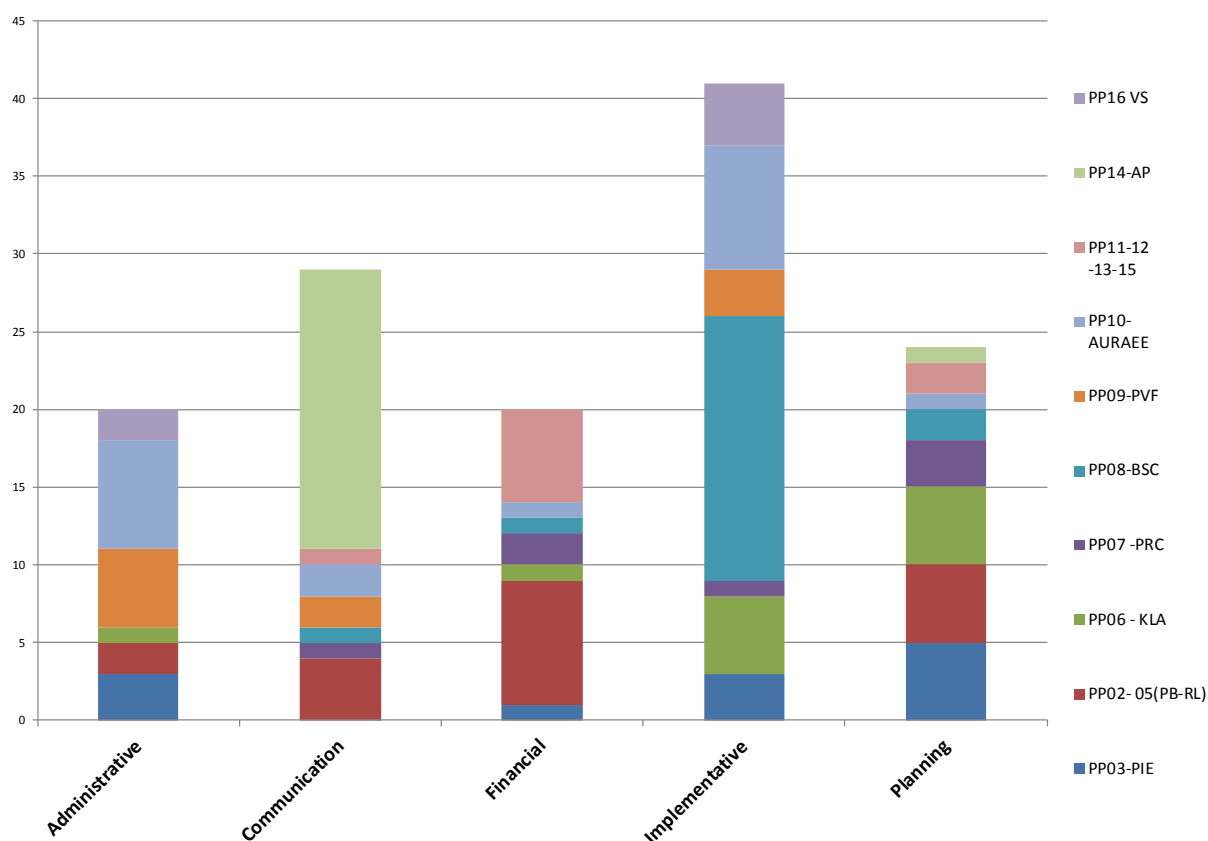


FIGURE 5: RAP ACTIONS DISTRIBUTION ACCORDING TO ACTION TYPE-GENERAL RANK

The table/graph shows that:

- AURAE (Auvergne-Rhône-Alpes) PVF (Bourgogne-Franche-Comté and Grand Est /Alsace) and Piedmont Region account the majority of the administrative actions;
- Lombardy Region and Alpine Pearls account the majority of the actions focused on communication;
- Lombardy Region and German Lands (Landkreis Berchtesgadener Land and Landkreis Traunstein) account the majority of the actions focused on financial issue;

- Lombardy Region and Alpine Pearls account the majority of the actions focused on communication;
- Piedmont Region, Lombardy Region and Klagenfurt Municipality account the majority of the actions focused on planning;
- BSC, Ltd, Kranj, RDA of Gorenjska (Gorenjska region) and AURA EE (Auvergne-Rhône-Alpes) account the majority of the actions focused on HW and SW implementation.

3.7.8 Action Implementation & Reporting

The e-MOTICON Regional Action Plan started its implementation in 2018, and afterwards it was reviewed and updated in accordance with the outcomes of the Quality Status Report 2019, the EUSALP strategy and the new EU policies

The regional plan will be implemented by means of local measures, guidelines and other agreements included in the Implementation Plan presented in Annex I as well as Contracting Parties' national programmes of measures, joint activities and partnerships with other organisations. Some milestones to support implementation have already been identified. In order to be able to effectively monitor progress it is necessary to report about national implementation of the actions set out in this Regional Action Plan.

The e-MOTICON partnership shared a common framework, in which progression indicator from a base line value and a target one, and a starting and a closing date of implementation were defined and measured for each action. The RAPs PA could use this simple scheme or improve it with impact or performance indicators to monitor planned action deployment.

3.7.9 Communication Strategy

Communication strategy is performed by local authorities of the RAP area: they committed themselves by signing a Memorandum of Understanding to foster the e-MOTICON strategy and to implement Regional Action Plan in their Strategic Plan. Besides the implementation, communication among PAs and with the wide public and with other level of public administration is also due (as the high number of actions on communication show).

3.8 Conclusion

The RAP for the areas of competence of the e-MOTICON partnership gives a comprehensive picture of the strong will to face daring challenge to build an interoperable network for charging electric vehicle. Moreover, they represent for the local administration the opportunity to check their needs in a common and transnational framework and a tactic tool to foster E-CS deployment to support e-mobility.

Differences among the RAPs can be found mainly in actions that are focused on the state of the art of the interoperability of the infrastructure for charging electric vehicles:

- Germany Land, which shows a more mature framework for e-mobility and policy and industrial support to electric charging network deployment, selected implementative actions that refers to Pillar #3 of e-MOTICON strategy;
- Italian Regions give more relevance to communication and action on financial items, showing interest to create the proper habitat for a good deployment of an interoperable and transnational the electric charging network;
- France Partner reveals great attention to partnership involvement and implementative action;
- Slovenian partners focus on planning and implementation of the network;
- Austrian Partners show different approach, due to the differences among the type of Municipalities: Alpine Pearls needs actions on communication, while Klagenfurt Municipality is focused on planning and implementative actions.

Some hints on transnational features can also be found:

- Small municipalities, and in particular the Alpine Pearls ones, mainly need actions on communication and information of tourist stakeholders in order to raise awareness regarding the need for and features of charging stations for electric vehicles in tourism;
- Bigger cities need clear methodological approach to manage the complexity of their planning action;
- Regional bodies need communication among them to increase their effectiveness at national level and to check their goals in a transnational perspective;

Even if 5 RAPs are not able to cover the entire Alpine Space territory, they represent indeed a large mapping of the area. The effort carried out by the Partnership not only highlighted the different policies but also verified and illustrated how they can be integrated into a common picture: a connected and sustainable Alpine Space!

4 Project facts & figures



2M€



5 partners



42 observers



30 months



e-MOTICON website
<https://www.e-moticon.eu>



Networking Platform
https://www.e-moticon.eu/how_to_use.html

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5 Glossary

AC	Alternate Current
AFID	Alternative Fuels Infrastructure Directive
AG	Action Group
AS	Alpine Space
B2B	Business-to-business
CAN	Controller Area Network
CCS	Combined charging system
CHAdemo	CHArge de MOve
CNG	Compressed Natural Gas
COM	Communication of the European Commission
DC	Direct Current
DIN	Deutsches Institut für Normung eV
DSO	Distribution System Operator
EC	European Community
E-CS	Electric vehicle Charging Station
EEA	European Energy Agency
ETS	Emission Trading Scheme
EU	European Union
EUSALP	EU Strategy for the Alpine Region
EV	Electric Vehicle
GIREVE	Groupement pour l'itinérance des recharges électriques de véhicules, French roaming platform
H2	Hydrogen
ID	Identification
IEC	International Electrotechnical Commission
ISO	International Standardisation Organisation
LEV	Light Electric Vehicle
LNG	Liquefied Natural Gas
LPG	Liquefied Petroleum Gas
LPT	Local Public Transport
NFC	Near Field Communication
OCA	Open Charge Alliance
OCPI	Open Charge point interface
OCPP	Open Charge Point Protocol
PA	Public Authorities
P&L	Process and Location
PEMS	Portable Emission Measurement System
PLC	Power Line Communication
POS	Point of Sale
PWM	Pulse Width Modulation
Q&A	Questions and Answers
QR	Quick Response
RDE	Real Driving Emissions
R&D	Research and Development
RFID	Radio Frequency IDentification
SMS	Short Message Service
SPEC	Specification
SUMP	Sustainable Urban Mobility Plan
SWD	Staff Working Document
SWOT	Strengths Weaknesses Opportunities and Threats
V2G	Vehicle-to-Grid
WLTP	World Harmonized Light Vehicle Test Procedure
WPTx	Work Package on Task x

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