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**EnerMOB**



Interregional  
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N  
for int  
low carbon  
Electromobility  
Networks  
ER  
MOBility



PROJECT BROCHURE



# Interregional Electromobility Networks for int**ER**urban low carbon **MOB**ility

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# 1 Introduction

Electromobility is a general term for the development of electric powertrains designed to shift vehicle design away from the use of fossil fuels and carbon gas emissions. The concept envisions the use of vehicles with electric motors, including cars, scooters, motorcycles, bicycles, trams, trolleybuses, trains or buses,

that can be full electric vehicles, as well as hybrid electric vehicles and those using hydrogen fuel cell technology. The common feature of all of them is that they are fully or partly driven electrically, have a means of storing energy on board, and obtain their energy mainly from the power grid.

Abbreviations for electric vehicles	
<b>EV</b>	Electric Vehicle. EV is a vehicle that uses one or more electric motors for propulsion. It can be powered by a collector system, with electricity from extravehicular sources, or it can be powered autonomously by a battery.
<b>HEV</b>	Hybrid Electric Vehicle. A vehicle that combines a conventional internal combustion engine system with an electric propulsion system (hybrid vehicle drivetrain). The presence of the electric powertrain is intended to achieve either better fuel economy than a conventional vehicle or better performance.
<b>MHEV</b>	Mild Hybrid Electric Vehicle. A mild hybrid has a small electric motor and is used to boost and support the internal combustion engine temporarily, you can't drive purely electric.
<b>FHEV</b>	Full Hybrid Electric Vehicle. A full hybrid is basically an MHEV, but with a high-voltage battery and a slightly larger electric motor. Short distances can be driven with the full hybrid electric vehicle purely electrically.
<b>PHEV</b>	Plug-in Hybrid Vehicle. The battery can be charged externally via plug, allowing for more powerful electric motors. Depending on the design, PHEVs can drive longer distances using solely their electric system.
<b>BEV</b>	Battery Electric Vehicle. BEV describes what is commonly called an "electric car": a vehicle with an electric motor powered by a battery and charged via power plug.
<b>FCEV</b>	Fuel Cell Electric Vehicle. FCEV is a concept that uses hydrogen as an energy source. In a fuel cell, the reaction between hydrogen and oxygen generates the power necessary for the electric motor. The only emission is water.

The emergence of electromobility designs is also tied to the idea of smart power grids that will provide the energy that these vehicles run on. Improving the efficiency of the vehicle goes along with improving the efficiency of the grid, and these efforts, in tandem, lead to the greatly reduced energy needs and carbon gas emissions caused by transport.

Emissions are having a serious impact on the climate and environment. More and more CO<sub>2</sub> is entering the atmosphere, with the result that the Earth is becoming warmer and warmer. According to a survey by the Intergovernmental Panel on Climate Change (IPCC), traffic is responsible for 24 percent of all CO<sub>2</sub> emissions worldwide. Electric vehicles counter that - unlike gasoline and diesel cars, they don't emit any CO<sub>2</sub> when driven. Yet electric vehicles are CO<sub>2</sub>-neutral in the full sense of the word only if the batteries and the

electricity to power them are produced using renewable energies. Low-emission cars also mean better air quality and therefore have a positive effect on people's health.

There are still certain challenges to be overcome so that the many advantages of the electric powertrain can be leveraged: limited range of electric vehicles, the incomplete charging infrastructure, especially of fast charging stations on long-distance routes, different charging systems among countries and regions etc.

But there is no doubt that the future belongs to electromobility. Electromobility is considered to be a central component of a sustainable and climate-friendly transport system based on renewable energies and it will ensure that eco-friendly, quiet and efficient vehicles will be on our roads.

### Did you know?

Electromobility is regarded as a modern trend, but to be precise, it's not an invention of our times. The first cars with an electric motor were presented at the end of the 19th century.

The number of charging stations in Europe is growing steadily. In 2020, there were roughly 285.800 public charging stations for electric vehicles in Europe (including Turkey).

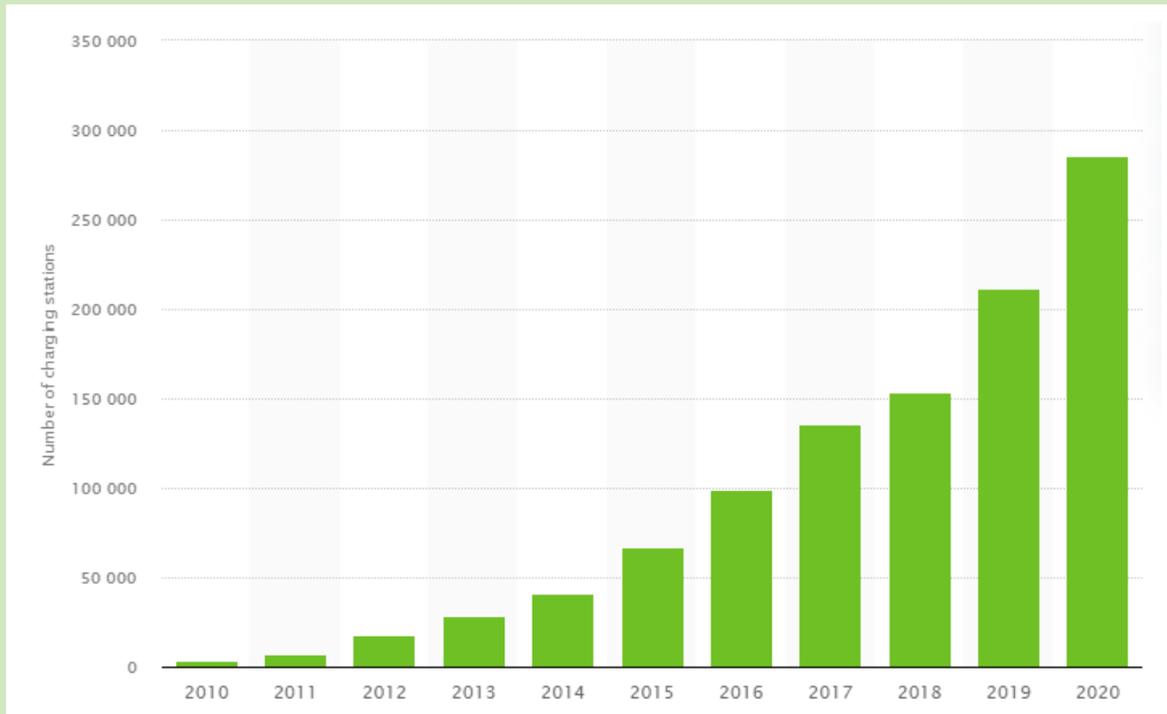


Figure 1: Number of electric vehicle charging stations in Europe from 2010 to 2020 (<https://www.statista.com/statistics/955443/number-of-electric-vehicle-charging-stations-in-europe/>).

Battery electric vehicles have a market share of around 5,3 % across the European Union, while plug-in hybrid electric vehicles hold a somewhat equal share of 5,2 percent. Electromobility in Europe is expected to continue its growth in the future, with charging stations set to become a staple on European roads.

## 2 Presentation of the EnerMOB project

In recent years, the European policies on the deployment of alternative fuels are acting as a driving force to several EU projects to promote sustainable mobility through the enabling of electric vehicles to circulate at least in urban/suburban agglomerations and other densely populated areas. The ADRION area is featured by an inadequate coverage and accessibility of public charging infrastructures in order to enable electric vehicles to circulate in the ADRION regions, not to mention the lack of common standards needed for the operation of such infrastructure. Such criticality generates a limitation for the medium and long-range trips within the ADRION regions for the use of electric vehicles.

In this framework, the objective of the EnerMOB project was to study and support common solutions for electric transport systems at interurban and interregional level, by implementing pilot networks of charging infrastructures and by assessing sustainable technologies to manage energy demand of electric mobility. The project mainly aimed to promote the use of electric vehicles in the existing regional/local transport systems of the ADRION area according to interregional common guidelines and to capitalize on experiences of already tested projects and actions by more advanced EU States.

To ensure operative results in a wider territory, the EnerMOB project involves partners from 5 ADRION States and the partnership is constituted by operative authorities that are concretely able to operate on regional planning as well as on building of small-scale investments for transport. The EnerMOB project is implemented by local and regional authorities in Greece, Italy, Slovenia, Serbia and Croatia, aiming at the creation of small-scale investments and pilot tests of interconnections between different cities using electric vehicles.

As main overall objective, EnerMOB project aimed to implement “Interregional Electromobility Networks” connecting Adriatic-Ionian regions at transnational level using common standards. This overall project objective is structured through 3 specific objectives.

- To define common guidelines to implement electromobility systems according to same technical standards and communication protocols.
- To implement joint strategies for mobility and urban planning of electromobility systems in the framework of existing regional transport networks.
- To implement regional “Small-Scale Infrastructure Network” allowing interurban electric transport displacement between cities, rural areas and intermodal terminals.

The EnerMOB project was divided into five work packages, within which numerous activities were carried out. The main outputs of the project are:

### 1. Pilot “Interregional Electromobility Network”

Establishment of Adriatic-Ionian “Interregional Electromobility Network”, constituted by pilot regional “Small-Scale Infrastructure Networks” developed by partners in the project, that are connecting cities, rural areas, and intermodal terminals at transnational and interurban level.

### 2. “Small-Scale Infrastructure Network” Long-Term Strategy

Long-Term Strategies are an upgrade to previous project output “Small-Scale Infrastructure Network Action Plan”. Strategies were upgraded on the basis of testing results of pilot actions, by including new interventions and mitigation measures on transport and energy issues. This output aims to enforce Interregional electromobility networks.

### 3. Transnational Cooperation Network for Interregional Electromobility in Adriatic Area

Through a Memorandum of Understanding signed by EnerMOB partners and open to public and private stakeholders, an open transnational cooperation network will be established at the end of project which aims to promote electromobility in ADRION area and to transfer and capitalize results with other partners and external regions. Signatories will commit to promote open electromobility without territorial restrictions and transfer experiences to other regions and institutions.



## EnerMOB project in a nutshell

EnerMOB is part of the Adriatic-Ionian programme INTERREG V-B Transnational 2014-2020, better known as ADRION which is one of the instruments dedicated to the implementation of the EU Cohesion Policy. ADRION is a European transnational programme that aims to act as a policy driver and governance innovator for the benefit of more than 70 million people in the Adriatic and Ionian region.

Project Start - End Date: 01-01-2018 - 31-12-2021

EnerMOB involves 6 partners from 5 ADRION States:

- Free Municipal Consortium of Ragusa, ITALY (lead partner)
- Region of Peloponnese, GREECE (partner)
- Regional Development Agency of Northern Primorska Ltd. Nova Gorica, SLOVENIA (partner),
- County of Primorje and Gorski Kotar, CROATIA (partner)
- Regional economic development agency for Sumadija and Pomoravlje, SERBIA (partner)
- City of Kragujevac, SERBIA (associated partner)

Target groups of the EnerMOB project are local, regional and national authorities, providers of infrastructure and (public) services, agencies, universities, companies and international organizations.

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## 3 Importance of Interregional Electromobility Networks and common standards for electric systems

In the EU, the recharging infrastructure development is scattered and mainly coordinated at regional level. Individual EU Member States formulate targets and incentivise the deployment of charging infrastructure in accordance with Directive 2014/94/EU (Alternative Fuels Infrastructure Directive [AFID]). There are no explicit targets at EU level, but rather a multitude of supporting measures. As a result, most charging stations currently exist only in urban areas in Western European countries. An EU-wide network of fast chargers along the main motorways across the continent does currently not exist.

In addition to simply the lack of stations, there are different standards concerning the connector and rated power needed on the charger and vehicle side, as well as the payment method. As a result, the business case for deploying a network of charging stations becomes even more challenging, because either all standards are accounted for or the operator risks narrowing the potential customer base to only those that have the matching connector. Standardisation of charging equipment can solve this issue and an EU-wide approach can help accelerate both the establishment of recharging infrastructure and the production of Electric Vehicles (EV).

Thus, differently to vehicles with combustion engines, a **BEV cannot cross over to different EU States because of a lack of extended number of charging infrastructures having common charging standards.**

Currently, with exception of the agreements of some multinational enterprises operating in Northern and Western EU Countries, in all EU territory EV charging services' providers use different communication protocols that do not interact between themselves. Such criticality generates a **limitation for medium/long range trips with BEVs**, because a driver cannot supply its electric vehicle from different charging points managed by different providers.

Interregional Electromobility Networks and common standards for electric systems are of huge importance since **the transition to low carbon transport** is one of the key targets of the EU current energy and climate policies. The EU set the target that by 2050, emissions from transport (excluding international waterborne transport) must be 60% lower than they were in 1990 and the EU must firmly be on the path towards full decarbonisation.



# 4 Contributions from partners

## 4.1 ITALY (Free Municipal Consortium of Ragusa)

In the field of electromobility infrastructure and services The Province of Ragusa operates in accordance with the General strategy for the development of electric mobility in the province of Ragusa, of which the main objective is to strengthen and extend the provincial network of infrastructures and electric mobility services to improve the tourist accessibility in the connections between attraction sites, urban centres and transport hubs.

As part of the EnerMOB project, the pilot action developed by the Free Municipal Consortium of Ragusa was focused on the testing of a first functional lot of the local electromobility network. The project was developed that consists of following small-scale investments.

- The supply, installation, connection, activation, maintenance and management of **4 public charging Infrastructures** with standard “accelerated” power. Each charging infrastructure must consist of 2 charging points with maximum power provided by each socket not less than 22 kW and must be accessible to public 24 hours a day, 7 days a week, 365 days a year, for the period of 8 years.
- The supply, installation, connection, activation and maintenance of **2 charging infrastructures for the benefit of the Public Body fleet**, of “slow” standard power. Each charging infrastructure must consist of 1 charging point with a standard power of 7,4 kW and must be accessible to the Public Body fleet 24 hours a day, 7 days a week, 365 days a year, for the period of 8 years.

- The supply and activation of an **ICT platform** consisting of a data acquisition and remote control system to allow the monitoring of data by the Public Body during the service management by the successful economic tenderer (for the units reserved for the Public Body and those accessible to the public). The web service, including technical support for the management and maintenance of the recharging points, must be available for a period of 8 years and will reside near the economic tenderer available infrastructures.
- A flat-type charging service for **the supply of 15.000 kWh for the electric vehicles of the Public Body fleet**, to be used within the 8-years contract period.

The Free Municipal Consortium of Ragusa thought it necessary to give priority to the installation of the recharging infrastructures accessible to the public in urban parking areas and / or near the schools of the main provincial urban areas.

Therefore, to implement the pilot action of the EnerMOB project within the provincial network of infrastructures and electromobility services, a first group of charging infrastructures has been planned that can also be useful for the commuter journeys from home to school and home to work along interurban routes.

This local network scheme involves the installation of 4 recharging infrastructures accessible to the public in sites equidistant about 30-50 km from each other and located in the urban centres of Ragusa (Parking adjacent to the “Enrico Fermi” Scientific High School), Vittoria (Parking adjacent to the “G. Mazzini” Higher Education Institute), Modica (Parking adjacent to the “G. Galilei” Scientific High School) and Pozzallo (rest areas along via Aristodemo located near the “G. La Pira “ Higher Education Institute).



Figure 2: Project area identified for the installation / Layout of parking bays and charging infrastructure (Modica)

As for the 2 charging infrastructures at the service of the Free Municipal Consortium of Ragusa fleet, reserved for the electric vehicles use by the Public Body internal staff, the parking areas identified for their

installation are parking area inside the branch office “Ex IPAI” of Free Municipal Consortium of Ragusa, and parking area inside the branch office “Viale Europa”, both located in Ragusa.

## 4.2 GREECE (Region of Peloponnese)

In the framework of the EnerMOB project The Region of Peloponnese deployed a small-scale network of EV charging infrastructure, consisting of three charging stations and leased a BEV that is used by the personnel of the Regional Authority to test and assess its capability to serve the mobility/transport needs of the Regional Authority and the ability of the regional EV charging network to efficiently support the needs of EV users.

Three AC charging stations have been installed and are operating in Tripoli (2 Ethnarchou Makariou Square), Kalamata (Psarron and Damofontos Street) and in the Isthmus of Corinth (on the Old Athens-Corinth National Road 200, meters after the bridge). The charging stations are of dual output, with a maximum output power of 2 x 22 kW, and are the first step in the development of a regional network of electric infrastructure in the Peloponnese.



Figure 3: Charging stations in Tripoli, Kalamata and in the Isthmus of Corinth

The use of the new charging stations during the pilot operation of the Regional Electricity Network is free for all users of electric cars and owners of electric cars moving in the Peloponnese region.

Furthermore, in order to test the regional “Small-Scale Infrastructure Network”, the Region leased a BEV and performed assessment of the use of EV charging infrastructure on the basis of:

- data collected through the ICT platform to which the 3 EV charging stations are connected to (in order to monitor and manage their operation) and
- data collected dynamically via a data logger installed by the evaluator in the leased BEV.

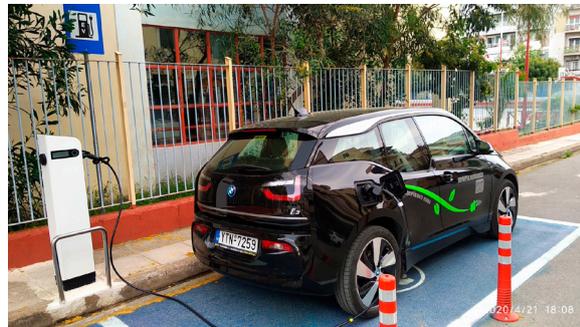


Figure 4: BEV used by The Region of Peloponnese

The evaluation proved that the network can satisfactorily support intra-regional movements with electric vehicles between the cities of the region without problems, involving autonomy stress with one electric car with average battery capacity, like the car used for the purposes of the project by the Peloponnese Region.

### 4.3 SLOVENIA (Regional Development Agency of Northern Primorska Ltd. Nova Gorica)

The current charging infrastructure in Slovenia is based on 31 fast public charging stations on the Slovene motorway network and over 400 public charging stations in settlements. The charging infrastructure for high-capacity charging stations will spread to poorly covered areas, where coverage is not optimal with regard to the number of electric vehicles. The installation of public charging stations in municipal centres and major cities in Slovenia and the charging stations for multi-dwelling buildings in private use is encouraged.

In Goriška region 31 public charging stations were available before Northern Primorska RDA in the framework of the EnerMOB project installed a **small-scale network of EV charging infrastructure, consisting of 2 AC charging stations (2 x 22 kW AC)**. The two AC charging stations have been installed and are operating in attractive locations in Goriška Region.

ed in the parking area of Castle Dobrovo, which is frequently visited by the numerous tourists and citizens. Municipality of Brda is highly attractive and has many visitors throughout the whole year.



Figure 5: Charging point at Municipality of Renče - Vogrsko

The first charging station is located on the main square in Municipality of Renče - Vogrsko, where it is visible and accessible to the public. The main square is visited by all the inhabitants of Municipality of Renče - Vogrsko, as in the square there are several objects such as a church, grocery store, pub.

The second charging station is operating in Dobrovo in Municipality of Brda. The charging station is locat-



Figure 6: Charging point at Municipality Brda, Dobrovo

Both charging stations offer free charging to the public, 24 hours a day, 7 days a week, 365 days a year. With installation of two charging stations under EnerMOB project there are now 33 publicly available charging stations in the Goriška region.

For the testing phase and assessment of the regional “Small-Scale Infrastructure Network” in the region, electric vehicle VW e-Up was rented and branded with the design created within the EnerMOB project. Testing was performed from 15th of September to 15th of December 2020. Employees of the Northern Primorska RDA drove predefined routes in the County. Routes for testing as well as driving conditions for testing purposes have been agreed with external experts and the purpose was to test the newly installed electromobility infrastructure.



Figure 7: Vehicle rented by of Northern Primorska RDA

During the testing phase of the pilot action each partner used a set of ICT tools to collect, validate and commit the locally collected data for integration.

#### 4.4 CROATIA (County of Primorje and Gorski Kotar)

In the Republic of Croatia, the current situation in relation to electromobility includes about 1.500 electric vehicles and 400 publicly available charging stations, according to which Croatia is currently far from EU standards of electromobility, but things are changing rapidly, the network of charging stations is expanding, and electric cars are becoming a part of everyday life.

As part of the EnerMOB project, small-scale electromobility network was developed in the form of 3 AC charging stations (2 x 22 kW AC) for electric vehicles. **Three AC charging stations have been installed and are operating** in attractive tourist and traffic locations in Rijeka International Airport, Municipality of Fužine and in the port Melak on Island Rab.

All three charging stations can be used 24 hours a day, 7 days a week and are free for all the users. It is only necessary to connect with the appropriate cable (connector).

Within the project The County of Primorje and Gorski Kotar also carried out **testing of the existing and newly installed infrastructure for electromobility in the County** with electric vehicle Volkswagen e-UP. Testing was conducted during the tourist season, when there is the greatest demand for this type of service.

Installation of charging stations for electric vehicles has created conditions for greater use of electric vehicles in the County of Primorje and Gorski Kotar, which leads to a reduction in carbon dioxide emissions generated in road transport, increased energy efficiency and reduced dependence on other energy sources.

With the implementation of the EnerMOB project, the County is more accessible and enables greater mobility of the local population and visitors.



Figure 8: Charging points in Municipality of Fužine, the Rijeka International Airport and in Rab, Port Melak

## 4.5 SERBIA (Regional Economic Development Agency for Sumadija and Pomoravlje, City of Kragujevac)

Republic of Serbia is at the very beginning in the process of “electrification” of road transport. At this moment, very few EVs (about 200 pieces) and HEVs (about 3.500 pieces) have been registered. The fact that the interest in vehicles on these types of powerdrives is growing is also shown by the fact that only during 2020, that number increased by more than 50 percent.

Apart from the relatively high price of electric cars and the low standard in Serbia, the one of the reasons of slow “electrification” of vehicles in Serbia is undeveloped infrastructure of chargers in cities and on the road network. The EVs “on road” charger network in the Republic of Serbia for the last year consists of 12 fast chargers.

There are currently 200 public chargers in Serbia. They were installed in public parking garages and parking lots of major cities, shopping malls, hotels, private companies. The situation is similar in Kragujevac with insignificant number of registered EVs and undeveloped infrastructure of chargers. There are currently about 15 public chargers in Kragujevac.

Charging services for EVs and electricity are currently free of charge, which is a significant limitation to expanding the network and involving other stakeholders in investing in this area.

In framework of the EnerMOB project **REDASP procured and installed a private, facade electrical vehicle charger**, Model: ABB Wallbox AC charger, Type: EVLunic\_B+\_W22-T-K-0. This is Slow-Charging Point from a private socket-outlet with an in-cable protection device (Type 2).

The charger is connected to three-phase electric power (AC) and has a maximum power up to 22 kW. It

is installed on the external wall of the business premises, at the height of the ground approx. 1.5 m. The use of private, facade electrical vehicle charger during the pilot operation of the Regional Electricity Network will be free for all owners and drivers of electric cars in the territory of the City of Kragujevac.

REDASP also implemented an open tender procedure for procurement and installation of private, facade electrical vehicle charger (integrated tender procedure for procurement and installation of chargers and development of necessary project documentation).

City of Kragujevac, associated partner in the EnerMOB project, also installed two chargers in the public parking garage. Chargers were also installed in shopping mall (5 pieces), hotel (1 piece), private companies, car dealers and services (6 pieces).

Within the project REDASP rented a Full Electric Vehicle, M1 category - Volkswagen e-Golf 100 kW, for a period of 18 months. Based on the project visibility guidelines the vehicle was branded with the design created within the EnerMOB project. After that period REDASP rented another Full Electric Vehicle, M1 category - Nissan Leaf, for a period of 2 months.

Vehicles were rented for the purpose of comparative tests of maximum ranges to tourist destinations. Based on testing results of pilot actions, the “Small-Scale Infrastructure Network” Action Plan in “Small-Scale Infrastructure Network” Long-Term Strategy for territory of Republic of Serbia was upgraded. We believe that “Small-Scale Infrastructure Network” Long-Term Strategy will contribute to the development of tourism in Serbia.



Figure 9: Facade electrical vehicle charger

# MAIN PROJECT INFORMATION

Project acronym	EnerMOB
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website	<a href="https://enermob.adrioninterreg.eu">https://enermob.adrioninterreg.eu</a>

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## PARTNERSHIP



Free Municipal Consortium  
of Ragusa - LP



Ελληνική Δημοκρατία  
Περιφέρεια Πελοποννήσου

Region of Peloponnese - PP2



RRA severne Primorske  
Regijska razvojna agencija d.o.o. Nova Gorica

RDA of Northern Primorska  
Ltd. Nova Gorica - PP3



County of Primorje  
and Gorski Kotar - PP4



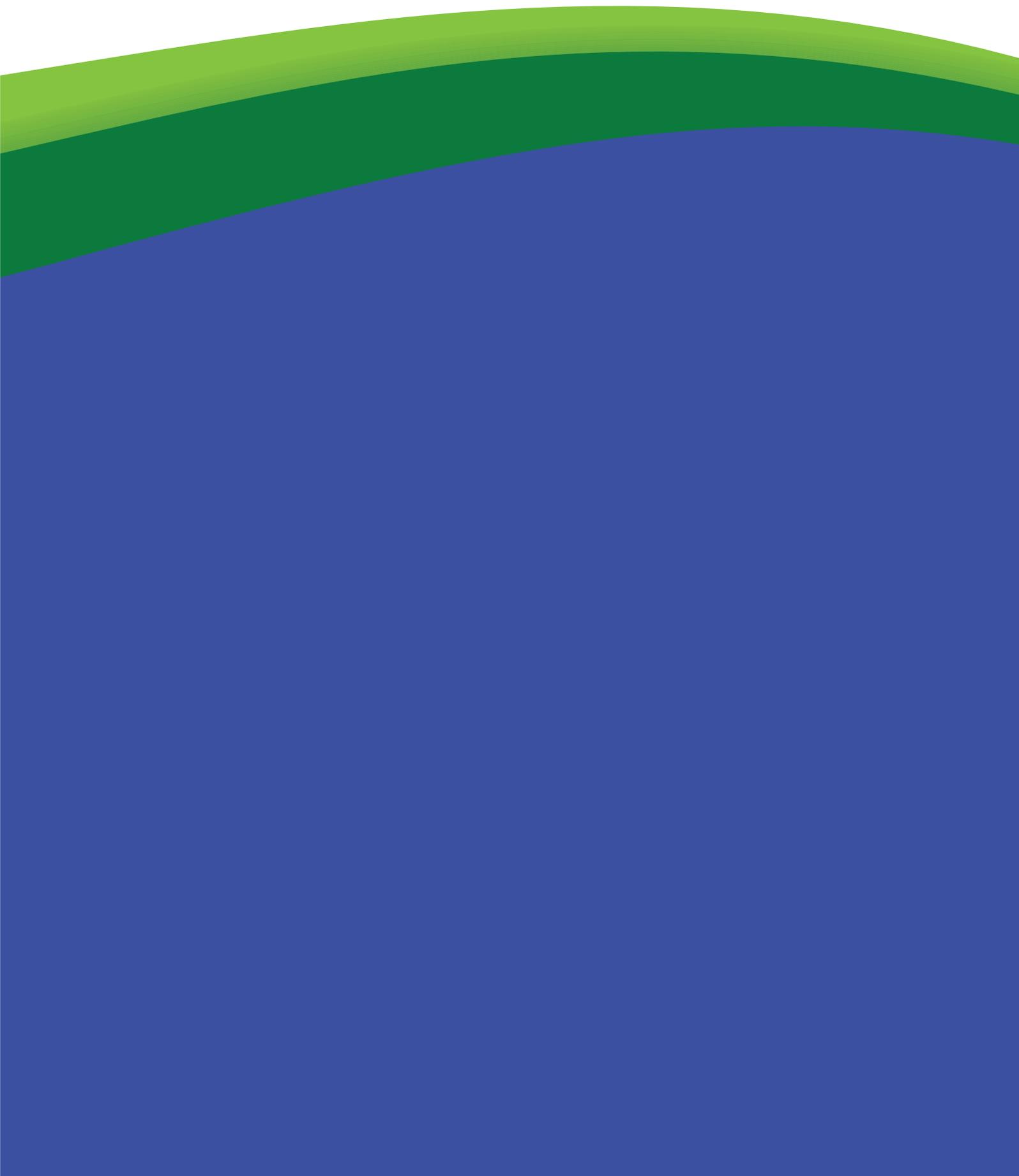
Regional economic development  
agency for Sumadija and  
Pomoravlje - PP5

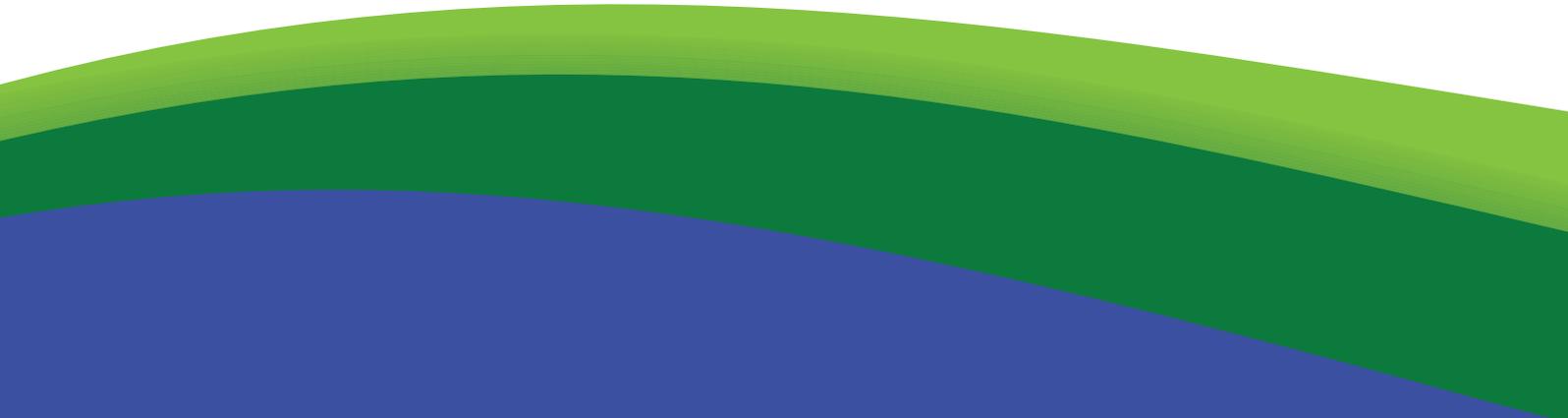


City of Kragujevac - PP6  
(associate partner)

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