



Workshop

Sustainable transport

The Road to Success - e-mobility in Primorje-Gorski Kotar County



Assist. Prof. Vedran Kirincic, PhD

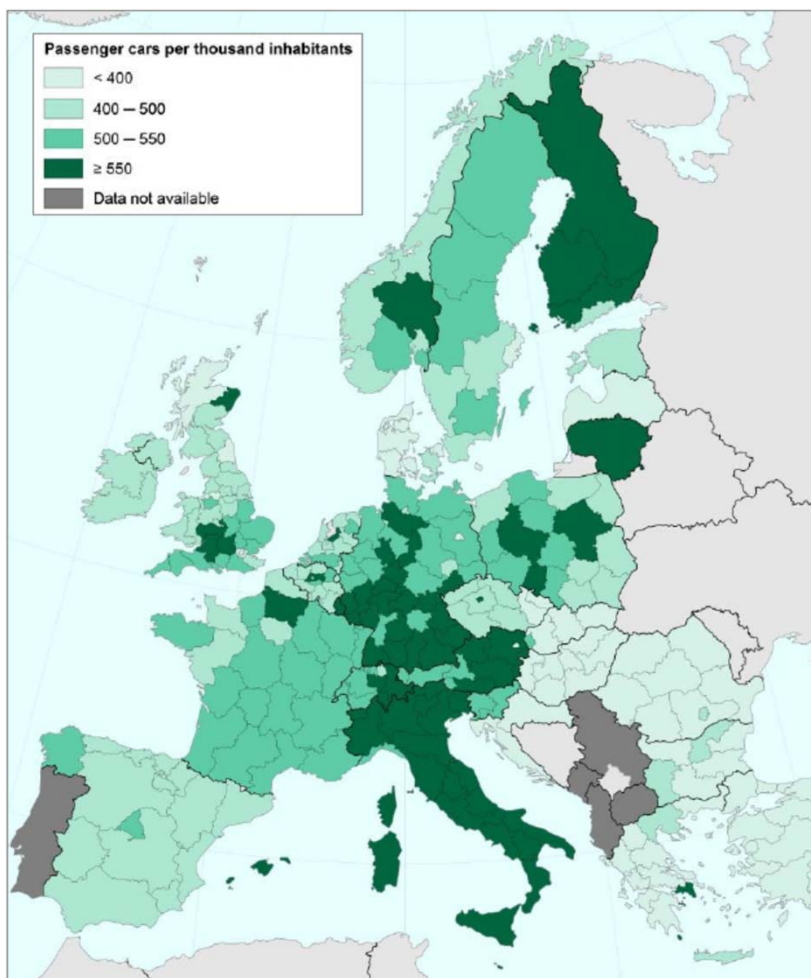
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Where are we?



Number of passenger vehicles per 1k people in NUTS2 regions, 2013

2017: HR 358, EU average 497; PGZ >550

Source: Eurostat, [Transport Development Strategy of the Republic of Croatia \(2017-2030\)](#)

Primorje-Gorski Kotar County



Primorje-Gorski Kotar County – charging infrastructure



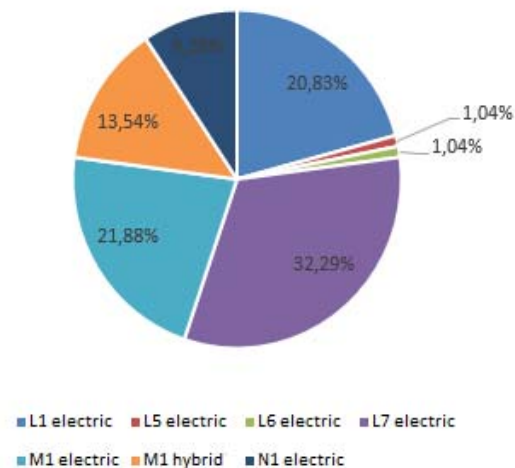
Source: ZE Mobility

	Primorje-Gorski Kotar County
Area (km ²)	3.588
Population (2011)	296.195
Density (/km ²)	83
Charging stations	60+
EV and PHEV	~500

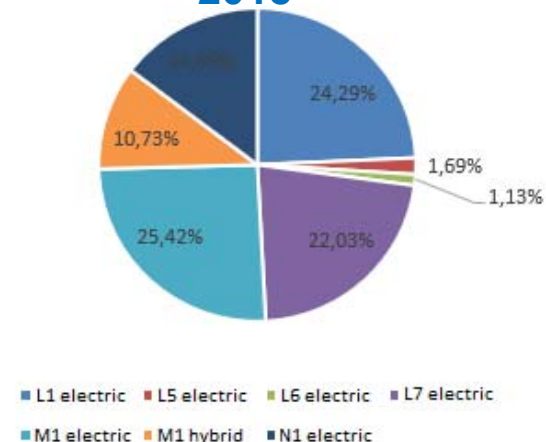
Electric and Hybrid Vehicles in the County of Primorje-Gorski Kotar in 2017 and 2018

Category and description	Type	Year 2017		Year 2018		Change 2018/2017	
		Vehicle number	Category share	Vehicle number	Category share	Relative	Absolute
L1 - A two-wheeled light motor vehicle	Electricity	20	20.83%	43	24.29%	115.00%	23
L5 - Motor tricycle	Electricity	1	1.04%	3	1.69%	200.00%	2
L6 - Light quad bike	Electricity	1	1.04%	2	1.13%	100.00%	1
L7 - Heavy quadricycles	Electricity	31	32.29%	39	22.03%	25.81%	8
M1 - Motor vehicles intended for the carriage of passengers with a maximum of eight seats in addition to the driver's seat	Electricity	21	21.88%	45	25.42%	114.29%	24
M1 - Motor vehicles intended for the carriage of passengers with a maximum of eight seats in addition to the driver's seat	Hybrid vehicle with external charge	13	13.54%	19	10.73%	46.15%	6
N1 - Motor vehicles intended for the carriage of goods with a maximum mass not exceeding 3,5 tonnes.	Electricity	9	9.38%	26	14.69%	188.89%	17
Total		96	100.00%	177	100.00%	84.38%	81

2017



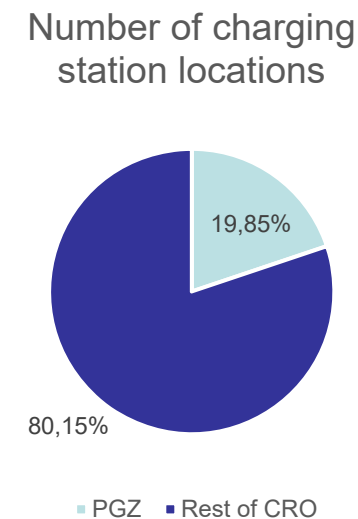
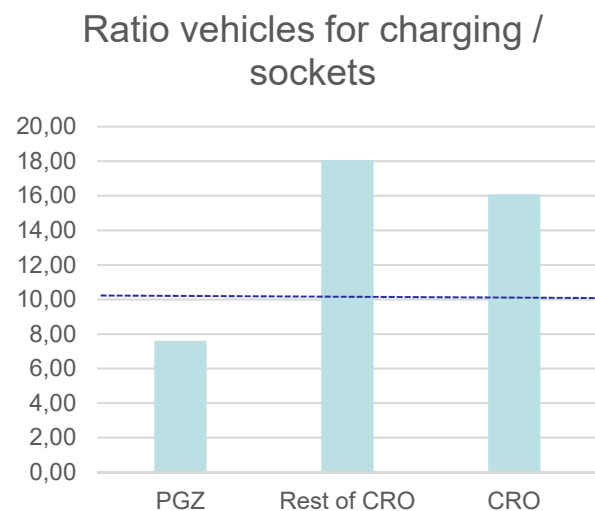
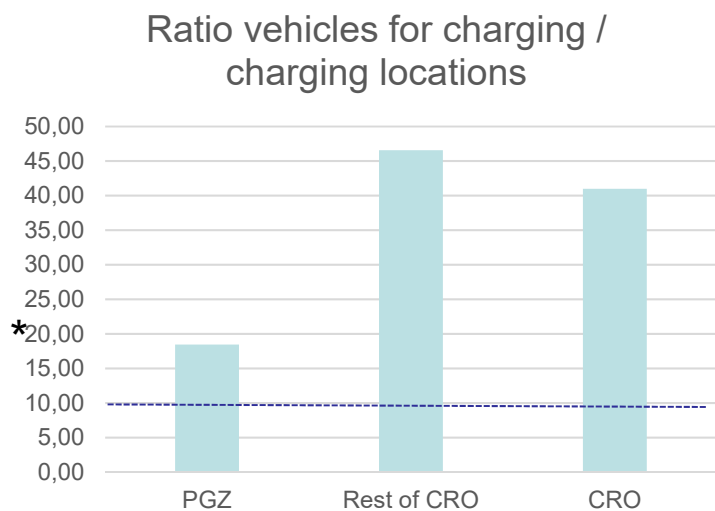
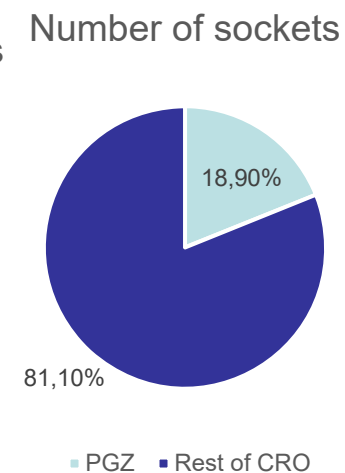
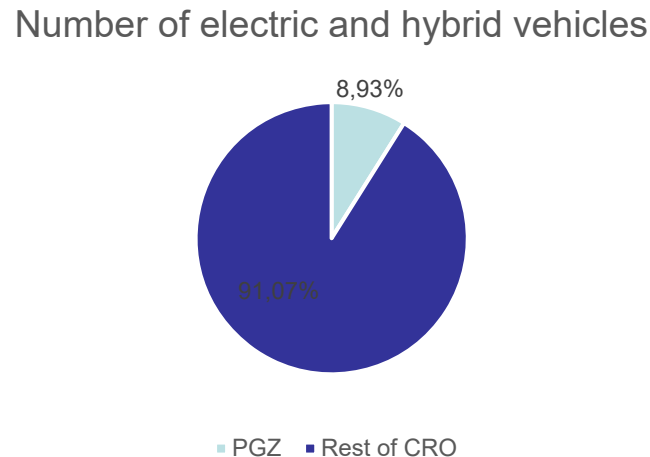
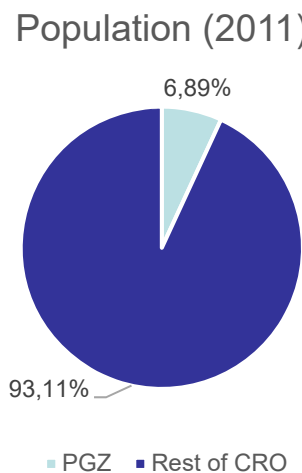
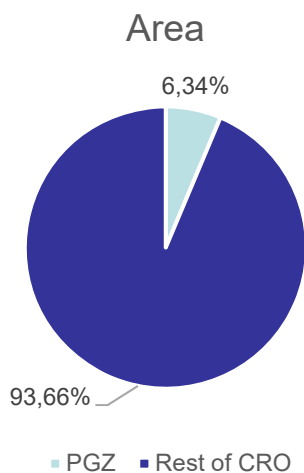
2018



Source: Center for Vehicles of Croatia (CVH)

The Environmental Protection and Energy Efficiency Fund (eng. EPEEP, cro. FZOEU) 2014-2019 (national figures): financial support of 14.6 M euro for 3.530 vehicles

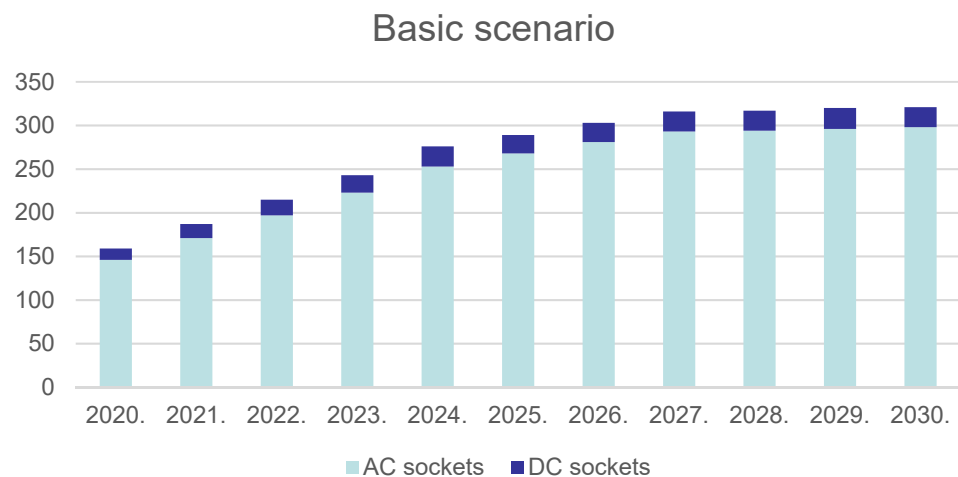
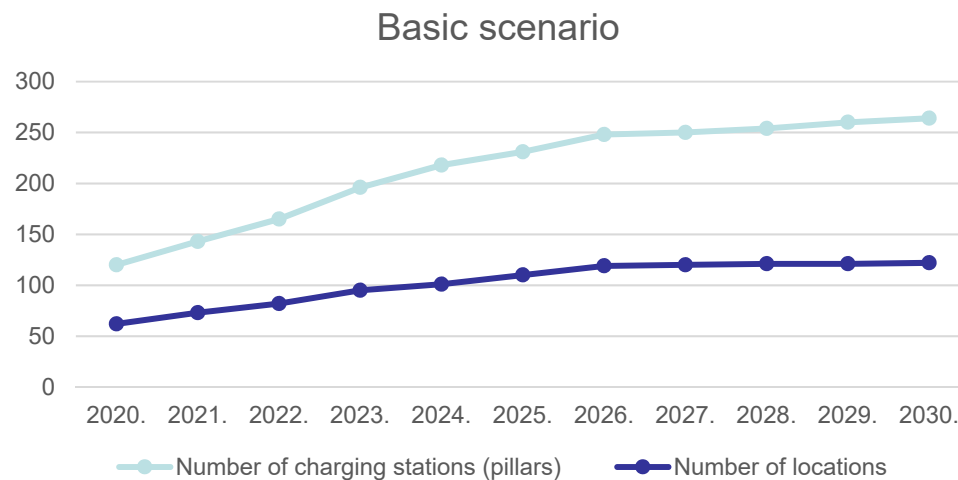
Primorje-Gorski Kotar County vs rest of Croatia



* The EU's Directive on Alternative Fuel Infrastructure – DAFI, 2014.

Primorje-Gorski Kotar County projections

Primorje and Gorski Kotar county	Parameter	2020	2025	2030
Basic scenario	AC sockets	146	268	298
	DC sockets	13	21	23
	Total sockets	159	289	321
	Number of charging stations (pillars)	120	231	264
	Number of locations	62	110	122
Moderate scenario	AC sockets	206	330	348
	DC sockets	27	44	46
	Total sockets	233	374	394
	Number of charging stations (pillars)	180	299	323
	Number of locations	92	126	134
Dynamic scenario	AC sockets	263	402	403
	DC sockets	35	46	54
	Total sockets	298	447	457
	Number of charging stations (pillars)	226	361	375
	Number of locations	116	126	164



EnerMOB - Interregional Electromobility Networks for intERurban low carbon MOBility



The project budget: 1,222,513.63 EUR
 PGZ budget: EUR 222,745.17



Transnational Cooperation Network for Interregional Electromobility in Adriatic Area (1 Memorandum of Understanding)	Main Project Output
“Small-scale Infrastructure Network” Action Plans (5 units planned – one per partner)	Other Main Outputs
Pilot “Interregional Electromobility Network” (1 unit planned)	
“Small-scale Infrastructure Network” Long-Term Strategies (5 units planned – one per partner)	
Local Small-scale Infrastructure Networks (5 units planned – one per partner)	Aim of small-scale investments
Full Electric Vehicles to be used by all the partners for the testing phase of pilot actions (8 units planned)	Small-scale investments
Charging points to provide electric energy to FEVs (16 units planned)	
Predispositions to connect photovoltaic plants to charging point (4 units planned only for LP)	
ICT tools for remote control of charging services using common communication protocols in all participating regions (1 + 5 units planned)	

EnerMOB - Interregional Electromobility Networks for intERurban low carbon MOBility

Charging stations (2x22 kW AC) for electric vehicles have been developed in the framework of the EnerMOB project.

Three AC charging stations have been installed and are operating in attractive tourist and traffic locations in **Rijeka International Airport, Municipality of Fužine** and on **island Rab in the port Melak**.

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.



EnerNETMob - Mediterranean Interregional Electromobility Networks for intermodal and interurban low carbon transport systems



The Mediterranean program covers many regions and cities that do not have developed policies for sustainable mobility, and given the growing growth of electric cars at both European and national and regional levels, it is necessary to systematically develop long-term strategies. So far, small infrastructure networks have not been consolidated in the EU to allow further movement of battery-powered electric vehicles. The EnerNETMob project seeks to address the needs of these two challenges of a lack of charging infrastructure and common standards.

The overall goal of the project is to develop, test and promote sustainable electromobility plans, based on common standards of the electric transport system at the transnational level, by connecting a regional network of electric charging stations, in order to achieve greater mobility between cities and regions in the Mediterranean.

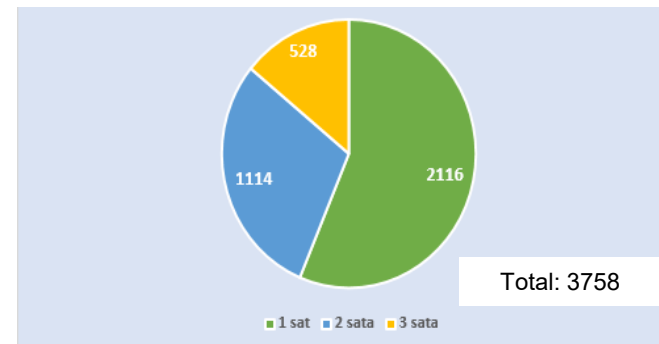
The project budget: 5,742,802.10 EUR
PGZ budget: 415,875.00 EUR



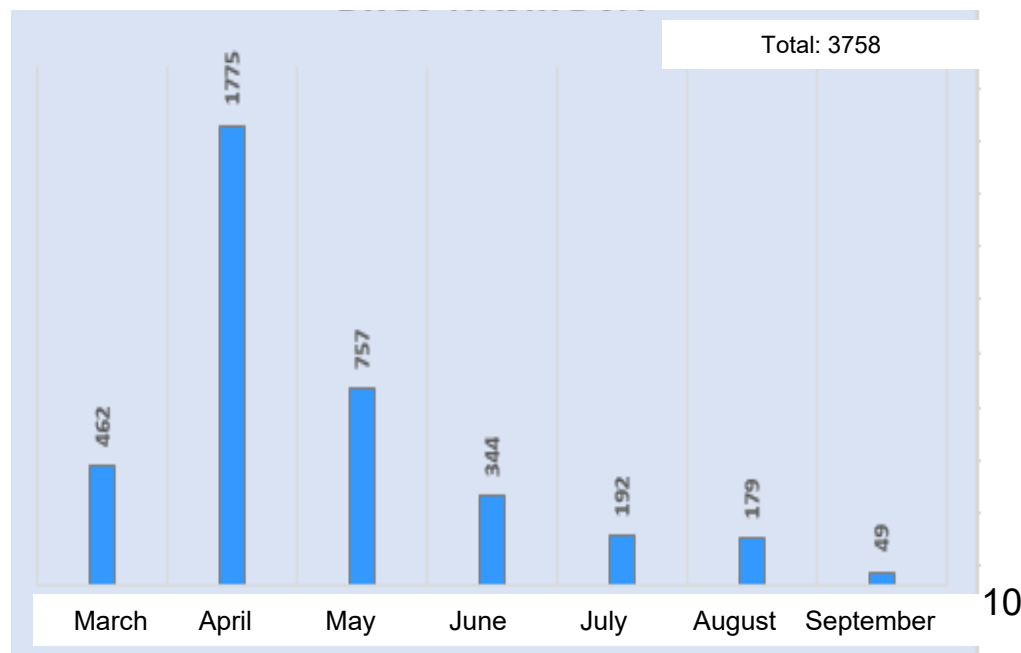
eBike-sharing system



Use of e-bikes by tariffs (hours)



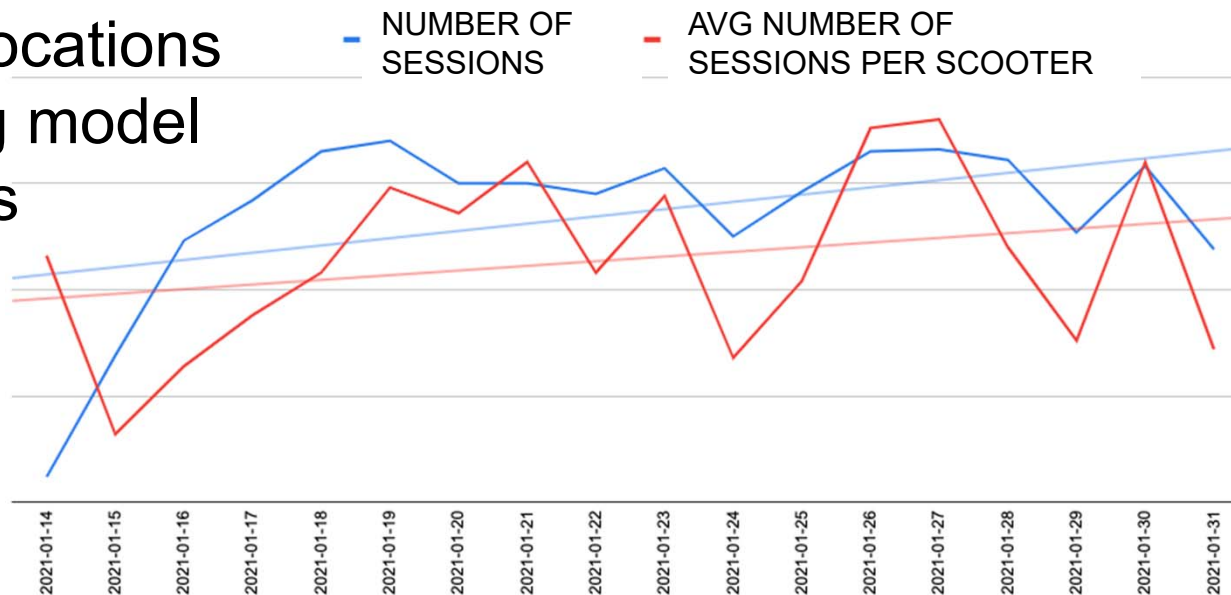
Number of sessions in 2020



Bolt electric scooter rentals



10 starting locations
 Free floating model
 200 scooters
 0,1 Eur/min



Krk in Europe

Munich 570 km

Wien 530 km

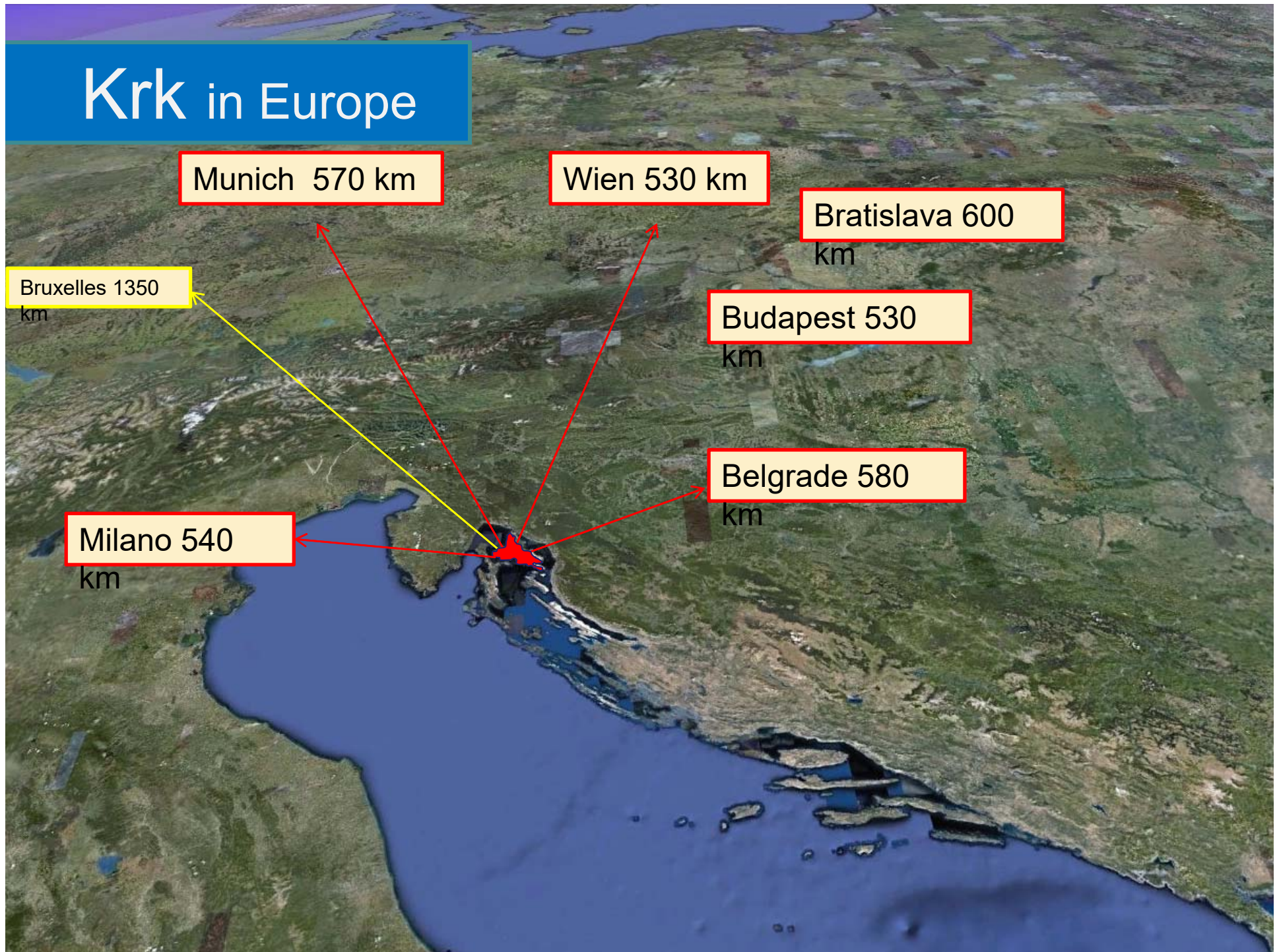
Bratislava 600 km

Bruxelles 1350 km

Budapest 530 km

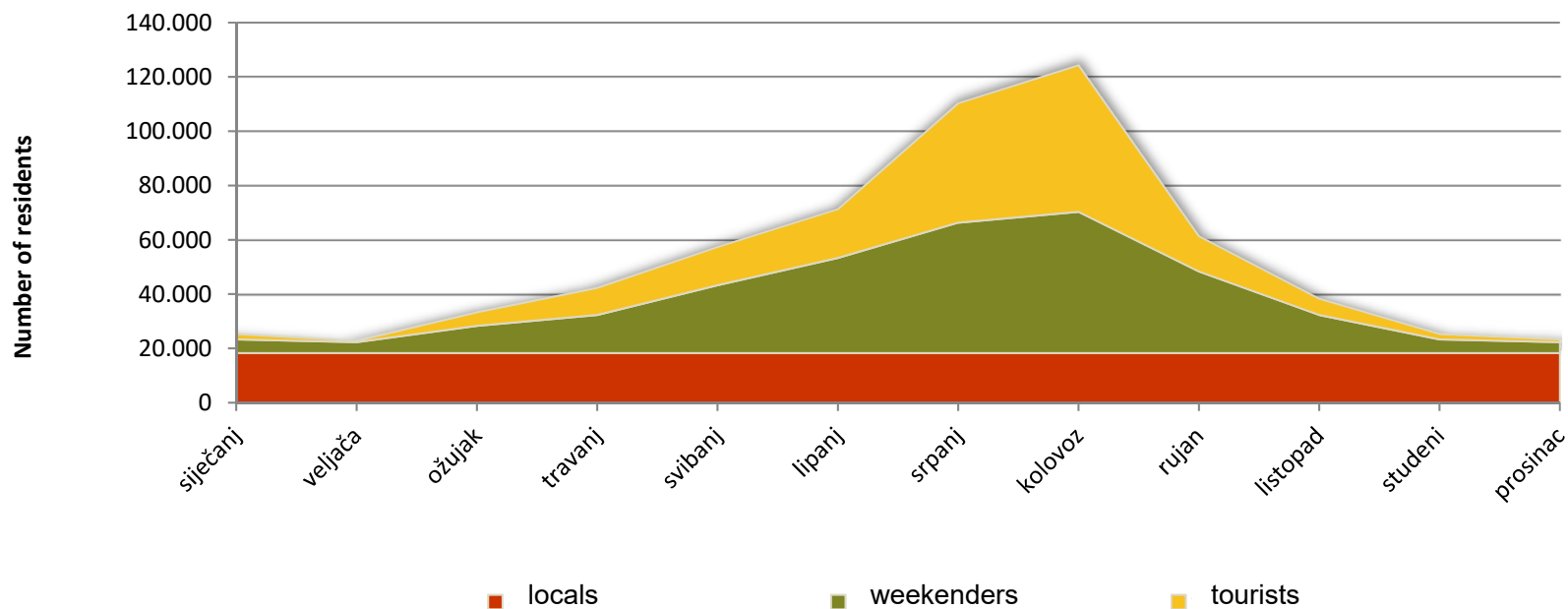
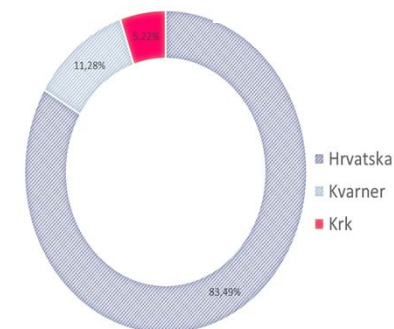
Belgrade 580 km

Milano 540 km



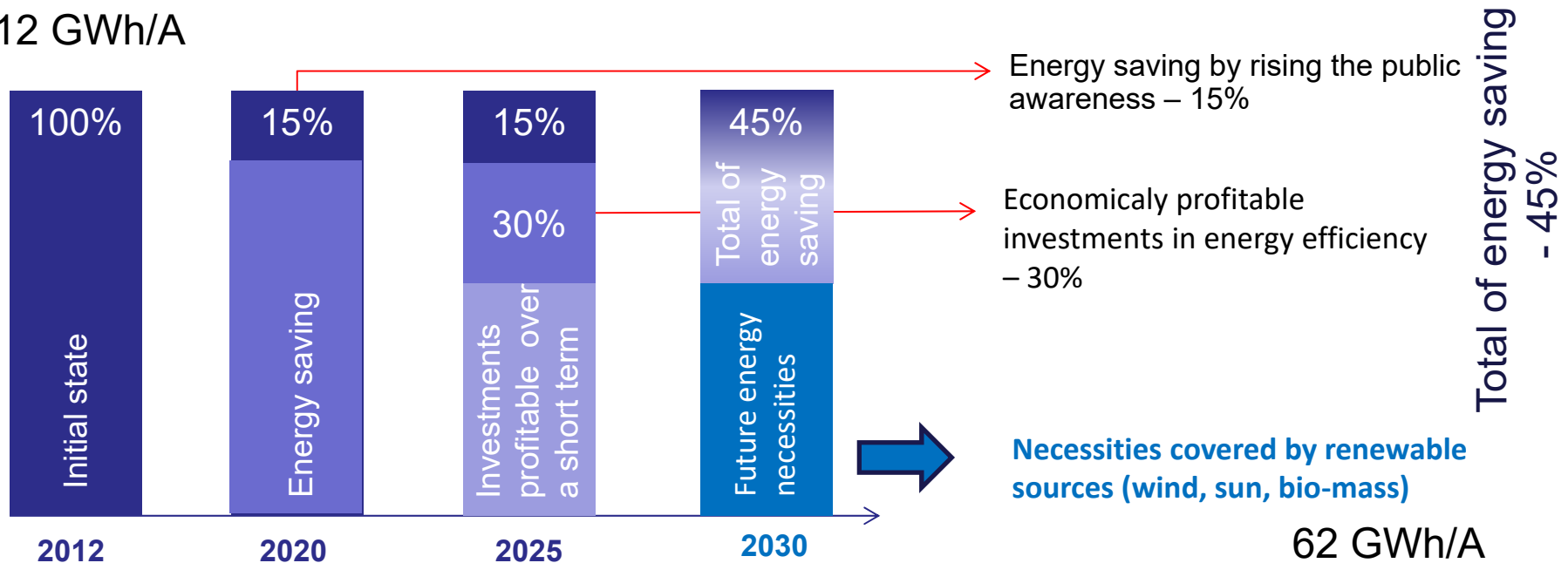
KRK in numbers

- ✓ **19,500 locals**
- ✓ **50,000 owners of weekend houses (weekenders) in top season**
- ✓ **52,000 registered nights in top season or 4 M annually**
- ✓ **30,000 objects, 10,000 used regularly, 20,000 occasionally**
- ✓ **Area 410 km², coastline 200 km**

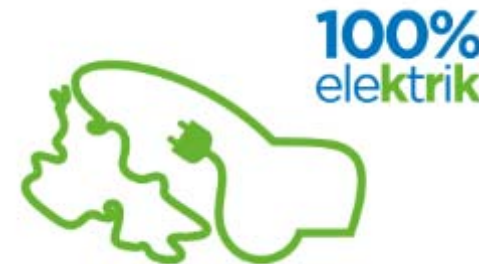


The island of Krk – 2030 strategic aims Steps towards zero GHG emissions

112 GWh/A



Source: “Interdisciplinary strategy of zero emissions for integrated development of the island of Krk”, igr AG, Ponikve Eko Otok Krk, Croatia, 2012.



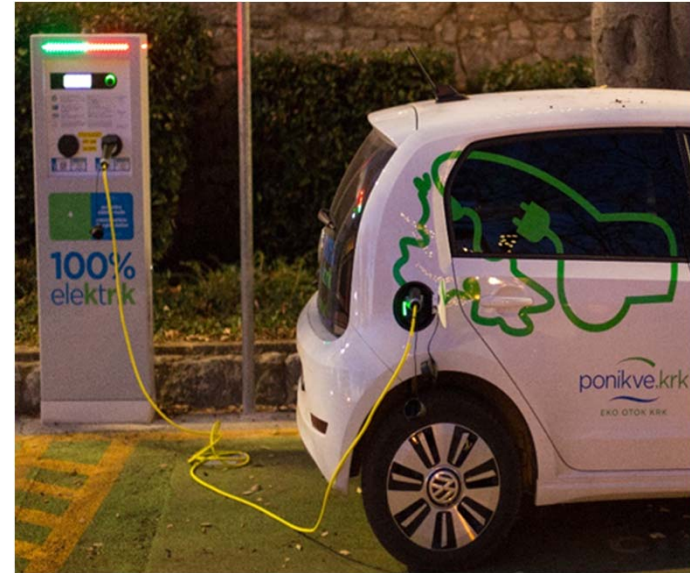
eMobility

ELECTRIC CHARGING STATIONS

- ✓ 12 charging stations (7 municipalities)
127.300 Euro, EPEEP fund: 64.200 Euro (40%)
2 x 22 kW
IEC 62196 Type2 Mode 3

ELECTRIC VEHICLES

- ✓ 10 electric vehicles 207.452 Euro,
EPEEP 88.346 Euro (30%)

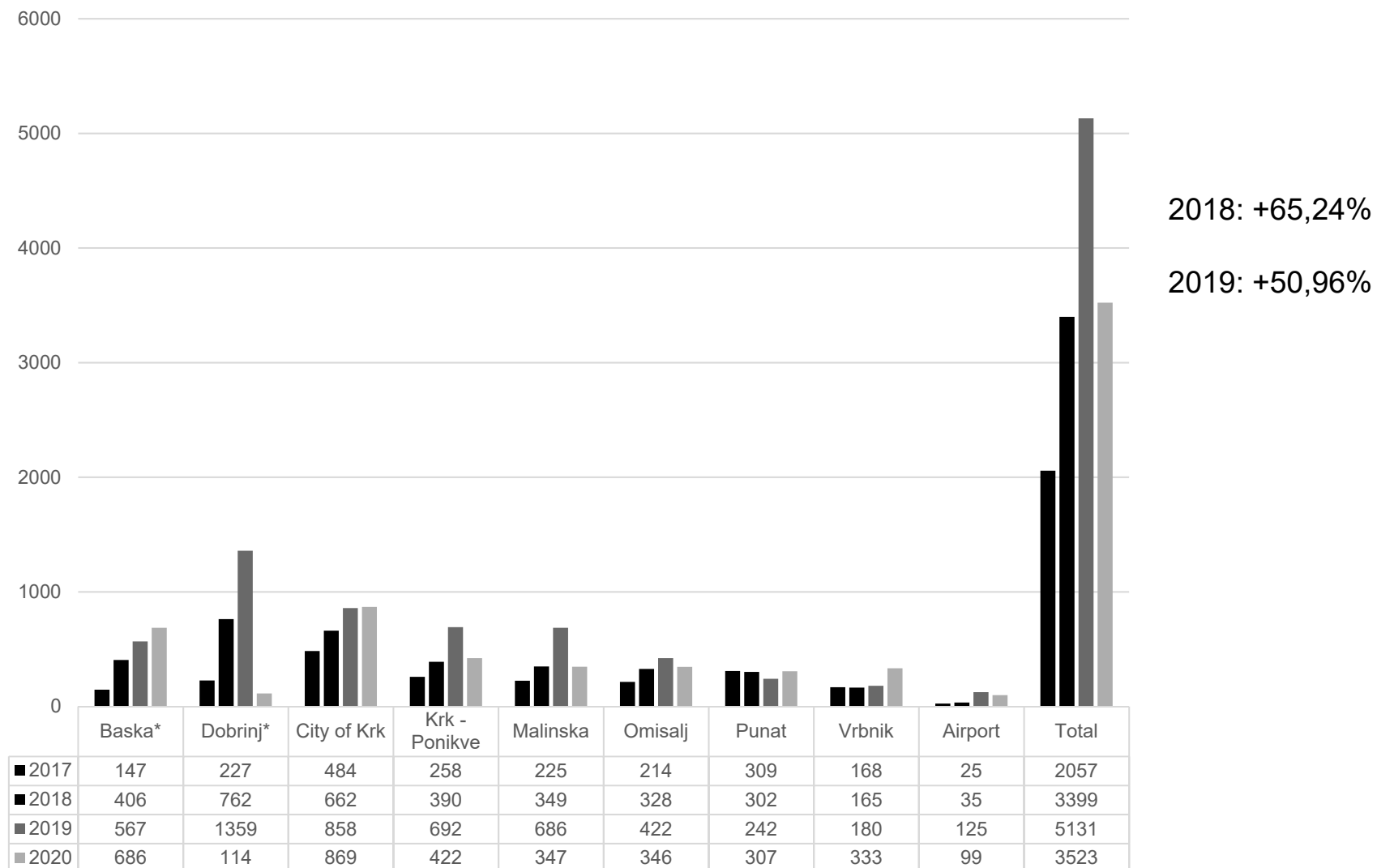


Charging stations on the island of Krk – no range anxiety!



Source: Main electrotechnical project for charging stations at the island of Krk, E.G.S.- ELEKTROGRADITELJSTVO d.o.o., 2016.

Number of charging sessions



Remarks:

2019: charging station in Silo (Dobrinj) was out operation for several months

2020: 1/1/2020-30/9/2020

Source: Ponikve Eko Otok Krk

Conversion of ICEV to EV



- Established conversion team for electric vehicles *E-mobile team Krk*
- Employees of Ponikve eko otok Krk and external experts
- Equipped auto mechanic workshop for conversion of vehicle
- EPEEP fund subvention of 7.544 Euro
- Conversion started in 2015, finished in 2016



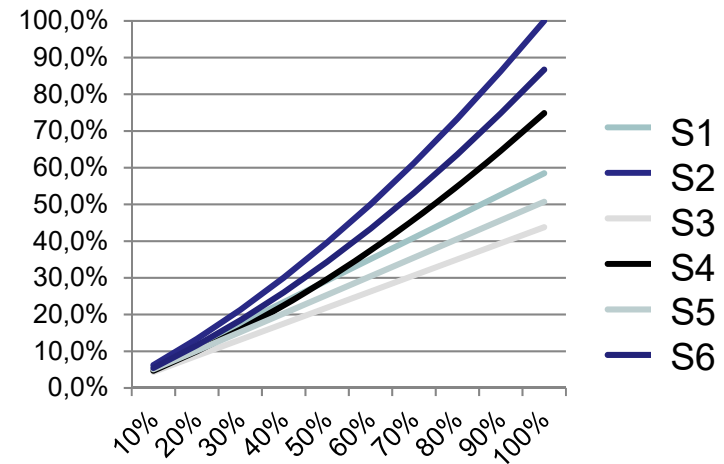
Analysis of the transport system of the island of Krk

- Top three categories contribute to CO₂ emissions (93.51% in total):

- M1 – small passenger vehicles (up to 8 passengers)
- N1 – transport vehicles ≤ 3500 kg
- N3 – transport vehicles >12000 kg

- Simulated scenarios:

- S1: EV 0-100 % in all categories, RES 0%
- S2: EV 0-100% in all categories, RES 0-100%
- S3: EV 0-100 % in the category M1, RES 0%
- S4: EV 0-100% in the category M1, RES 0-100%
- S5: EV 0-100 % in the categories M1 and N1, RES 0%
- S6: EV 0-100 % in the categories M1 and N1, RES 0-100%



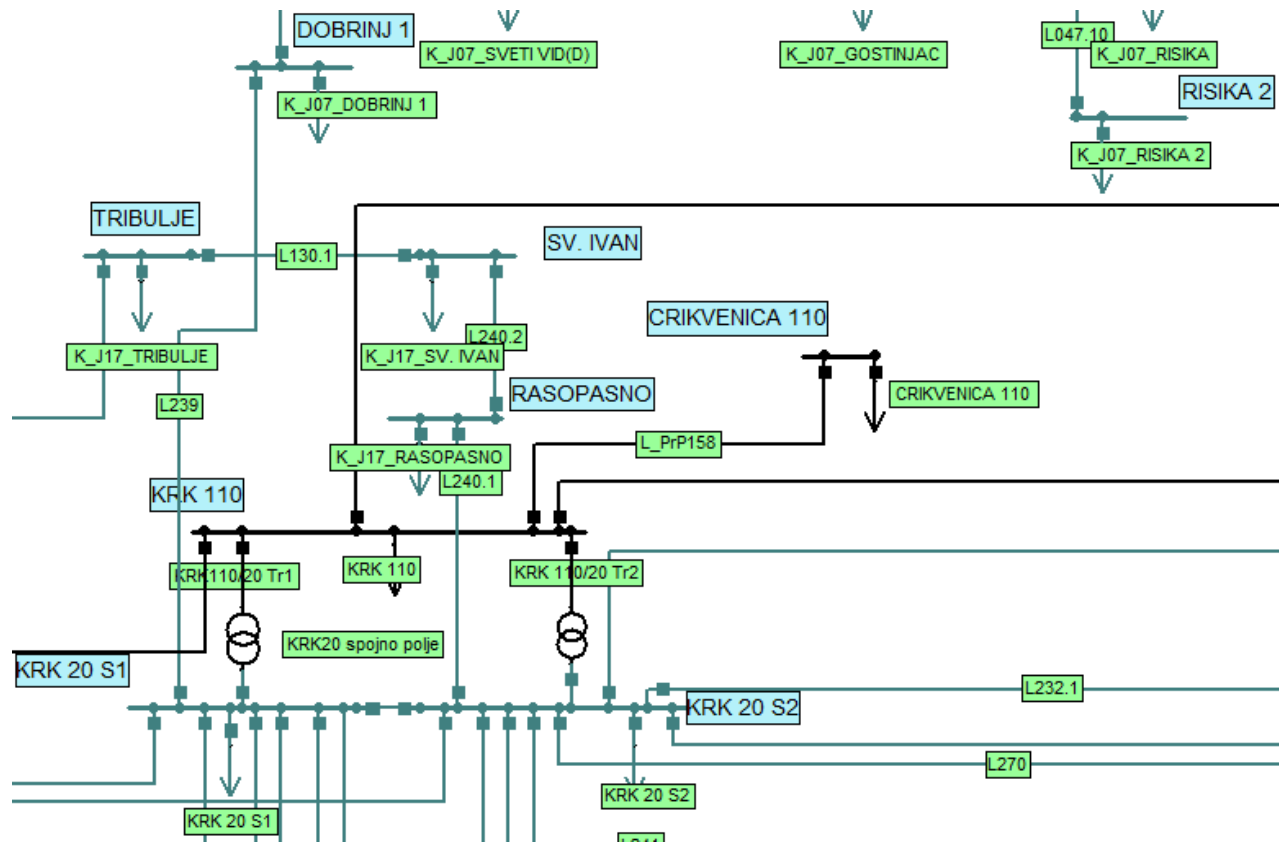
- Remarks:

- penetration of EV (S1, S3 and S5) saves CO₂, theoretically up to 58.5 % (S1)
- additional penetration of RES (S2, S4 and S6) saves CO₂, theoretically up to 100%
- S2 is not realistic in the short term period (technical and financial factors)
- more realistic scenarios for CO₂ savings: 74,9 % (S4) and 86.7 % (S6)

- Recommendations:

- penetration of EV in the categories M1 and N1 (numerous models, standard infrastructure, funding);
- penetration of RES – PV systems, WPP – generation of EE for local consumption

The mathematical model of the island of Krk power system – Smart Grid

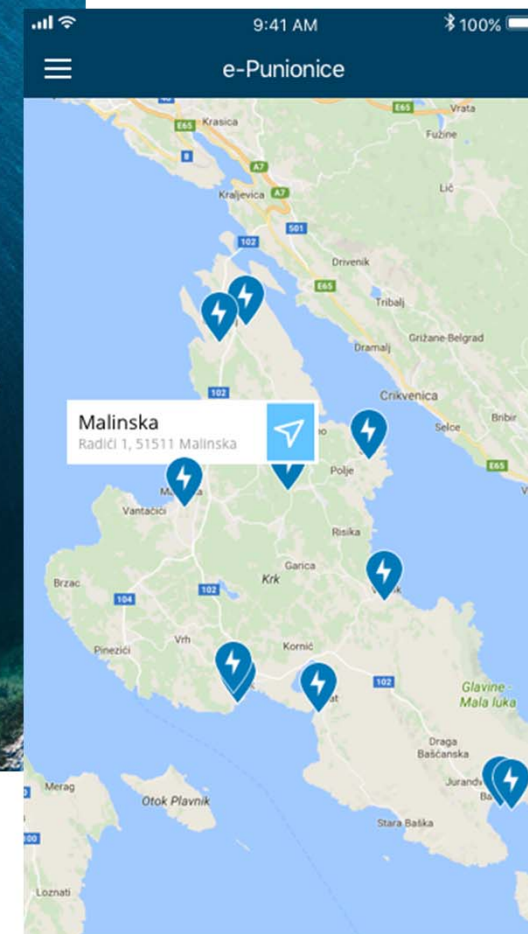


A part of the mathematical model of the island of Krk power system modeled in the software package NEPLAN



Sveučilište u Rijeci
TEHNIČKI FAKULTET

KRKbike mobile app



28 bicycle routes
642 km



Source: "Sustainable Urban Mobility Plan (SUMP) for the island of Krk - Interdisciplinary study of electromobility at the island of Krk and the mobile phone application"; Faculty of Engineering, Sensum and Molekula for Ponikve eko otok Krk Ltd, Croatia, 2017.

Available @ Google Play, App Store, <https://www.krkoutdoor.com/>

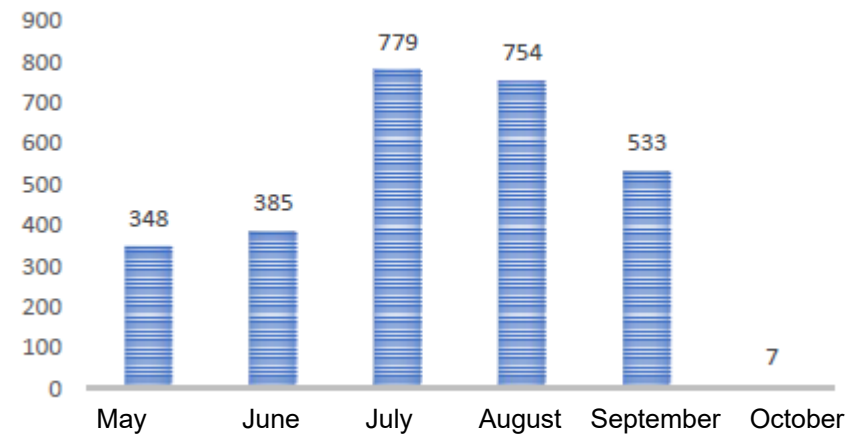


Bike sharing system on the island of Krk

- 8 charging locations
- 10 zones with 10 sockets each
- Ministry of tourism
107.803 Euro
- Domestic provider –
vehicles, charging
equipment, software



Number of sessions in 2020



Source: Ponikve Eko Otok Krk

E-mobility support and strategic documents



E-MOBILITY SUPPORT



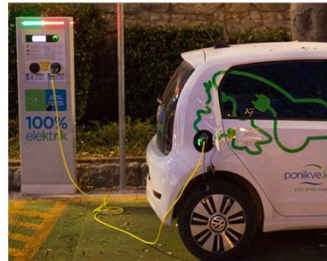
Support of e-mobility on the regional or local level

Source: EIHP

No	Yes
Charging station deployment	<ul style="list-style-type: none"> - Support private sector to deploy charging stations - Education, promotion
EV purchase subsidies	<ul style="list-style-type: none"> - Strengthening EV advantages (positive discrimination) - EV's in own fleet
Providing or co-financing of mobility services	<ul style="list-style-type: none"> - Support private sector - Education, promotion

SUMP – Sustainable Urban Mobility Plan

INTERDISCIPLINARY STUDY OF ELECTROMOBILITY AT THE ISLAND OF KRK AND THE MOBILE PHONE APPLICATION

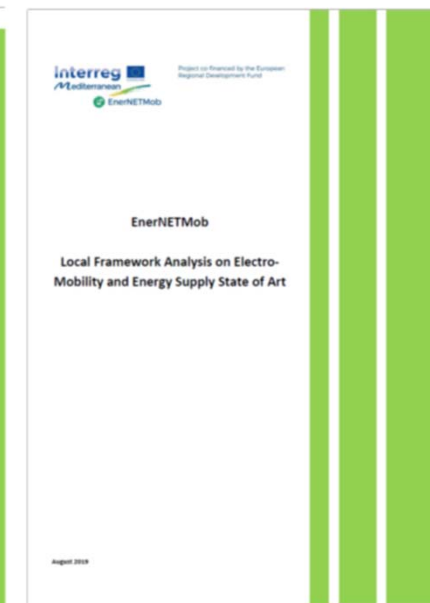
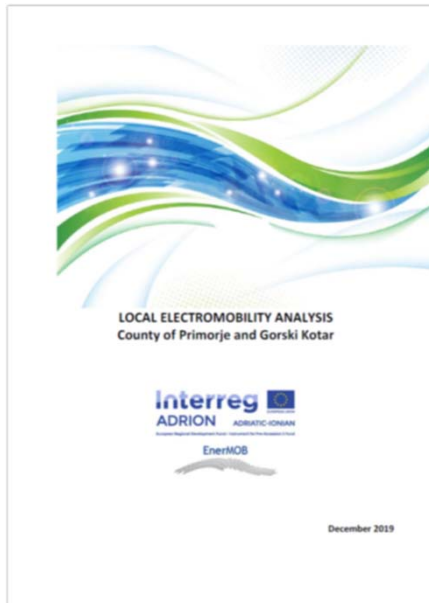


SHARING SYSTEM STUDY AND MARKETING STUDY FOR ELECTRIC VEHICLES ON THE ISLAND OF KRK



January 2017

SHARING SYSTEM ON THE ISLAND OF KRK MANAGEMENT PLAN



Mobility & Transport Arena

www.woom.zone #GreenArena
4. besplatni webinar

10.12.2020.
1:00 PM - 3:00 PM CET

"ODRŽIVI PROMET I EMOBILNOST KAO NOVI KONCEPT U ENERGETICI I PROMETU"

Moderator:
Doc. dr. sc. Vedran Kirinčić, Tehnički fakultet Rijeka

Panelisti:
Željko Purgar, poslovno savjetovanje, Željko Purgar s.p.
Domagoj Puzak, Tim za e-Mobilnost HEP Grupe
Tin Koren, voditelj marketinga, Strujni krug udruga vozača EV
Igor Ban, E-Mobility Manager, TSG Croatia, Piraex d.o.o.

Vedran Kirinčić
Željko Purgar
Domagoj Puzak
Tin Koren
Igor Ban

www.woom.zone #Mobility&Transport Arena
1. besplatni webinar

17.02.2021.
2:00 PM - 3:30 PM CET

"Zašto nam je potrebna rEvolucija u mobilnosti i transportu"

Moderator:
Doc. dr. sc. Vedran Kirinčić - Tehnički fakultet Rijeka

Panelisti:
Dr. sc. Duško Radulović - SENSUM
Dr. sc. Ivan Güttler - Državni hidrometeorološki zavod
Dr. sc. Bruno Židov - Energetski institut Hrvoje Požar
Nevena Đukić - Energetski portal

Vedran Kirinčić
Duško Radulović
Ivan Güttler
Bruno Židov
Nevena Đukić

Medijski partneri: STRUJNI KRUG ENERGETSKI PORTAL ALUMNI TFR

www.woom.zone #Mobility&Transport Arena
2. besplatni webinar

07. 04. 2021.
2:00 PM - 3:00 PM CET

enasolAuto - investicijska prilika u energetske sektoru Hrvatske

Panelisti:
Predrag Šeatović - direktor enasolAuto Startupa
Milan Horvat - FIMA, financijski savjetnik Enasola

Moderator:
Doc. dr. sc. Vedran Kirinčić, Tehnički fakultet, Sveučilište u Rijeci

Predrag Šeatović
Milan Horvat
Vedran Kirinčić

www.woom.zone #Mobility&Transport Arena
3. besplatni webinar

12.04.2021.
2:00 PM - 3:30 PM CET

"Jedinice lokalne i područne (regionalne) samouprave kao pokretači tranzicije u mobilnosti i transportu"

Panelisti:
Gordana Lalić - Grad Poreč-Parenzo, CEO gradskog poduzeća Parentium d.o.o.
Martin Bučan - viši savjetnik, Splitsko-dalmatinska županija
Ivan Ivanković, dipl. ing. el. - pomoćnik pročelnika za energiju i klimu, Grad Zagreb, Gradski ured za gospodarstvo, energetiku i zaštitu okoliša
Doc. dr. sc. Vedran Kirinčić - Tehnički fakultet Rijeka - moderator webinar

Gordana Lalić
Martin Bučan
Ivan Ivanković
Vedran Kirinčić

Medijski partneri: STRUJNI KRUG ALUMNI TFR ENERGETSKI PORTAL SVEUČILIŠTE U RIJECI SDEWES

Purpose of Mobility & Transport Arena:

- Promote green, smart and efficient transport and mobility,
- Raising the level of awareness and knowledge of the whole society with an emphasis on politics, business and citizens,
- Market education,
- Promotion of innovative models,
- Promotion of competencies,
- Industry development,
- Create a mobility and transport community in the EU and the region.
- Virtual events are free for all participants and recordings are permanently available free of charge

Some of the topics:

- Sustainable transport and eMobility as a new concept in energy and transport
- Why we need a revolution in mobility and transport
- Investment opportunities
- Local and regional self-government units as drivers of transition in mobility and transport

Recommended methodology

- Actions needed to establish a low-carbon community:
 - create **a long-term vision** and draft **strategic documents**
 - integrate **renewable energy sources** to support increased electricity demand;
 - establish **a network of charging stations**;
 - equip **the workshop** and establish **a team for the conversion** of electric vehicles;
 - implement energy efficiency measures in buildings and public lighting, systematic energy management in the public sector;
 - waste collection and management systems and water resources management;
 - develop broadband IT infrastructure (optical network);
 - establish a project team to **attract funds** from national and EU funds;
 - continuous **educational activities** through the energy cooperatives and local action groups with a plan to build **an educational & research center** and **promotional activities** for more intensive involvement of the local population and awareness of the general public.



Workshop

Sustainable transport

The Road to Success - e-mobility in Primorje-Gorski Kotar County



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