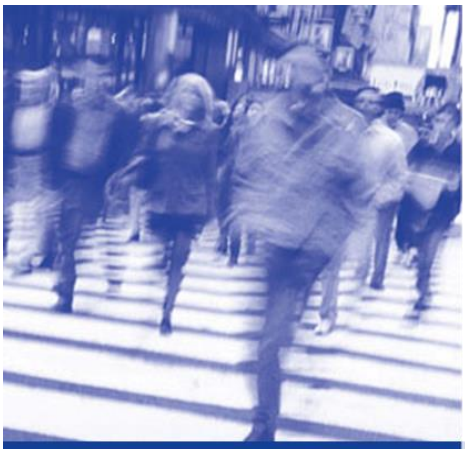

CiViTAS
Cleaner and better transport in cities

KOPRIVNICA

Implementation Status Report

K 1.2 Zero CO2 University Campus

Deliverable No.:	
Project Acronym:	CIVITAS DYN@MO
Full Title:	
DYNamic citizens @ctive for sustainable MObility	
Grant Agreement No.:	296057
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Workpackage/ Measure Title:	
Design of Campus rental electric bike system	
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Igor Bajalica	
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THE CIVITAS INITIATIVE
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1. INTRODUCTION

The University North campus has been defined as a „public low carbon-emission space ". All buildings within the campus that are being reconstructed or built will be energy efficient buildings of the A+ class (passive buildings) or energy class A. Considering the fact that traffic is one of the greatest generators of greenhouse gas emissions, it is necessary to devise low-energy traffic solutions as well. This is fairly simple to achieve within the campus, which is spatially limited enough. The campus is, due to its primary purpose, also an ideal space for sustainable forms of mobility, which ensure the necessary peace and quiet, which is a prerequisite for a stimulating learning environment.

Campus users are an ideal group for introducing an innovative traffic solution to as they are active young people, future decision-makers. Their transport habits will have a long-term effect on their lives and surroundings and it is therefore important to keep those habits as sustainable as possible. Students are also ideal disseminators as they have good communication skills and techniques, which could be used to influence a wider range of people.

A broader goal of the measure is to form a traffic corridor, the center of which would be the campus as a sustainable mobility space. That means that the measure shall include the movements of students and other campus users outside of the campus perimeter in an as sustainable a manner as possible. Therefore, the journey from the railway station or any other part of the city to the campus should be sustainable – walking or cycling but also using new methods of transportation – public transportation or electric bicycle ("pedelec"). Designing these traffic corridors will also require a long-term plan and adequate changes in order to satisfy the transport needs of the growing number of campus users. The process starts with the making of the Sustainable Urban Mobility Plan (SUMP), which is also one of the measures of CIVITAS DYN@MO Project.

Goals of the K 1.2 Zero CO2 University Campus Measure:

- Develop an urban mobility plan for a zero emission campus
- Plan the use of zero emission vehicles for the transportation of people and goods
- Plan the infrastructure for zero emission vehicles and non-motorized methods of transportation
- Develop a student-bicycle system
- Develop a virtual mobility center concept for the university campus
- Promote sustainable mobility in the region
- Increase public awareness about better traffic solutions
- Plan possibilities for the mobility of the university campus for several thousand students
- Develop a SUMP competency center

2. PUBLIC BICYCLE SYSTEM IN CAMPUS

In autumn 2014, the first public bike-sharing service, BicKo, was introduced in the city of Koprivnica. The "Bicycle Oasis" Project, along with the BicKo acronym, was financed by the European Union through Hungary-Croatia IPA Cross-border Co-operation Program. The total value of the project was around €600 thousand, and the European Union financed 85%.

One of the seven terminals around the city of Koprivnica was built in Koprivnica Campus, right next to the management building of "Kampus" Ltd. This allows uninterrupted arrival and the use of mechanical bicycles as well as connecting the university part of the city with other relevant points in the city of Koprivnica. The most frequent mechanical bicycle line today is the one from the campus to the railway station which shows that the bicycles are used by students of University North, and that those bicycles have made it easy for the students to reach the University.

Picture 1: Logo of the public bike-sharing service "BicKo" in Koprivnica

Vozite sigurno i uživajte u vožnji!
Drive safely and enjoy your ride!

Encouraged by a great response of students in using mechanical bicycles, and their participation in the "BicKo" system, the decision makers in the city of Koprivnica accepted the idea to introduce electric bicycles whose terminal would be placed in the vicinity of the University North building within Koprivnica campus.

3. PROCUREMENT

Public procurement under number 3/14 E-MV for the procurement of *pedalecs* and the construction of a bicycle terminal in the Koprivnica campus complex started in August 2014 by "Kampus "Ltd.

The buyer, "Kampus"Ltd, published on October 20, 2014 a call for tenders for the procurement of electric bicycles and the construction of a bicycle terminal in the Koprivnica campus complex in the electronic issue for public procurements of the "Official Gazette", and the amendment of the documentation under number 2014/S 014-0050432 on October 31, 2014.

The procurement was carried out by using an open procurement procedure based on provisions of the Public Procurement Law. The estimated value of the tender was HRK 450,000.00 (VAT excluded).
Public opening of the tenders was done on November 11, 2014. Two tenders were received:

Registered bidders:

1. Ducati Components Ltd., Ludbreg
2. Bidder Alliance UTE Ltd., Pula and PENTA Ltd., Pula.

The offer of Ducati Components Ltd. for the subject of the tender was HRK 379.000,00 (VAT excluded). The total value of the tender was HRK 473.750,00 (VAT included).
The bidder alliance UTE Ltd., Pula and PENTA Ltd., Pula offered for the subject of the tender HRK 426.409,20 (VAT excluded).

The director of "Kampus" Ltd., made a "Decision on the best offer for the procurement of electric bicycles and the construction of a bicycle terminal in the campus complex in Koprivnica" on December 17, 2014, which was in favor of the bidder Ducati Components Ltd, Ludbreg, in the amount of HRK 379.000,00 (VAT excluded).

Picture 2: Logo of Ducati components Ltd

DUCATI
komponenti d.o.o.

The bidding documentation for the open tender procedure (3-14 E-OG) dated November 10, 2014, was sent with equipment catalogue and technical specifications.

Ducati Components Ltd as a bidder, named the following sub-contractors in their documentation:

1. „Zaštita Jukić" Ltd., Kunovec Breg – video-surveillance system (HRK 17.500,00)
2. „Elektrospektar", Selnik – electrical installations (HRK 7.720,00)
3. „Obrt za prodaju, ugradnju i održavanje – Klarić", Buzet – construction works (HRK 52.780,00).

Contract number 2/15 on the procurement of electric bicycles and the construction of the bicycle terminal in the campus complex in Koprivnica between Ducati Components Ltd, Ludbreg, and "Kampus" Ltd, Koprivnica was made on February 02, 2015.

The subject of the contract was the procurement of 10 electric bicycles and the construction of the bicycle terminal in the campus complex in Koprivnica in accordance with the bidding documentation and the "Decision on the best offer for the procurement of electric bicycles and the construction of a bicycle terminal in the campus complex in Koprivnica" dated December 17, 2014 and the Supplier's tender dated November 10, 2014.

By signing the contract, the Supplier stated that they were obligated to deliver the goods (bicycles) and finish construction works in accordance with the tender in the amount of HRK 379.000,00 (VAT excluded).

4. FINANCING THE PROJECT

The Environmental Protection and Energy Efficiency Fund (EPEEF) adopted a decision on choosing the beneficiaries of funds for the purpose of immediate co-financing the project for promoting cleaner transport through "the procurement of 10 electric bicycles for the needs of University North in Koprivnica" by providing subsidies. The decision was made according to the public open call for tenders for the immediate co-financing of other measures of energy efficiency in transport, published on September 19, 2014 and the offer of "Kampus" Ltd from Koprivnica.

Picture 3: Official logo of The Environmental Protection and Energy Efficiency Fund

FOND ZA ZAŠTITU OKOLIŠA
I ENERGETSKU UČINKOVITOST

The contract on immediate co-financing of the project for promoting cleaner transport "The procurement of 10 electric bicycles for the needs of University North in Koprivnica" by providing subsidies between The Environmental Protection and Energy Efficiency Fund in Zagreb and "Kampus" Ltd was made on April 21, 2015.

The Fund made an obligation to co-finance the project in the amount of 35.56% of justified investment costs, and no more than HRK 64,008.00.

5. CHARACTERISTICS AND TECHNICAL SPECIFICATIONS

ELECTRICAL BICYCLE – E-BIKE *PEDALEK*

The working principles of the bicycle:

- Electro-mechanical system measures the revolving torque made by the rider on the pedals.
- Electric motor keeps (assists) the turning torque which is proportional to the rider's effort.
- The entire electronics is located in the center of a wheel (motor, batteries, control electronics).
- Management capabilities of the bicycle are done through a screen located on the stem of the bicycle.

Picture 4: Electrical bicycles

Technical specifications:

Color

- Matte white

Frame (material)

- aluminum, damage-resistant material

Motor

- integrated motor in the hard case in the center of the back wheel
- motor strength 0,25 kW (progressively decreasing)
- maximum speed with the motor assistance is 25 km/h

Battery

- Li-ion (lithium ionic) integrated in the hard case in the center of the back wheel
- capacity – 0,6 Ah
- charge – 48 V
- time to recharge: 0-100% approximately 3 hours, 20-80% approximately 1.5h
- battery life – 1000 cycles
- range – do 60 km

GPS system

- integrated GPS antenna on the bicycle frame
- active „real time“ bicycle movement tracking (anti-theft system) through a computer and central unit (pylon)
- charging directly from the wheel battery

Screen

- three levels of assistance (LOW, MED and HI) which control the strength of assistance
- indicator of battery life

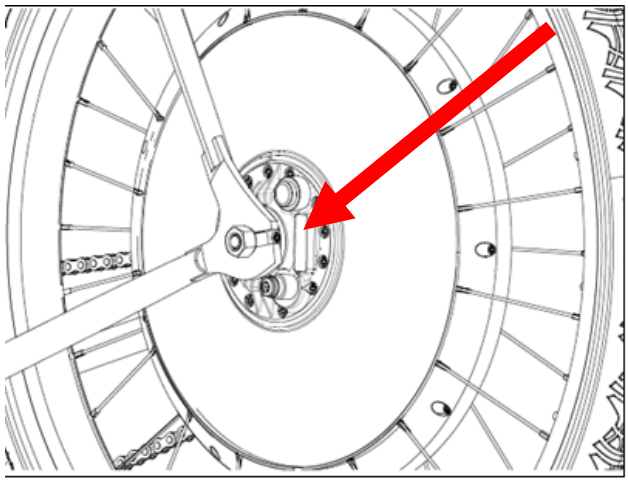
- date and time
- possibility of turning off the assistance
- special sensors for measuring air pollution (CO, NO, RH)
- measuring spent calories

Picture 5: Examples of screen with electric bicycle specifications

Special characteristics:

- special tires resistant to external punctures
- ON/OFF button on the wheel with the touch screen display of battery life (3 levels)
- Special sensors for measuring air pollution (CO, NO, RH)
- measuring spent calories
- data is loaded onto the central unit (pylon)
- three controllable levels of assistance (LOW, MED, HI)
- bicycle is in accordance with European standards EN15194 and EN14764

Picture 6: The position of ON/OFF button on the back wheel



BICYCLE STAND SYSTEM WITH INTEGRATED CHARGERS AND CENTRAL UNIT - PYLON

Bicycle stand system consists of 2 separate stands with 5 bicycle slots on each piece. The stands are made of metal and plastic-coated, which makes them weather and damage resistant. The stands have the possibility to automatically lock bicycles. The system is connected to the Internet for the purpose of distant administration of the central unit and the transfer of data to a remote computer.

The stand system consists of two components:

1. central unit - pylon
2. two separate stands with 5 bicycle slots each

Picture 7: Terminal with 10 electric bicycles with associated slots and pylon

Technical specifications:

- total weight – 430 kg
- charge – three-phase (3P+N+T 400V 16A)
- temperature of use – from -15°C to +40°C
- protection level – IP50
- regulations it meets:
    - CEI EN 61000-6-2:2006-10
    - CEI EN 61000-6-3:2007-11+./A1:2013-06
    - EN 62233:2008-04

Technical characteristics of the info desk - pylon:

- material – galvanized sheet/stainless steel
- height – 170cm
- weight – 130 kg
- color – matt white + green
- screen – 12.1 monitor", 1024x768
- strength – 2300 VA
- computer with Internet access, an application for managing and supervision of bicycles
- TCP/IC protocol for communication with a remote computer and for sending reports on usage of bicycles

Technical characteristics of a stand:

- material– robust anti-vandal material (steel coated in plastic)
- color – matt black
- weight – 150 kg each stand
- designed for easy insertion of a bicycle in a slot with an automatic locking possibility

<u>RFID cards</u>

Cards are personalized, dimension 85x54 mm (16 bit/32 bit).

RFID card is used to identify a user, and they can be programmable to be used in other producer's machines.

Picture 8: Example of RFID card – both sides

6. INTRODUCTION AND USE

TERMINAL OPENING

The grand opening of the electric bicycle terminal in Koprivnica campus was held on June 10, 2015, and it was officially done by the Mayor of Koprivnica, Vesna Želježnjak, with a large delegation of project participants.

The Mayor and the project participants spoke to the media and expressed their satisfaction with the realization of the project that made Koprivnica one of the first Croatian cities with a functioning system of mechanical and electric bicycles within its public transport. They emphasized University North, that is, its professors and students, who are now more flexible about their methods of getting to the University, despite it being somewhat removed from the city centre, by using mechanical bicycles, but also electric bicycles, thanks to the newly opened electric bicycle terminal.

Picture 9: Official grand opening of the Koprivnica campus terminal

USING ELECTRICAL BICYCLES

In order to get a personalized RFID card which enables a user to unlock and rent electrical bicycle, one must sign a contract with an authorized system manager – "Kampus" Ltd.
A future user first fills in an application for using bicycles in the head office of "Kampus" Ltd. After the application is approved, the user is asked to sign a Contract on renting bicycles. There are two basic types of contract: A contract for a bicycle rental subscription (the user receives a RFID card) and a contract on a single use of a bicycle (the user receives a code). Both contracts have further two distinctions – for adults and minors.

Picture 10: First page of a Contract for leasing a bicycle, for adults*

„Kampus“ d.o.o., Trg dr. Žarka Dolinara 1, Koprivnica, OIB: 93251651059 (kao Posuditelj)

i

_____, _____(adresa),

OIB:_____, mobitel:_____ (kao Posudovnik),

zaključili su:

UGOVOR O POSUDBI BICIKLA br. __/15

Uvodna odredba

Članak 1.

Temeljem suglasnosti Grada Koprivnice kao vlasnika terminala i GKP „Komunalac“ d.o.o. kao ovlaštenog operatera BicKo sustava, „Kampus“ d.o.o. je ovlašten upravljati i održavati sustav električnih bicikala, a sukladno uvjetima posudbe određenim Općim uvjetima korištenja BicKo usluge, koji su sastavni dio ovog Ugovora.

Predmet ugovora

Članak 2.

Potpisom ovog Ugovora Posudovnik stječe pravo na besplatnu posudbu bicikla marke DucatiEnergia FREEDUCK2 iz sustava BicKo čiji je vlasnik Grad Koprivnica te u tu svrhu, za cijelo vrijeme trajanja ovog Ugovora, prima karticu za korištenje bicikla.

Primjena Općih uvjeta korištenja BicKo usluge

Članak 3.

Na prava i obveze ugovornih strana primjenjuju se Opći uvjeti korištenja BicKo usluge koji čine sastavni dio ovog Ugovora o posudbi.

Potpisom ovoga Ugovora Posudovnik izričito izjavljuje da je prije sklapanja ovog Ugovora upoznat sa svim odredbama Općih uvjeta BicKo usluge, te je suglasan s njihovom primjenom na ovaj Ugovor.

Opći uvjeti BicKo usluge dostupni su Posudovniku na web stranici i u poslovnim prostorijama Posuditelja u Koprivnici, Trg dr. Žarka Dolinara 1, te na internet stranici www.bicko.bike.

**Translation of the Contract shown in Croatian above*

„Kampus“ Ltd, Trg dr. Željka Dominara 1, Koprivnica, Tax number: 93251651059 (as Lender)

and

_____, _____ (address)

Tax number: _____, Mobile phone: _____ (as Borrower)

Have made the following:

AGREEMENT OF RENTING A BICYCLE No: _____ / 15

Introductory provision

Article 1

Based on the approval of the city of Koprivnica, as the owner of the terminal and the city utility company „Komunalac“ Ltd as an authorized operator of the BicKo system, „Kampus“ Ltd is authorized to run and maintain the electric bicycle system, and in accordance with the terms and conditions of rental set in General Terms and Conditions of Using BicKo Services, which is a constituent part of this Agreement

The subject of the Agreement

Article 2

By signing this Agreement, the Borrower gains the right to rent a bicycle DucatiEnergia FREEDUCK2 from the BicKo system, whose owner is the city of Koprivnica, free of charge and for that purpose, the Borrower shall receive a card to use the bicycle, for the entire duration of this Agreement.

Application of General Terms and Conditions of Using BicKo Services

Article 3

General Terms and Conditions of Using BicKo Services apply for the rights and obligations of both Parties, and the Conditions are a constituent part of this Agreement.

By signing this Agreement, the Borrower explicitly states that he has read and understood the General Terms and Conditions of Using BicKo Services before signing the Agreement, and he agrees to their application on this Agreement.

General Terms and Conditions of Using BicKo Services are available to the Borrower on the internet page www.bicko.bike and in the offices of the Lender in Koprivnica, Trg dr. Žarka Dolinara 1.

After the user has registered, he can choose a bicycle at the electric bicycle terminal. He then needs to press the RFID card to the stand and after the sound signal wait for the bicycle to be unlocked. The bicycle is unlocked and ready for use. If there are no markings on the screen at

the moment of taking the bicycle, the user must press the „touch“ key on the back wheel of the bicycle.

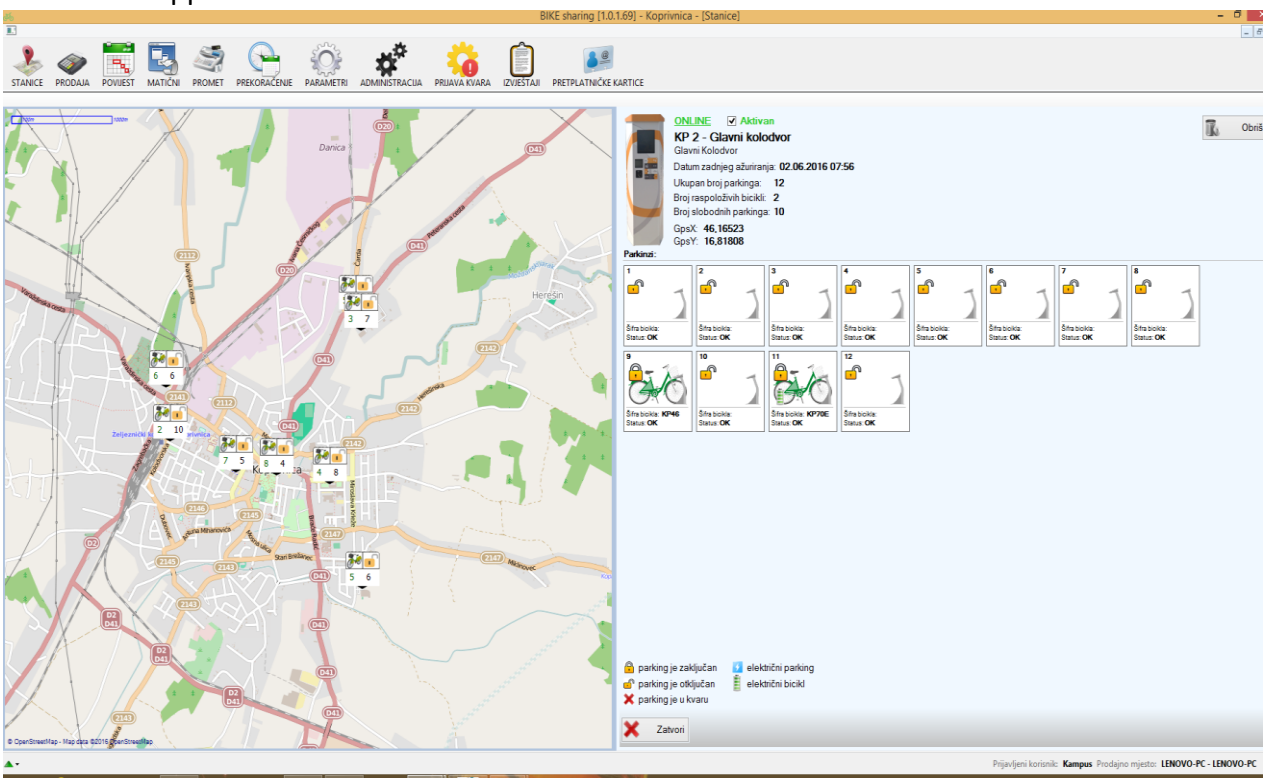
Picture 11: Picture of a bicycle slot

In accordance with the contract, a user may use a bicycle for maximum two hours. For each time a user exceeds the time limit, the user shall receive a warning from the system manager. After use, the bicycle is returned to a slot on one of the “BicKo” stands in the city. If the bicycle is correctly returned an audio signal can be heard and there is a sign of a closed lock on the stand.

7. APPLICATION

The application enables a complete overview of the electronic bicycle system within the entire BicKo system in the city of Koprivnica.

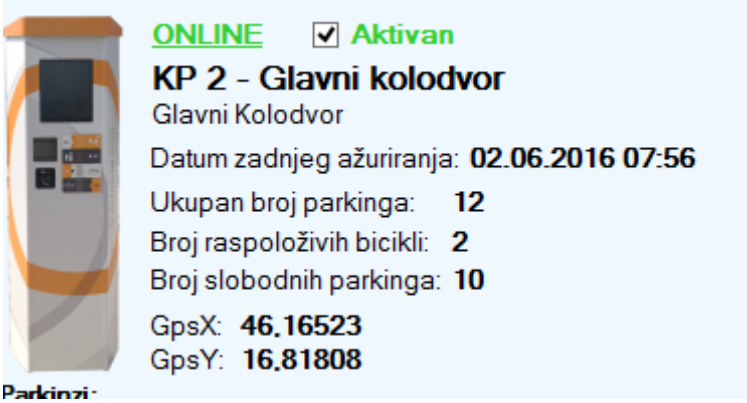
Picture 12: Application interface



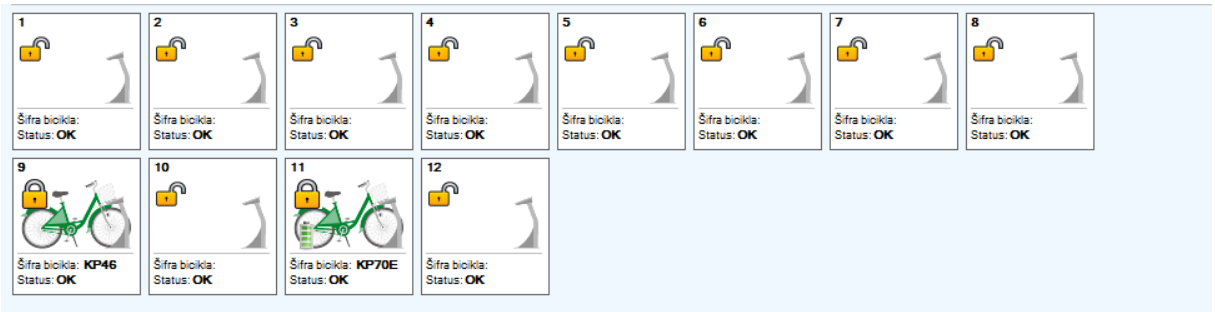
1. Stand – the state of stands is monitored, their availability, if they are active or inactive, if there is a malfunction, pylons can be controlled (eject a jammed card, reset the app and reset the pylon), bicycles at a particular stand are shown
2. Sales – used for the sales of codes
3. History – history is shown by choosing a bicycle, parking, code or card and date of use
4. Master data – it is possible to change, add and erase: bicycles, users, points of sale, articles and subscribers
5. Turnover – an overview of sales during a day
6. Exceeding time limit – differentiates codes and subscribers (charging for exceeding time limit, erasing them, writing notes)
7. Pre-authorization – enables keeping records of each contract and user
8. Parameters – in case changes are made in the work organization (i.e. change in VAT)
9. Administration – enables: overview of free bicycles, code deactivation, overview of unreturned bicycles, bicycle status, informative e-mail.
10. Notification of malfunctioning – notification of malfunctioning or repair of a bicycle
11. Reports – turnover per article, turnover per method of payment, turnover per bicycle, turnover per code, turnover per subscriber, overview of deleted time-limit exceeding, overview of pre-authorization status, overview of subscribers

12. Subscribers' cards – it is possible to deactivate a card in case of theft and replace it

Picture 13: Stand data



Picture 14: Bicycles at a chosen stand



8. STATISTICS AND RESULTS

Table 1: Turnover of electric bicycles in the city of Koprivnica

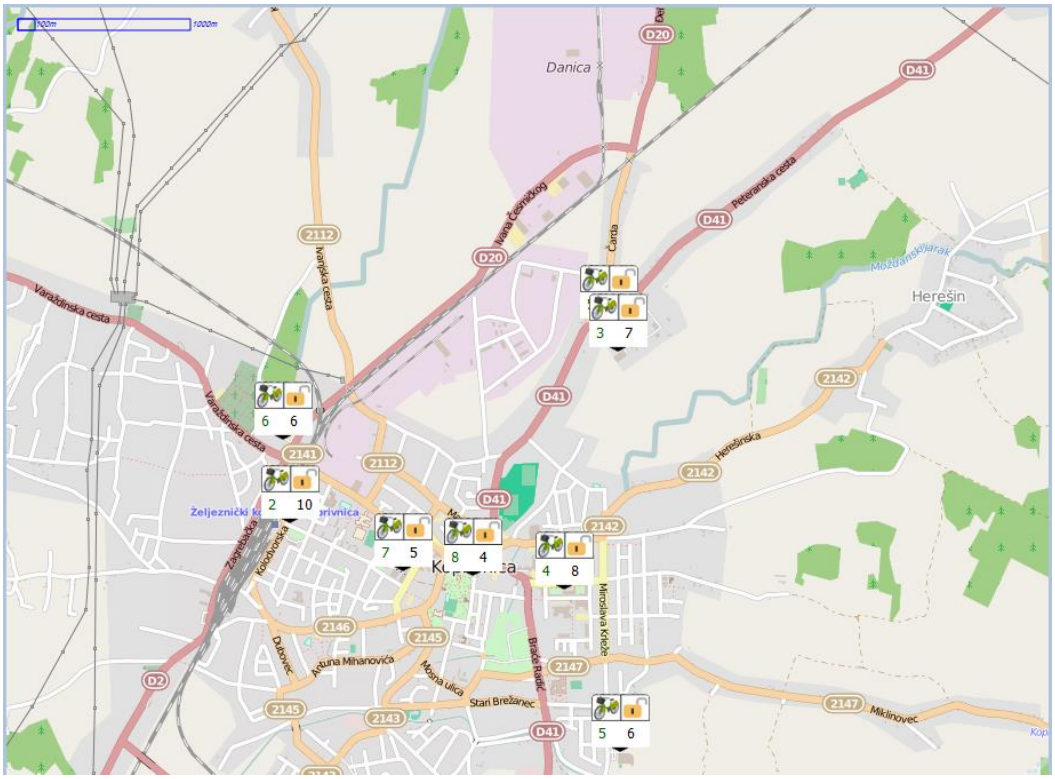
Naziv bicikla	Ukupno vožnji	Promet prema				
		Zrinski	Dom Mladih	Glavni kolodvor	KP 3 - Lenišće	Kampus
KP61E	22	16	4	0	0	2
KP62E	6	0	0	0	0	6
KP63E	172	11	9	20	16	116
KP64E	176	26	8	12	27	103
KP65E	215	34	18	20	37	106
KP66E	152	18	10	12	2	110
KP67E	147	20	5	25	2	95
KP68E	9	0	0	0	0	9
KP69E	128	2	10	6	0	110
KP70E	173	6	9	21	4	133
Ukupno	1.200	133	73	116	88	790

Ukupan broj korisnika	107
Ukupan broj vraćanja/preuzimanja na stanici	1677

Since releasing the electrical bicycles, and since issuing the first user RFID card, on June 10 2015, until June 02, 2016 the total number of issued cards is 107 and there were 1200 rides registered.

It is important to mention that the BicKo system, which includes electrical bicycles, was out of service from November 01, 2015 until April 01, 2016 because of the winter season and unfavorable weather conditions. Therefore, the above mentioned numbers in the Table show the results for a total of 7 months.

Picture 15: Mechanical terminals (7) and electric bicycle terminals (1) in Koprivnica



There are 7 terminals/stations for mechanical bicycles in the city of Koprivnica. The campus complex has one terminal for mechanical and one for electrical bicycles. The most frequent line for mechanical bicycles is Campus – Railway station. Also, electrical bicycles show a greater number of bike returns/rentals at the Railway station terminal.