

# **ACTION PLAN**

## **for UOM Electric Mobility**

### **Association**



*"Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union. Neither the European Union nor the granting authority can be."*

## PROJECT INFO

Project title	Partnership for Promotion and Popularization of Electrical Mobility through Transformation and Modernization of WB HEIs Study Programs
Project acronym	PELMOB
Project reference number	101082860/ERASMUS-EDU-2022-CBHE-STRAND-2
Funding scheme	Capacity Building in the field of Higher Education: Strand 2
Web address	www.pelmob.pr.ac.rs
Coordination institution	University of Mitrovica
Project duration	01 December 2022 – 30 November 2025

## DOCUMENT CONTROL SHEET

Work package	WP4: Creation of associations for popularization of EM in WBC
Ref. no and title of activity	T4.1: Action plan for EM associations
Title of deliverable	D4.1: Action plan for EM associations created
Lead institution	Ethnikó kai Kapodistriakó Panepistímio Athinón NKUA
Author(s)	Milanko Damjanović, Boško Matović, Radoje Vujadinović, Sreten Simović, Boško Matović, Vladimir Ilić, Borjanka Dragović, Rada Ljepavić, Duška Četković
Document status	Final
Document version and date	v.01, 26/01/2024
Dissemination level	Public/Internal

## VERSIONING AND CONTRIBUTION HISTORY

Version	Date	Revision description	Partner responsible
v.01	26/01/2024	Final document	UDBM

---

## Contents

<b>1) Executive summary</b> .....	3
<b>2) Current situation related to electric mobility in WBC</b> .....	7
2.1 Overview of the legal framework of electrical mobility in Montenegro .....	11
2.2 Customer habits in Montenegro .....	13
2.2.1 Socio-demographic characteristics .....	13
2.2.2 Attitudes related to the possession of EV .....	14
2.2.3 Issues related to the transition to EM .....	15
2.2.4 Familiarity with the concept of EM .....	15
<b>3) Electromobility: challenges, potential and goals</b> .....	17
<b>4) Structure of EM UoM association</b> .....	20
4.1 Vision and mission of EM Association .....	21
4.2 Aims of EM Association .....	22
4.3 Tools for networking .....	23
<b>5) EM Association perspective for future developments</b> .....	24
5.1 Short term action plan .....	24
5.2 Long term action plan .....	24
<b>6) KPI for EM Action Plan</b> .....	29

## 1) Executive summary

During the last decade, many governments have announced new climate change mitigation commitments that include national or regional commitments to reduce their carbon emissions in the 2025-2035 timeframe. The underlying government planning efforts and national actions do tend to be linked with a major transformation in the transport sector toward advanced efficiency technology with a shift to lower-carbon energy sources.

Many governments have announced that their original goals will not be met for a variety of reasons, amongst which one of the most important is the lack of skilled and trained personnel with sufficient level of knowledge in this area.

Based on the identified need for promotion and implementation of EM in the Western Balkan countries (Bosnia and Herzegovina, Albania, Montenegro and Kosovo\*) and taking into account specific objectives defined by the Erasmus Plus Programme Guide (section Capacity Building in the field of higher education), the specific objectives of the project for all WB partner countries are as follows:

- to improve and develop the existing curricula for undergraduate and master studies in accordance with Bologna requirements and national accreditation standards by implementing new courses in the field of EM. These courses should cover provisions concerning Ecological and sustainable design in road traffic, Electro Mobility and Hybrid Technology, Organization and exploitation of Electrical Vehicles, Intelligent Technologies for Internet of Vehicle, Energy Storage Systems for Electric Vehicles, Electric Vehicle Systems Architecture and Standardization Needs. The aim of the improved study programs is to include different disciplines such as environmental sciences, sustainable transport, and electrical engineering. Indicators for measuring achievement: 10 developed and implemented EM curricula (3 in Bosnia and Herzegovina, 3 in Kosovo\*, 2 in Montenegro, 2 in Albania). The modernized/new EM curricula will precisely define the teachers' competencies, learning outcomes, course content and syllabi.
- to design and implement new EM labs in WB. The equipment obtained through the project will be used for the establishment of the laboratories where the students will have practical lectures related to the EM. Indicators for measuring

achievement: 10 new laboratories will be established with appropriate equipment and manuals.

- to create and organize EM associations, which will be comprised of all relevant interested stakeholders (schools, public and private companies, local self-governments etc.) and citizens. EM associations will organize various events such as workshops with popular lectures related to the use of EM, public demonstrations with use of EM devices, EM campaigns and other awareness raising activities. Special attention will be paid to EM associations workshops – Green weeks, which will be organized during the second and third project year. The main objective of these EM associations is to promote EM with the goal of raising public awareness about the potential benefits of EM. Indicators for measuring achievement: 10 EM associations will be created, at least 10 local workshops for networking with EM stakeholders and citizens organized, 10 Action plans for EM associations created, created WEB corners for EM associations on partners' WEB sites, organization of 20 Green Weeks (2 per each WB HEI), popularization materials created.

The project expects to achieve these objectives through the implementation of eight interconnected Work Packages (WPs). Dissemination is one of the award criteria on which the application was assessed. WP8 (Dissemination and Exploitation) runs in parallel with the other WPs over the project lifetime and its deliverable 8.2, the Dissemination and Exploitation Plan, will be requested and further assessed. It focuses on defining a comprehensive and consistent project dissemination strategy, which will ensure maximum visibility of project results during and beyond the project lifetime.

This project aims at modernizing WB HEIs study programs through the introduction of new electric vehicle-related courses at the bachelor and master levels of education. It will be done through both the creation of new and the modernization of existing study programs and the creation of awareness-raising hubs within which EM associations will be created. As such, the specific objectives of the project for all WB partner countries are as follows:

- to improve and develop the existing curricula for undergraduate and master studies in accordance with Bologna requirements and national accreditation standards by implementing new courses in the field of EM. These courses should cover provisions concerning Ecological and sustainable design in road traffic, Electro Mobility and

---

Hybrid Technology, Organization and exploitation of Electrical Vehicles, Intelligent Technologies for the Internet of Vehicles, Energy Storage Systems for Electric Vehicles, Electric Vehicle Systems Architecture, and Standardization Needs.

- to design and implement new EM labs in WB. The equipment obtained through the project will be used for the establishment of laboratories where the students will have practical lectures related to the EM. Indicators for measuring achievement: 10 new laboratories will be established with appropriate equipment and manuals.
- to create and organize EM associations, which will be comprised of all relevant interested stakeholders (schools, public and private companies, local self-governments, etc.) and citizens. EM associations will organize various events such as workshops with popular lectures related to the use of EM, public demonstrations with the use of EM devices, EM campaigns, and other awareness-raising activities.

Broadening the context of project activities undertaken to achieve these objectives, a series of topics are presented here that will be addressed within the framework of the local workshops, the Green Weeks, as well as the introduction of the study programs. In line with local workshops, the aims of the PELMOB project related to the popularization of EM in WBC will be introduced, the survey results on community awareness related to EM will be presented, and feedback on existing and future cooperation between the HEIs and EM stakeholders and citizens will be collected, questions around the creation of EM associations and their mission will be discussed, opportunities for the popularization of EM in WBC will be presented, a draft list for EM association members will be created, and activities of EM Associations for the popularization EM in WBC will be introduced.

As for the Green Weeks, the following topics will be tackled: practical presentations of the pilot plant of the solar charger for electric micro-mobility vehicles, introduction to the technical characteristics of the equipment, short training on battery charging, short training for using of electric micro-mobility vehicles, driving training and safety measures practice, organization of promotional rides within the free space of the premises of the WB HEIs, introduction with the EM mobility devices (bicycles, scooters, batteries, chargers, driving simulators, lab car models, etc.), introductions to EM association activities and further networking with event attendees. Whereas for the presentation of the new and/or created study programs, the following topics will be covered: students will be informed

about the content of EM curricula, developed courses, gained competencies and skills, with possibilities or further advancements as well as with possibilities for employment, they will be introduced to the program of student internships, learning and teaching methods, as well as practical knowledge and skills gained abroad and recognized by the home institution. Also, students will also get information about financial issues related to student internships.

This present document reviews project activities related to the sustainability of the project outcomes by setting out provisions accompanied by measurable indicators for collective efforts in sustaining the project's impact beyond its lifetime. Taking the project outcomes as a starting point, alongside specific measures to sustain these outcomes, concrete actions have been planned and KPIs have been set for their achievement and for the maintenance of the communication process with project partners. This document initially provides an overview of the expected impact of the project.

## 2) Current situation related to electric mobility in WBC

Mass serial production of the first models of electric vehicles began in 2010, when the construction of the first chargers for electric vehicles also started. The first charging station for electric vehicles in Montenegro was installed in 2019. Therefore, the beginning of electric mobility development in Montenegro in this moment is being late for 8-9 years in comparison with the developed countries in Europe and world.

From these facts, it is obvious that the market development of electric mobility in Montenegro is being late in comparison to the developed countries from the rest of the world. Up till now, the interest for this area has been noticed only in academic community and rare enterprises which try to improve the services for their clients (for example hotels) by installation of the charging stations for electric vehicles, or this is only for promotion of the basic business (for example car dealers).

According to the data from the Statistical Office of Montenegro - MONSTAT, the representation of the registered motor vehicles by type of fuels in Montenegro is given in Table 1. The largest number of registered vehicles in Montenegro are on diesel and petrol fuels. The share of electric vehicles in Montenegro in the total number of vehicles is minor. From 2022 to 2023, the number of electric vehicles increased from 323 to 415 vehicles. Of the total number of vehicles in Montenegro, electric vehicles make up only 0.16% in 2023, and there is no precise data on the type of electric vehicle.

**Table 1.** Number of registered motor vehicles by type of fuel (MONSTAT, 2023)

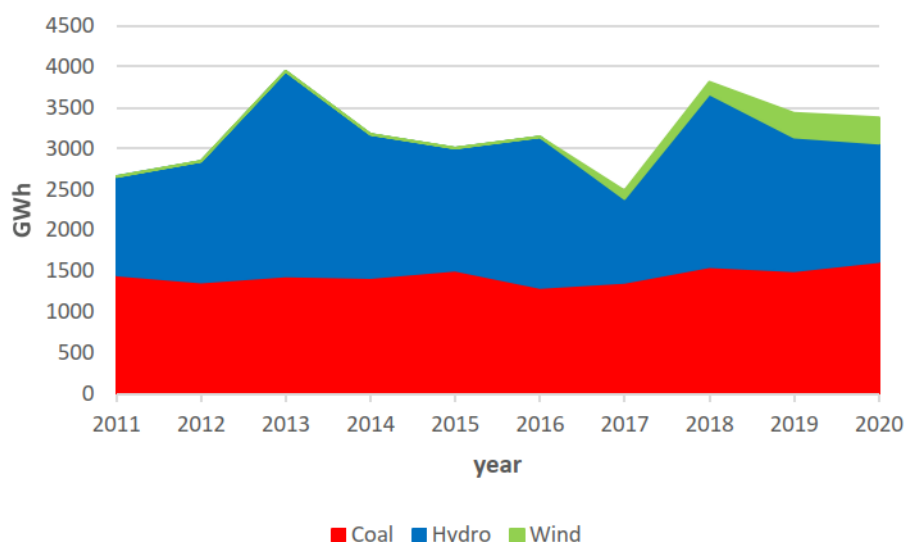
Type of driving energy	2021	2022	Index 2022/2021
Total	250,907	262,997	104.8
Eurosuper 95	50,257	50,990	101.5
Eurosuper 98	499	480	96.2
Eurodiesel	192,978	204,825	106.1
Mix	23	26	113.0
LPG/CNG	6,827	6,261	91.7
Electric energy	323	415	128.5



The main reason for promotion of electric vehicles instead of the conventional vehicles with the internal combustion engine (ICE), is environment protection, i.e., decreasing air pollution.

Before the concrete comparison of the pollution, it is necessary to explain that the pollution from the electric vehicles is not zero, because the pollution from the electric vehicles depends of the emissions caused by the production of the electric energy used by the electric vehicles.

In the electric power system of Montenegro, the electric energy is dominantly produced from the thermal power plants and two large hydropower plants. In addition, in the last few years, electricity in Montenegro has been produced using two wind power plants and several small hydroelectric power plants. Electricity production in Montenegro in 2020 took place according to the following energy mix: coal (47,8%), hydropower (42,9%) and wind (9,3%). When it comes to the entire period from 2011 to 2020, it is obvious that electricity production in Montenegro is oscillatory, which is a consequence of the different amounts of electricity produced in hydroelectric power plants per annum during the observed period. Electricity production from hydroelectric power plants varies depending on the amount of precipitation (Lučić et al., 2023).



**Figure 1.** Electricity production by sources in Montenegro (Lučić et al., 2023).

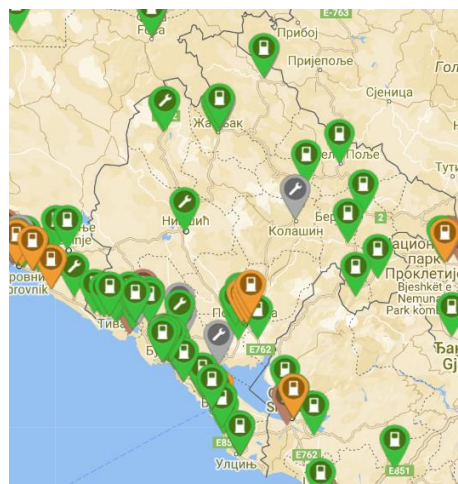
Results indicate that the usage of electric vehicles, which are being charged with the electric energy from the existing electric power system in Montenegro, leads to the considerable decreasing of the air pollution:

- Decreasing of the CO<sub>2</sub> emission from 20 %,
- Decreasing of the NO<sub>x</sub> emission from 99,75 %.

It is very important to note that with the further development of the Montenegrin electric power system in the direction of decarbonization, emissions of all pollutants will be reduced. This will be supported by design and construction of new and more efficient thermal blocks, installation of facilities for desulphurization and denitrification in existing thermal blocks, larger integration of renewable energy sources, co-combustion of biomass with coal in thermal plants, etc.

It is known that the infrastructure for charging of the electric vehicles is one of the prerequisites for market development of the electric vehicles. Absence of this infrastructure will certainly be one of the main obstacles for market development of the electric vehicles in Montenegro. Montenegro is still not a member of the EU, so it does not have the Directive 2014/94/EU transposed into national legislation, but it will certainly have to fulfill this obligation during the process of entering the EU.

The first charging station for electric vehicles in Montenegro was installed at the island Sveti Stefan, in 2019. After that, the car dealers' companies, banks, taxi companies, etc., installed these charging stations. According to data of Ministry of Interior, 444 charging stations were identified in Montenegro in 2022 year (see Figure 2).



**Figure 2.** Charging stations in Montenegro (see: <https://www.plugshare.com/>)

**Hybrid electric vehicles (HEVs)** are the ones who use two or more energy sources for traction, unlike the conventional vehicles which use only one. The most often is the combination of the petrol or diesel motor with the electromotor, as it is the case for Toyota Prius. HEVs recently became very popular, because they have much less emission of harmful gases which pollute the air and cause acid rain (carbon dioxide, etc.). Considering the autonomy of the electric drive, HEVs can be divided into partial and full HEVs. The full HEV has a possibility to drive only with the electromotor. In that case, the electric motor has at least one third of the power of the ICE. In the partial HEV, the electromotor serves only as an assistance to the ICE. HEVs combine the electric motor and ICE during driving. The electric motor speeds up the vehicle up to approximately 40 km/h, after which the ICE takes the role. The battery of the HEV is charged by using petrol engine and regenerative braking.

**Plug-in hybrid electric vehicles (PHEVs)** are full HEVs equipped with a battery which can be charged from the utility grid, with the charger. PHEV behaves as an electric vehicle without the emission of harmful gases on shorter distances, and as standard HEV on larger distances. Its advantage is, when the battery is fully discharged, the driver does not have to worry about finding the battery charger from the grid, because the vehicle will automatically switch to the hybrid mode, like standard HEV.

**Electric vehicles with extended range** are driven only with the electric motor, unlike the HEVs and PHEVs. In this case, ICE only charges the batteries. Depending on the weather conditions, electric devices and driving style, these vehicles can cross about 65 km using the electric energy stored in the batteries, without usage of petrol and without air pollution. After that, the vehicle is automatically switched to the petrol generator which continues to produce electricity and enables the extended range.

**Electric vehicles with batteries (BEVs)** are fully electric vehicles. They do not have ICE. In order to charge the batteries, the BEVs must be connected to the electric power grid. For crossing about 100 km with single charging, batteries with much larger capacity are necessary, from 18 to even 35 kWh. Electric vehicles are much more expensive than conventional vehicles with ICE and HEVs, because of their lithium-ion batteries. However, due to the mass production of these batteries, their price is decreasing.

## 2.1 Overview of the legal framework of electrical mobility in Montenegro

Strategic and plan documents on the level of Montenegro which can be considered relevant to the initiation of the activities for development of the electric mobility, are:

- Energy Development Strategy of Montenegro until 2030  
([https://cedis.me/wp-content/uploads/2017/06/strategija\\_razvoja\\_energetike\\_cg\\_do\\_2030\\_godine\\_0\\_0.pdf](https://cedis.me/wp-content/uploads/2017/06/strategija_razvoja_energetike_cg_do_2030_godine_0_0.pdf))
- National Strategy for Sustainable Development to 2030  
(<https://www.gov.me/dokumenta/67dc487e-097d-41d2-8fd5-7827a19a1f5a>)
- Transport Development Strategy – Montenegro 2019-2035  
(<https://www.gov.me/dokumenta/39f31ac4-a0b6-4228-bff1-47c82e6c5534>)
- Energy Efficiency Action Plan  
(<https://www.gov.me/dokumenta/4824f3fc-f13c-4be3-8be9-2705a9783317>)
- Law on energy  
(<https://www.gov.me/dokumenta/d17f9f62-ea19-4dd2-a73f-cbf6bfffab5c>)
- Law on roads  
(<https://www.gov.me/dokumenta/478a8442-7905-4e76-8e12-9ec4030e8d46>)
- Law on Road Traffic Safety  
(<https://www.gov.me/dokumenta/022a8ec6-b13e-44d2-8493-24e781bd94c3>)
- Law on environmental impact assessment  
(<https://www.gov.me/dokumenta/6cb5d964-ac65-4b12-bf08-e9a9f6880221>)
- Law on environment  
(<https://www.gov.me/dokumenta/74746713-6b4d-42ed-93eb-85c10799b3b5>)
- Decree on activities that emit greenhouse gases for which a permit for the emission of greenhouse gases is issued  
(<https://www.gov.me/dokumenta/f1613e3e-c37d-45af-8454-ba558e3ba744>)

In the given documents, the usage of electric energy in transport is mentioned, and the construction of charging stations is expected in the future. Within the Energy Development Strategy of Montenegro until 2030 is provided support for the construction of infrastructure for the introduction of charging points for electric vehicle batteries in road traffic. Also, in the Transport Development Strategy is defined aim to promote alternative types of fuel and electro mobility. However, on the national level there is no National action

plan on introduction of charging infrastructure for electric vehicles. In addition, On the national level, there is no legislation which explicitly regulates any segment of electric mobility. Market development of electric vehicles in Montenegro is being late in comparison to the developed countries from Europe and world. Till now, the interest for this area has been noticed only in academic community and rare companies which try to improve the services for their clients (for example hotels) by installation of the charging stations for electric vehicles, or this is only for promotion of the basic business (for example car dealers). In such circumstances, Montenegrin Electricity Distribution System (CEDIS) can be considered as one of the pioneers and certainly the most important promotor of electric mobility in Montenegro, which considers possibility of expansion its traditional business on the new area which becomes more attractive for modern companies from energy sector. However, for any important improvement in this domain it is necessary to engage a number of investors and stakeholders, which should work together to create a positive ambience for acceptance and development of the concept of electric mobility in Montenegro.

A prerequisite for any systematic improvements in the area of electric mobility in Montenegro, is establishment of legislation framework, in the way that is done in EU countries. As it can be concluded from the EU experiences, the foundation for establishment of such framework comes from the domain of environmental protection, after which a specific regulation for the infrastructure of the electric vehicles charging or some other aspects from this area is adopted. For this reason, a review of the national legislation and strategic documents from the area of environmental protection will be given first. The focus will be on air protection.

The main entities for regulation of electric mobility in Montenegro are following:

- Ministry of Energy and Mining;
- Ministry of Finance;
- Ministry of Spatial Planning, Urbanism and State Property;
- Ministry of Education, Science and Innovation;
- Ministry of Education, Science and Innovation;
- Ministry of Tourism, Ecology, Sustainable Development and Northern Region Development;

- Ministry of the Interior;
- Transport Administration;
- Montenegrin Electricity Distribution System (CEDIS);
- Eco Fund;
- Energy and Water Regulatory Agency of Montenegro;
- Center for Motors and Vehicles, Faculty of Mechanical Engineering;
- Auto Moto Association of Montenegro;

## **2.2 Customer habits in Montenegro**

In previous project task Survey of EM community awareness in Montenegro has been conducted. Data were collected in a quantitative e-survey, considered suitable for large samples.

The questionnaire was composed of 14 questions/statements and additional sub questions and statements. All items were in the form of closed questions. The questionnaire included questions scored on the 4-point scale from “very important” to “not sure”, “yes/no” questions and questions where multiple answers were provided. In total, 426 participants were included in the survey.

The first part of the questionnaire included socio-demographic questions like gender, age, educational qualification, and occupation of the participants. The first part of the survey aimed to investigate the attitudes of the participants related to the possession of EV. The second part aimed to issues related to the transition to EM. The third part of survey was related to support to various investments/incentives for EM and familiarity with the concept of EM were surveyed and to knowledge and education gaps in relation to EV and main concerns related to EM.

### **2.2.1 Socio-demographic characteristics**

Almost equal level of interesting in survey could be found regarding male and female participants. Where the female participant took advantage about 6%. The customers at age range 31-40 were dominant in the interest of topic of EM in our country. These group followed by ones in range 41-50, higher than 50 and finally group where the age of customers in range between 20-30 years.

When analyzing educational qualification, we can conclude that academic level educated people were more interested in issues related to electromobility. From professional and job occupation point of view it can be concluded that the population that is permanent touch with new trends and technologies is the most interested in electromobility. This population includes academics professionals, engineers and software engineers, business professionals and self-employed. Students and homemakers shown interest in percentage less than 5%. Other occupation did not show statistically important interest.

### **2.2.2 Attitudes related to the possession of EV**

The survey showed that more than 93% of participant does not own or use an electric vehicle. More than 50% of participants stated that it is unlikely to buy or use EV in the near future. Currently almost a one quarter of the population strongly considering EV as their next vehicle. The main concerns could be submitted as follows:

- High price,
- Impossibility of tax exemption,
- Unknown cost of maintenance,
- Limited or impossible charging at home,
- Insufficiently prepared infrastructure,
- Absence of a campaign to educate citizens,
- The battery production process is not environmentally friendly

Based on responses conclusion can be made that most of population does not want to own but rather share EV. The reason for this opinion is based on lack of safe biking routes and safety issues related to it, high cost of purchasing of EV, limited access to safe location to park or charge EV. Besides the relatively high price, the range of EV is an obstacle for customers to cover their needs. Also, safety issues and the absence of legal provisions regulating this means of transport must not be neglected. As the final remark in this subchapter can be pointed out that the electromobility topics should be brought closer to the customers and to be informed by professionals based on the scientific facts.

### **2.2.3 Issues related to the transition to EM**

The Municipality importance in support the transition towards electric mobility has been placed as central role. Based on survey, Municipality should initiate and support issues on reduction on greenhouse gas emissions & climate actions and reduction of air pollution. The majority of customers have the opinion that the Municipality should ensure affordable transport and improve conditions for walking, bicycling and transit. Also, investment in publicly accessible EV charging stations, incentives for “EV Ready” retrofits to multifamily buildings and workplaces, investment in bicycle infrastructure that supports E-Bike adoption were found to be very important.

### **2.2.4 Familiarity with the concept of EM**

When it comes to what concepts should future and current users be familiarized with to increase their awareness of electric mobility then the following aspects should be encompassed:

- EV safety
- EV reliability
- Impact on the environment
- What are the requirements for EV battery charging?
- What is the charging time of the EV battery?
- EV Autonomy
- the advantages of EV
- the most common issues with EV
- Features of EV engine
- Outside temperature affects EV performance

One of biggest issues with the popularity of EV are the knowledge and education gaps. Activities on popularization of EM should include education on EV, how it works, how to “refuel” the electric vehicle, increase the level of knowledge concerning technical aspects of vehicles’ use, for example, connected with the necessity or lack of necessity to have additional equipment. Also, very important is to inform potential users about the issues related to the real costs of driving of electric vehicle.



Main concerns related to EM could be submitted in following categories:

- Lack of or insufficient knowledge of how electric vehicles work,
- Lack or insufficient knowledge of how to “refuel” the electric vehicle,
- Lack or insufficient knowledge of how to connect or disconnect the electric vehicle to the charging station,
- Lack or insufficient level of knowledge concerning technical aspects of vehicles’ use, for example, connected with the necessity or lack of necessity to have additional equipment (i.e., a cable for charging a vehicle).
- Lack of or insufficient knowledge related to the real costs of driving an electric vehicle.
- Lack or insufficient knowledge related to appropriate tax breaks or other discounts and applicable low-carbon mobility programs.
- Lack of or insufficient knowledge related to possibilities of improving the quality of life and the impact on sustainable development thanks to the application of electric mobility in practice.
- Lack or insufficient knowledge related to the safety of using electric vehicles, i.e., issues of connecting the vehicle to the charger; concerns about the possibility of electric shock.

All above mentioned aspects determine the direction of future activities of EMAs in WBC.

### 3) Electromobility: challenges, potential and goals

Electromobility represents the concept of using electric powertrain technologies, in-vehicle information, and communication technologies and connected infrastructures to enable the electric propulsion of vehicles and fleets. Powertrain technologies include full electric vehicles and plug-in hybrids, as well as hydrogen fuel cell vehicles that convert hydrogen into electricity. Electromobility efforts are motivated by the need to address fuel efficiency and emission requirements, as well as market demands for lower operational costs.

For the purpose of this Action Plan, besides BEV, the technology recognized under the electromobility term includes Plug-in Hybrid Electric Vehicles (PHEV), Hybrid Electric Vehicle (HEV) and Hydrogen Fuel Cell Electric Vehicles (FCEV). To the original list of vehicles, it was felt that range-extender electric vehicles (REEV) should also be included due to the fact that the new type of REEV includes a fully fledged battery similar to those found on BEV, but which are aided with petrol / diesel drive trains for longer distances travelled, should this be needed.

New technologies are in general accepted with a dose of skepticism, especially at the elderly population. On the other hand, people have some pretty bad experiences with batteries on home devices, mobile phones etc. So, they usually make a parallel with electric cars, and they have reason for skepticism. On the other side, cars are usually one of the main investments and impact at home budget, and people carefully go into this. In Montenegro people rather buy used and even conventional cars which are proven not having serious problems than a new one.

Montenegro is a small country, and practically all electric cars can reach each point in country theoretically, but also it is predominantly mountain area which is some kind of challenge for electric cars. For example, CEDIS which is located in capital Podgorica own some models of electric cars, and those cars reveal trip to the cities along the Adriatic Sea and back without problems, but trip to northern region of country and back is on the edge of possibilities even they have longer distance.

It has to be mentioned that Montenegro is not a member of European Union, and has very low standard, and electric cars are generally more expensive than traditional cars. Since

---

Montenegro is not EU member those cars are even more expensive because of custom fees and VAT. All of those are some challenges for electromobility.

All those things are obstacles for people to convert from traditional on electric cars. To make this transition easier, government should bring national plan for transition on electromobility and make huge effort in sense of building national network for charging Battery Electric Vehicles.

To overcome this challenge research institutes should work on the price of batteries, which will reduce car price. Second thing is lifetime of batteries. As mentioned above, people have bad experiences on mobile phones where after approximately 5 years they should change it. After that it should be worked on charging time in sense those times can be compared with tank filling. Next thing is improving energy efficiency in total which means better electromotor design with enhanced efficiency and performances at the same time.

During holidays and bigger fluctuation, it is quite possible to have bottle neck on charging stations. To overcome these issues, it should be integrated into car system information management for coordination and even distribution electromobility cars on charging stations. The ability to come up with creative solutions, and then test these ideas together with customers on real construction sites, is a key advantage in the exploration of these new technologies.

When we make a total conversion on electric cars, that means when all vehicles on the road are electric, we will eliminate exhaust emissions, we will just switch a problem to electric production. In Montenegro almost half of electricity is produced by thermal power plants on coal. We should take advantage of renewable power sources such as hydroelectric, solar and wind. The government is taking action to help boost the supply of renewable energy, but we still have a way to go. In past years we have had a huge protest of community and green associations against all projects of renewable energy.

On the other side, with transition on battery electric cars many automotive original manufacturers will lose their part of cake. Since our country has many companies who have this production, they will have to find a new nice of market.

Aftermarket part of business is also a very important part of the market, as well as services. Battery electric vehicles have much simpler powertrains, and only 1-2% moving parts

compared with internal combustion powertrain. Automatically that means less wear, they suffer less wear on components such as brakes and have little or no requirement for regular maintenance and oil changes.

This will result in a drastic reduction in demand for fast-moving parts that contributes to a large portion of parts business and profitability. It is projected that in another decade or so, the automotive aftermarket will have a much lower maintenance eco-system.

With a much lower need for maintenance, customers' visit frequency to the dealerships will reduce, resulting in less money spent in dealers' workshops or independent garages and fewer opportunities for OEMs and aftermarket distributors to sell parts.

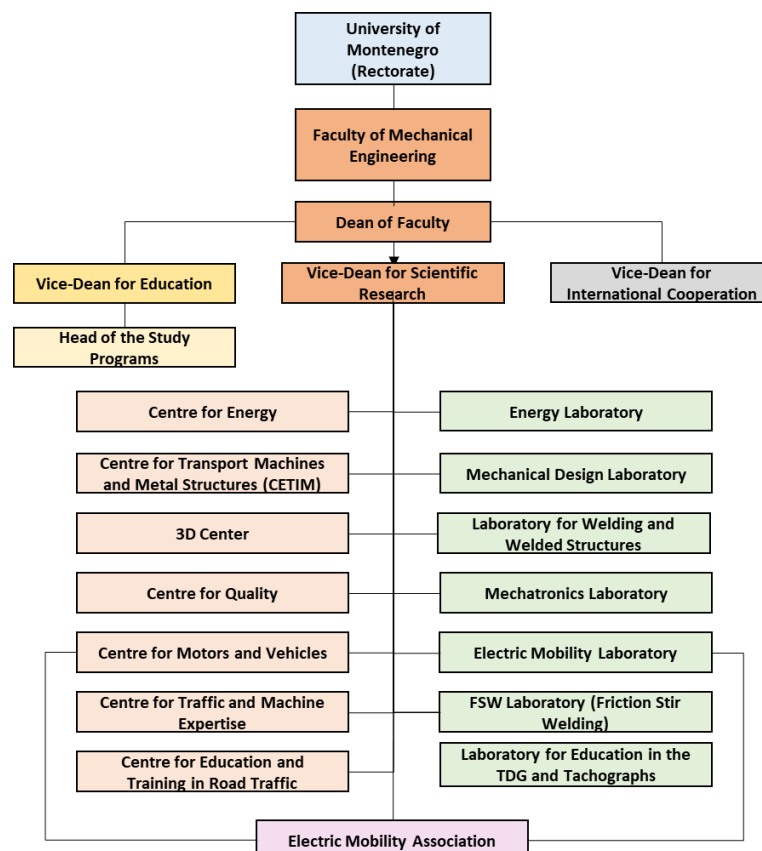
Many people claim that we should take action on climate change, but there is still suspicion on range and lifetime of electric cars which seems like slowing down the rate of adoption.

Anyway, electric mobility has great potential for the future. It is expected that with development and a better stake in the market we will figure out main problems in this technology which will focus research on those specific tasks, and result on solutions. At the same time growing production of electric vehicles will pull in new producers, automatically new ideas and technological solutions. Growing population of electric vehicles will have demand for a new profession resulting at spreading a whole service network in sense of in dealers' workshops or independent garages. All this will result in lower service and total costs.

In the future we can expect improvements in the field of recycling batteries and other components, and lower demand for raw materials.

## 4) Structure of EM UoM association

Aware of the fact that the whole of Europe, including our country, is in an energy transition, and that the transition to carbon-neutral forms of energy is more realistic, and that decarbonization of all sectors, including transport, is inevitable, turning to the electrification of transport is also inevitable in Montenegro. For this purpose, the formation of an association for electromobility through the implementation of the PELMOB project at UoM is one of the steps towards better awareness of people about the use of new, "clean" forms of transport, which ultimately means a cleaner environment and cities for everyone. As part of the implementation of the PELMOB project, it is planned that the association will be formed at the Faculty of Mechanical Engineering, which will be an integral part of the newly formed Laboratory for Electric Mobility and Centre for Motors and Vehicles at UoM. Its role will be reflected through the gathering of all interested members from different sectors of society (NGOs, businessmen, academic staff, students, individuals, citizens, representatives of the government, and others), and the promotion and improvement of awareness of the importance of the transition to electromobility. The structure of the association is shown in Figure 3.



**Figure 3.** Structure of the UoM Electric Mobility Association

University of Montenegro is a fully integrated higher education institution consisting of 19 faculties and three institutes, which have a certain degree of autonomy in making certain decisions. Among other things, faculties can form certain subunits, such as institutes, centers, laboratories and associations. In this sense, and in accordance with the rules of the University and the Statute, it is planned that the newly formed Laboratory for EM is a subunit of the Centre of Motors and Vehicles at the Faculty of Mechanical Engineering, while the Electric Mobility Association will operate under supervision of Laboratory for Electric Mobility. The organizational structure of the University shows the central role of the rectorate and a certain autonomy of the faculties.

The organizational structure of the Faculty of Mechanical Engineering is defined by the Statute and other rules of the University. The Faculty of Mechanical Engineering is managed by a Dean of Faculty. He is assisted in his work by three vice-deans: the vice-dean for education, the vice-dean for international cooperation and the vice-dean for scientific research.

It is planned that the newly formed Association for Electric Mobility at UoM will be a link between the academic community, research organizations, industry, other stakeholders and associations related to the transport sector, especially electric transport.

As part of the Laboratory for Electric Mobility, the Association will function in accordance with all valid documents of the University. Financial operations and distribution of funds from projects and other services performed by the Association will be carried out in accordance with the Rulebook on the distribution of funds of the University.

The Electric Mobility Association is planned to be an informal community whose coordinator is Prof. Dr. Radoje Vujadinović.

#### **4.1 Vision and mission of EM Association**

The Vision of the Electric Mobility Association is reflected in several steps:

- Raising awareness and considering the possibility of turning the industry towards the E-mobility sector - Aware of the fact that the electrification of the transport sector opens up new opportunities for companies that deal with technologies related to transport sector, this way possibilities of new business models for companies could be presented.

- Environmentally "clean" cities - by using electric vehicles and the electrification of transport in general, the emission of polluting substances and gases into the air is reduced to a minimum. This allows us to achieve higher air quality, less noise and less greenhouse gas emissions, which additionally contributes to the national plans for achieving carbon neutrality by 2050.
- More energy efficient transport - The use of electric transport significantly reduces the use of energy sources due to highly efficient e-engines. By using the e-power drive trains, compared to internal combustion engines, the need for energy is reduced by 50-80%;
- Energy independence - By using e-cars and transport in general, the dependence of both our region and the country on imported energy sources (gas and oil) is reduced.

The Mission of the Electric Mobility Association is to promote the widespread use of electromobility in general and electric vehicles.

#### **4.2 Aims of EM Association**

The Electric Mobility Association aims at:

- Instigating technical and technological improvements to optimize existing products with the aim of meeting market requirements.
- Encouraging the introduction of advanced techniques is likely to improve vehicle performance significantly and result in the rational utilization of energy sources.
- Initiating and, whenever possible, coordinating research and development projects.
- Organizing symposia, discussions and conferences, like EVS and AEC.
- Facilitating studies by means of study committees.
- Debunking myths about electromobility.
- Collaborating with other national/regional bodies with which it has common interests.
- Finding the necessary financial resources.
- Undertaking all other activities relevant to the object of the Association.
- Providing information to political authorities and any other decision-makers.

### 4.3 Tools for networking

In collaboration with other centers, associations and other bodies at the University and Faculty, the Association will use all available techniques, technologies and methods for networking and work.

The tools of the Association for networking are:

- Use of the teaching process at UoM through lessons on various modules on all essential items related to e-mobility.
- Use of laboratory and research facilities at UoM.
- Creation of workshops, seminars, green weeks and other similar events to promote and raise awareness of e-mobility.
- Creation of professional symposia, conferences where new achievements in the field of e-mobility and current research and knowledge would be presented.
- Creation of LLL courses related to e-mobility.
- Use of social networks, media and promotional material
- Exchange of teaching, administrative staff and students with stakeholders related to E-mobility.
- Giving lessons to students by e-mobility industry experts.
- Participation through various development and research projects, both national and international.

In accordance with the rules and statute of UoM, all laboratories located within the Faculty of Mechanical Engineering at UoM, which is also the case with the aforementioned laboratory, are under the supervision of the vice-dean for scientific research at the Faculty of Mechanical Engineering.



## 5) EM Association perspective for future developments

### 5.1 Short term action plan

Short term action plan would be implemented in the first phase and will be connected to the activities of the establishment and governing the Electric Mobility Association (EMA).

#### **Action 1.** Establishment of the EMA

The first step of the EMA is to establish the structure of the association with its members and governing bodies. The leadership of the EMA would be taken by the representatives of the Faculty of Mechanical Engineering (FME) as the initiator of the establishment of the EMA. FME would prepare the first founding meeting and send the invitation to the rest of the potential members of the association. The aim of the action is to create a functional environment for future EMA activities. The governing body of the Association should be formed by representatives of the initiator of the EMA establishment.

#### **Action 2.** Creating functional communication channels between EMA members and external stakeholders

The development of the EMA website, the creation of social media profiles for the EMA (LinkedIn, Facebook), the call for subscriptions to the monthly newsletter via the mailing list are activities that will be carried out to communicate with stakeholders. All EMA activities will be published through these channels and promoted through social media. EMA members will prepare a periodically newsletter with facts and activities of EMA.

#### **Action 3.** Update and adoption of the long-term action plan

Although this document is going to initially propose a long-term action plan, the establishment of the EMA will revise and update the proposed long-term action plan and harmonize it with possibilities and other obligations of the members of the EMA.

### 5.2 Long term action plan

This phase is going to be done as a sustainable development action plan of the EMA, with the activities that are going to be carried out continuously or periodically in the future. This preliminary long-time action plan should be aligned with the members of the EMA and updated with possibilities and capabilities of the EMA members.

#### **Activity 4.** Management and self-evaluation of the EMA

A governing body of the EMA should be identified and appointed in the short term. The management of the EMA's activities should be provided by the governing body throughout the future existence of the EMA. A self-evaluation of the EMA should be carried out periodically, as defined in the current legislation. Periodic reporting on the activities and self-evaluation of the EMA should be carried out by the Governing Body of the EMA, and this report should be submitted to the initiator of the establishment of the EMA. The Governing Body of the EMA would create media content which are going to be published on the digital media channels.

#### **Activity 5.** Education and training

The low level of awareness in the WB region about the importance of the impact of electrification of transport of goods and people is the main issue to be addressed by this association. Awareness campaigns should be provided to the public through digital communication channels, face-to-face presentations in schools, conferences and other mass events, monthly newsletters, etc. Educational courses and training on electromobility would be organized for experts and practitioners in the field of engineering and business. The round tables with stakeholders (companies, government representatives, NGOs, academics, students, etc.) would be organized occasionally, in line with the international calendars related to environmental issues.

#### **Activity 6.** Research and development

The infrastructure for electric mobility in the WB region is still under development. There is a lot of potential for conducting research activities in this area. Also, production and development of electric vehicles in this area could be interesting for the future cooperation projects with industrial partners. The Laboratory for EM as part of the main proposer should be a central figure for these activities in the wider area of EMA activities implementation. Funding for these activities should be obtained by submitting project proposals to local government calls, European funding opportunities (Interreg, Erasmus+, Horizon, COST, etc.) and other international funding sources.

### Activity 7. Bottom-up approach to the development of national actions and strategies

Through its activities, EMA aims to influence the general perception of electromobility. For the further development of this field, it is necessary to create legal frameworks at local, cantonal and national level. EMA and its partners (i.e. other associations with a similar focus) should develop proposals for legal documents and strategies for different levels of government. Proposals resulting from EMA activities are not guaranteed to be successful in changing the legal framework, but they will definitely point out the problem that should be tackled in the future. These activities should be funded by the project application from the international funding schemes.

**Table2. EM Action Plan**

ACTION	TASKS	WHEN	WHO	RESULT	REMARK
<b>Action 1.</b> Establishment of the EMA	Call for initial EMA meeting		FME	At least 20 members (persons, representatives of companies and other stakeholders) accepted the meeting	
	Initial EMA meeting		FME, stakeholders	Electro Mobility Association (EMA) is established, and governing body is chosen	
<b>Action 2.</b> Creating functional communication channels between EMA members and external stakeholders	Create EMA website		EMA governing body (EMA GB)	Website corner is prepared and published	Website corner will be a part of existing faculty or other stakeholder's webpage
	Create EMA social media (LinkedIn, Facebook)		EMA GB	Social media pages are created, and users are invited to join the pages	

ACTION	TASKS	WHEN	WHO	RESULT	REMARK
	Create newsletter subscription mail list		EMA GB	Call for subscription to the periodically newsletter is published on the social medias and website and mail list is collected.	Collection of subscription for the newsletter should be continuously opened.
<b>Action 3.</b> Update and adoption of the long-term action plan	Analysis and adaptation of the long-term plan (Actions 4-8)		EMA	Long term plan is updated and accepted for implementation.	
<b>Activity 4.</b> Management and self-evaluation of the EMA	Association member meeting	Yearly	EMA	Meeting is held and	
	Self-evaluation of the EMA activities and adaptations in the activity plan	Yearly	EMA	Yearly evaluation is done and documented	
	Report on the past activities	Yearly	EMA GB	Report is prepared and presented on yearly EMA member meeting	
	Creation of the media content	Continuously	EMA GB	Occasionally some of the media contents are created and published on website and social media	
	Creation of the periodically newsletter	Periodically	EMA	Periodically newsletter is created and distributed among subscribed members and stakeholders	Content of the Periodically newsletter could be: current activities, interesting facts and news in the topic area, call for action, etc. Content of the newsletter should be approved by EMA GB.
<b>Activity 5.</b> Education and training	Create and share EM awareness campaign	Continuously	EMA	EM awareness campaign is constantly present at digital communication channels	Newsletter and social media content should tackle the awareness problem.

ACTION	TASKS	WHEN	WHO	RESULT	REMARK
	Organization of educational courses and trainings	At least once per year	EMA	At least one educational courses or trainings in the field of EM are organized by the members of EMA with at least 15 participants	
	Organization of roundtables with topic in EM	Yearly	EMA	One roundtable with the topic in EM is organized within yearly meeting of the EMA members. At least 8 participants will take part in the roundtable.	
<b>Activity 6.</b> Research and development	Preparation of the project proposals with the topic on EM	Yearly	EMA, stakeholders	At least one R&D project application is prepared and submitted each year by the EMA consortia	
<b>Activity 7.</b> Bottom-up approach to the development of national actions and strategies	Organization of the meetings with the governmental structures responsible for EM	As needed	EMA	Meetings are held once per year within the yearly EMA meeting	
	Preparation of the project proposal for funding the national EM strategy preparation	As needed	EMA, government entity	Project proposal is prepared and submitted	
	Draft of national EM strategy preparation through the approved project	After the project approval	EMA, stakeholders' network	Proposal of the national strategy for EM is created and submitted for discussion to the governing bodies	

## 6) KPI for EM Action Plan

Impact	Target Groups	Key Indicators
EMA meetings	Members of EMA, stakeholders	Number of meetings including reports from meetings that were held (at least 1 per year)
Workshops for networking with EM stakeholders and citizens	Academic staff / students/organizations and EM stakeholders	Number of people who took part in a workshop (approx. 20 persons)
Organized Green Week	Academic staff / students/organizations and EM stakeholders	One per year and number of audiences reached through these events
Created WEB corners for EM association		One corner on official web page
Created EMA social media	Academic staff / students/organizations and EM stakeholders	Number of reached audience minimum 30. Amount and diversity of material Number of reactions on certain posts Minimum 20
Created newsletter subscription email list	Academic staff / students/organizations and EM stakeholders	Number of subscribers Amount of published posts related to the project (each event)
Organized educational courses and training	WB HEIs, students, teachers, EM-related target groups	Number of students and staff trained (10 in total)
Organized roundtables with topics in EM	EMA	Number of people who took part (At least 8 participants)
Increased interest in using EM	Wider community	The range of raised awareness in the community. (one survey per year conducted)

## 7) Decision on the establishment of EM Association



**UNIVERSITY OF MONTENEGRO  
FACULTY OF MECHANICAL  
ENGINEERING  
PODGORICA**



**81000 Podgorica, George Washington Street, Account number: 510-154-63, Tel: +382 20 245 003,  
Web : [www.ucg.ac.me/mf](http://www.ucg.ac.me/mf), Mail: [mf@ucg.ac.me](mailto:mf@ucg.ac.me)**

Number: 1-133/2

Podgorica, January 26, 2024

In accordance with Article 64 of the Statute of the University of Montenegro (UoM), and in the execution of the target activities defined by the Erasmus+ project under the PELMOB acronym (Partnership for Promotion and Popularization of Electrical Mobility through Transformation and Modernization of WB HEIs Study Programs), the Council of the Faculty of Mechanical Engineering, at the electronically held session on January 26, 2024, has made the following

### DECISION

I A special body for the promotion and popularization of electric mobility, named the "Association for the Promotion of Electric Mobility," is established at the Faculty of Mechanical Engineering, University of Montenegro.

II The main goal of forming the association mentioned in point I of this decision is defined by the ERASMUS+ project "Partnership for Promotion and Popularization of Electrical Mobility through Transformation and Modernization of WB HEIs Study Programs" - PELMOB, Erasmus+ CBHE Project No. 101082860-PELMOB-ERASMUS-EDU-2022-CBHE-promoting and popularizing electric mobility.

III Other interested entities (schools, companies, local authorities, etc.), as well as individuals who wish to contribute to the promotion of electric mobility, can join the Association for the Promotion of Electric Mobility.

IV The activities of the Association for the Promotion of Electric Mobility shall be led by Prof. Dr. Radoje Vujadinović, Dean of the Faculty of Mechanical Engineering.

V If necessary, the rules of organization, mode of operation, and division of activities can be defined by a separate act.



To be delivered to:

Project Coordinator;  
Project Manager of PELMOB at UoM;  
Dean of the Faculty; and  
A/a

## 8) Decision on the adoption of EM Action Plan



**UNIVERSITY OF MONTENEGRO**  
**FACULTY OF MECHANICAL**  
**ENGINEERING**  
**PODGORICA**



81000 Podgorica, George Washington Street, Account number: 510-154-63, Tel: +382 20 245 003,  
Web : [www.ucg.ac.me/mf](http://www.ucg.ac.me/mf), Mail: [mf@ucg.ac.me](mailto:mf@ucg.ac.me)

Number: 1-133/3  
Podgorica, January 26, 2024

In accordance with Article 64 of the Statute of the University of Montenegro (UoM), and in the execution of the target activities defined by the Erasmus+ project under the PELMOB acronym (Partnership for Promotion and Popularization of Electrical Mobility through Transformation and Modernization of WB HEIs Study Programs), the Council of the Faculty of Mechanical Engineering, at the electronically held session on January 26, 2024, has made the following

### DECISION

I Adoption of the Action Plan for the implementation of the activities related to aims of establishment and governing the Association for the Promotion of Electric Mobility (EMA).

II The main activities will be following:

- 1) Establishment of the EMA;
- 2) Creating functional communication channels between EMA members and external stakeholders;
- 3) Update and adoption of the long-term action plan;
- 4) Management and self-evaluation of the EMA;
- 5) Education and training;
- 6) Research and development;
- 7) Bottom-up approach to the development of national actions and strategies.

DEAN  
  
Prof. Dr. Badoje Vujadinović

To be delivered to:

Project Coordinator;  
Project Manager of PELMOB at UoM;  
Dean of the Faculty; and  
A/a