Projects in Croatian regional government units

Assoc. Prof. Vedran Kirincic, PhD

vedran.kirincic@riteh.hr

Sustainable energy / Mobility expert
Faculty of Engineering, University of Rijeka, Croatia
https://www.linkedin.com/in/vedrankirincic/
Transport sector in Croatian cities

Specific annual energy consumption in the transport sector (MWh / inhabitant)

Specific annual CO2 emissions in the transport sector (tCO2 / inhabitant)

Number of public transport lines

Number of EV charging stations (per 1000 inhabitants)

Source: Analysis of the readiness of Croatian cities for a green (energy) transition in 2021.
# Primorje-Gorski Kotar County – charging infrastructure

Source: ZE Mobility

<table>
<thead>
<tr>
<th></th>
<th>Primorje-Gorski Kotar County</th>
</tr>
</thead>
<tbody>
<tr>
<td>Area (km²)</td>
<td>3.588</td>
</tr>
<tr>
<td>Population (2011)</td>
<td>296,195</td>
</tr>
<tr>
<td>Density (/km²)</td>
<td>83</td>
</tr>
<tr>
<td>Charging stations</td>
<td>60+</td>
</tr>
<tr>
<td>EV and PHEV</td>
<td>~500</td>
</tr>
</tbody>
</table>
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.

Source: County of Primorje-Gorski Kotar
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
Primorje-Gorski Kotar County vs rest of Croatia

- **Area**: 6.34% PGZ, 93.66% Rest of CRO
- **Population (2011)**: 6.89% PGZ, 93.11% Rest of CRO
- **Number of electric and hybrid vehicles**: 3.77% PGZ, 96.23% Rest of CRO

- **Number of sockets**: 18.90% PGZ, 81.10% Rest of CRO
- **Number of charging station locations**: PGZ: 0.00, Rest of CRO: 5.00, CRO: 10.00
- **Ratio vehicles for charging / charging locations**: PGZ: 25.00, Rest of CRO: 20.00, CRO: 15.00
- **Ratio vehicles for charging / sockets**: PGZ: 10.00, Rest of CRO: 8.00, CRO: 6.00

<table>
<thead>
<tr>
<th>Primorje and Gorski Kotar county Parameter</th>
<th>2020</th>
<th>2025</th>
<th>2030</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basic scenario AC sockets</td>
<td>146</td>
<td>268</td>
<td>298</td>
</tr>
<tr>
<td>DC sockets</td>
<td>13</td>
<td>21</td>
<td>23</td>
</tr>
<tr>
<td>Total sockets</td>
<td>159</td>
<td>289</td>
<td>321</td>
</tr>
<tr>
<td>Number of charging stations (pillars)</td>
<td>120</td>
<td>231</td>
<td>264</td>
</tr>
<tr>
<td>Number of locations</td>
<td>62</td>
<td>110</td>
<td>122</td>
</tr>
<tr>
<td>Moderate scenario AC sockets</td>
<td>206</td>
<td>330</td>
<td>348</td>
</tr>
<tr>
<td>DC sockets</td>
<td>27</td>
<td>44</td>
<td>46</td>
</tr>
<tr>
<td>Total sockets</td>
<td>233</td>
<td>374</td>
<td>394</td>
</tr>
<tr>
<td>Number of charging stations (pillars)</td>
<td>180</td>
<td>299</td>
<td>323</td>
</tr>
<tr>
<td>Number of locations</td>
<td>92</td>
<td>126</td>
<td>134</td>
</tr>
<tr>
<td>Dynamic scenario AC sockets</td>
<td>263</td>
<td>402</td>
<td>403</td>
</tr>
<tr>
<td>DC sockets</td>
<td>35</td>
<td>46</td>
<td>54</td>
</tr>
<tr>
<td>Total sockets</td>
<td>298</td>
<td>447</td>
<td>457</td>
</tr>
<tr>
<td>Number of charging stations (pillars)</td>
<td>226</td>
<td>361</td>
<td>375</td>
</tr>
<tr>
<td>Number of locations</td>
<td>116</td>
<td>126</td>
<td>164</td>
</tr>
</tbody>
</table>
The island of Krk – 2030 strategic aims
Steps towards zero GHG emissions

Energy transition of the Cres-Losinj archipelago

Transport on Island
Sea transport - public
Sea transport - commercial
Tertiary sector
Industry
Residential buildings

Final Energy Consumption in 2018

<table>
<thead>
<tr>
<th>Category</th>
<th>MWh</th>
<th>CO₂ [tonne]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electricity</td>
<td>59,666</td>
<td>9,427</td>
</tr>
<tr>
<td>Heating</td>
<td>54,683</td>
<td>2,548</td>
</tr>
<tr>
<td>Transport to &amp; from</td>
<td>33,000</td>
<td>8,811</td>
</tr>
<tr>
<td>Transport on Island</td>
<td>22,862</td>
<td>6,440</td>
</tr>
<tr>
<td>Industry</td>
<td>506</td>
<td>135</td>
</tr>
<tr>
<td><strong>TOTAL:</strong></td>
<td><strong>170,717</strong></td>
<td><strong>27,361</strong></td>
</tr>
</tbody>
</table>

Source: Plugshare, TRANSITION PLAN TOWARDS CLEAN ENERGY – CRES - LOSINJ ISLANDS [link to report]

[link to report]
Energy transition of the Cres-Losinj archipelago

Transition pathways

**Electricity interconnection with mainland**

**Solar photovoltaic:**
- To provide half of electricity consumption
- Installation of 22.5 MW
- New spatial planning for solar PV

**Buildings**
- Retrofitted for energy efficiency
- Solar thermal
- Wood chips & pellets
- Air source & seawater heat pumps
- Rooftop solar photovoltaic

**Road transport**
- E-bike sharing system
- Electric public vehicles
- Electric buses for public transport

**Maritime transport**
- Electric + LNG ferries
- Electrification of small boats
- Amend criteria for grants
- Adapt legislative framework

**Raise awareness among citizens**
- Information campaigns

Energy transition of the Cres-Lošinj archipelago

Source: Examples of energy transition in the Cres-Lošinj archipelago [https://www.youtube.com/watch?v=92Jk6MNjn2o](https://www.youtube.com/watch?v=92Jk6MNjn2o)
Challenges and opportunities

https://www.strujnikrug.hr/electric-car-buying-guide/
https://www.strujnikrug.hr/ev-chargers/
eBike-sharing system
City of Rijeka

4 locations
28 e-bikes
1.5 Eur/h

Use of e-bikes by tariffs (hours)

Number of sessions in 2020

Total: 3758

March: 462
April: 175
May: 757
June: 344
July: 12
August: 179
September: 49
Total: 3758
BOLT SCOOTERS IN CROATIA 2021
Rijeka, Varazdin, Osijek

NUMBER OF SCOOTERS

NUMBER OF SESSIONS WITH SCOOTERS

Jan  Feb  Mar  Apr  May  Jun
Bolt electric scooter rentals
City of Rijeka

10 starting locations
Free floating model
200 scooters
0,1 Eur/min
electric bike rentals - City of Split

280+ bikes
50+ stations
I-SharE LIFE
Innovative sharing solutions for full electric travels in small and medium size urban areas

Climate neutral mobility concept

1) Electrification of vehicle fleet
   - the analysis of energy consumption and the development of a basic inventory of emissions of the existing fleet of vehicles
   - decarbonization plan

2) Innovative mobility concepts
   - sharing systems (car, bike, scooter)
   - mobility on demand

3) Integration with renewable energy sources
   - (non)integrated, microgrids, V2X

4) Energy infrastructure for vehicle charging
   - chargers on public lighting poles, domestic chargers - family houses and apartment buildings, destination chargers, travel (fast and ultra fast) chargers

5) Active participation of locals and visitors
Mobility As A Service - MaaS

„The key concept behind MaaS is to put the users at the core of transport services, offering them tailor made mobility solutions based on their individual needs. This means, for the first time, easy access to the most appropriate transport mode or service will be included in a bundle of flexible travel service options for end users.” The European Mobility as a Service Alliance

http://www.bipformaas.it/what-is-maas-lets-learn/
https://maas-alliance.eu/homepage/what-is-maas/
Future of mobility

STEP 1
Single Provider MaaS

STEP 2
Single Provider, Multimodal MaaS

STEP 3
Multi-provider, Multimodal MaaS

STEP 4
Internet of Mobility

INTERNET OF MOBILITY: BEYOND MaaS

"...electrification will not change anything concrete. The real revolutionary change will not be brought by electric cars. Smartphones have changed our lives, and we can expect the same in the future with cars: changing mobility will change our lives... Market change refers to vehicle ownership as well as autonomy. In such a scenario, people will no longer buy or own cars, but will use them and pay only when needed." – Mate Rimac, conference Auto2030
Projects in Croatian regional government units

Assoc. Prof. Vedran Kirincic, PhD

vedran.kirincic@riteh.hr

Sustainable energy / Mobility expert
Faculty of Engineering, University of Rijeka, Croatia
https://www.linkedin.com/in/vedrankirincic/