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Forum on modern public transportation

eSConnect. Remote
diagnosis
and predictive
maintenance
of e-buses.

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ELECTRIFICATION OF EUROPE WITH **URBINO ELECTRIC**

nearly **800** contracted and delivered **17** countries
Urbino electric buses to

over **20** million kilometres
of **electric** experience



Oslo Kristiansand Stalowa Wola Katowice
Ystad Rzeszów Ciechanów Jurmala
Västerås Jaworzno Ostrów Wielkopolski Oberhausen
Heidenheim Cluj-Napoca Łomianki
Bolzano Września Bronnoysund
Bergamo Barcelona Hamburg
Sosnowiec Bełchatów Sète Kraków
St Gallen Warszawa Poznań Schwabisch Hall
Ostrołęka Hannover Żilina Chodzież
Inowrocław Milano Bascharage
Nürnberg Ostróda



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COMPREHENSIVE **E-MOBILITY** SOLUTIONS



NEW TECHNOLOGIES AND CHALLENGES **IN OPERATION**

- How to deal with **sporadic faults**?
- **When to drive back** to the depot for charging?
- How to keep my **bus on the streets**?
- How to **provide its highest availability**?
- How to **react quickly**?





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keeps your
bus going

optimum
operations
planning

up to the
minute data

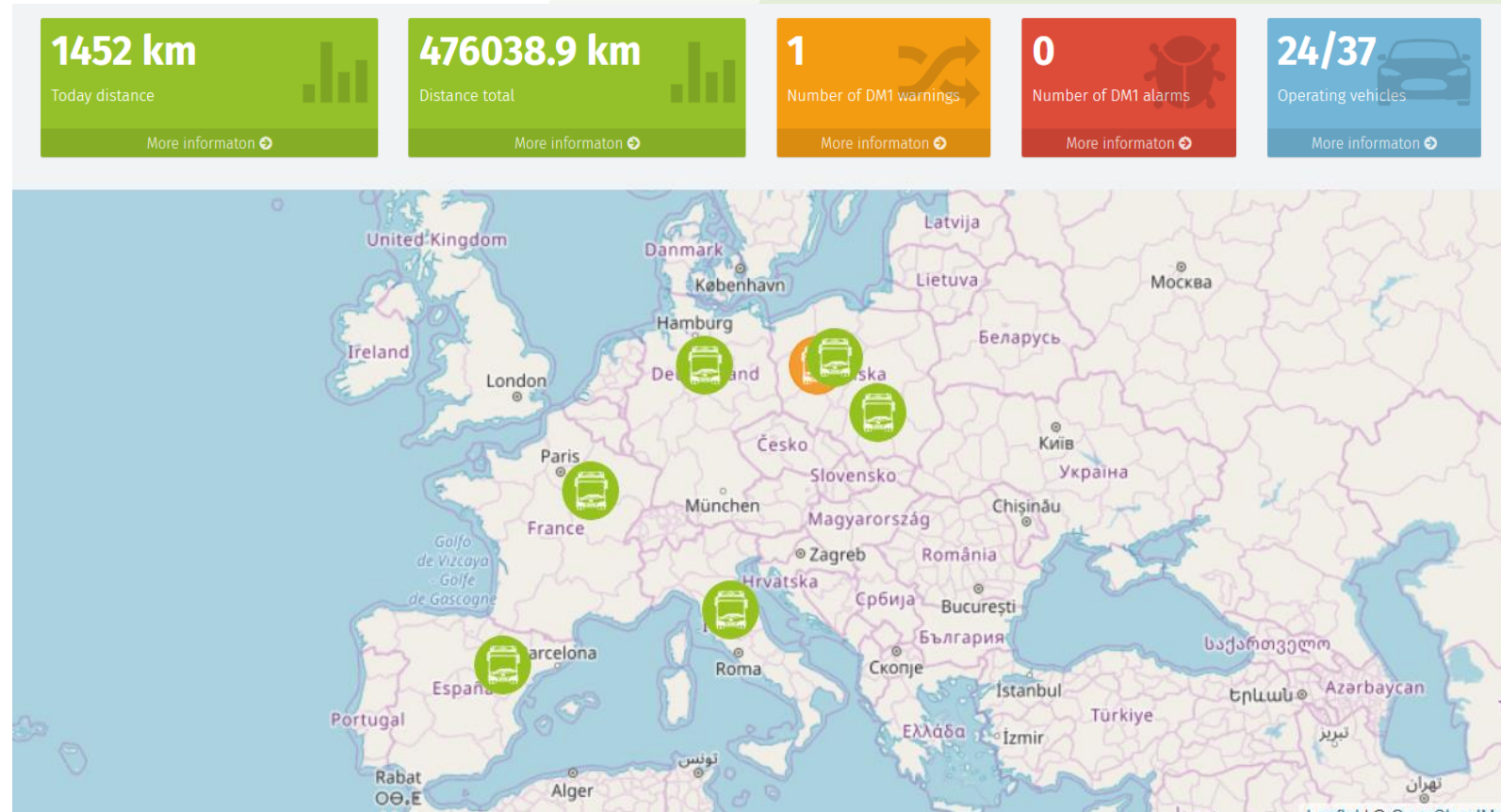
*in-house
designed
connected
service*

fleet
management
efficiency

monitor of
your vehicle's
form

eSConnect
SOLARIS

THE SOLUTION TO CHALLENGES





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eSConnect BENEFITS FOR FLEET OPERATION



Limit unnecessary downtime thanks to immediate breakdown information



Avoid unnecessary visits to the depot



Time to prepare your workshop for repair



Historic data analysis for higher operational efficiency



Optimum fleet capacity



Higher availability



Reduced operation cost

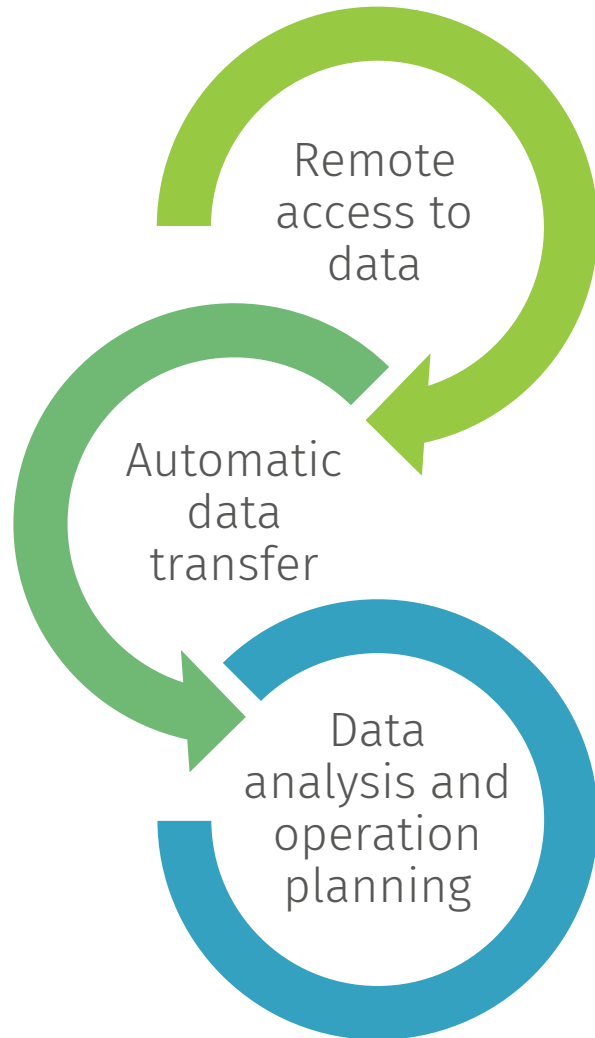




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DATA DELIVERY SYSTEM



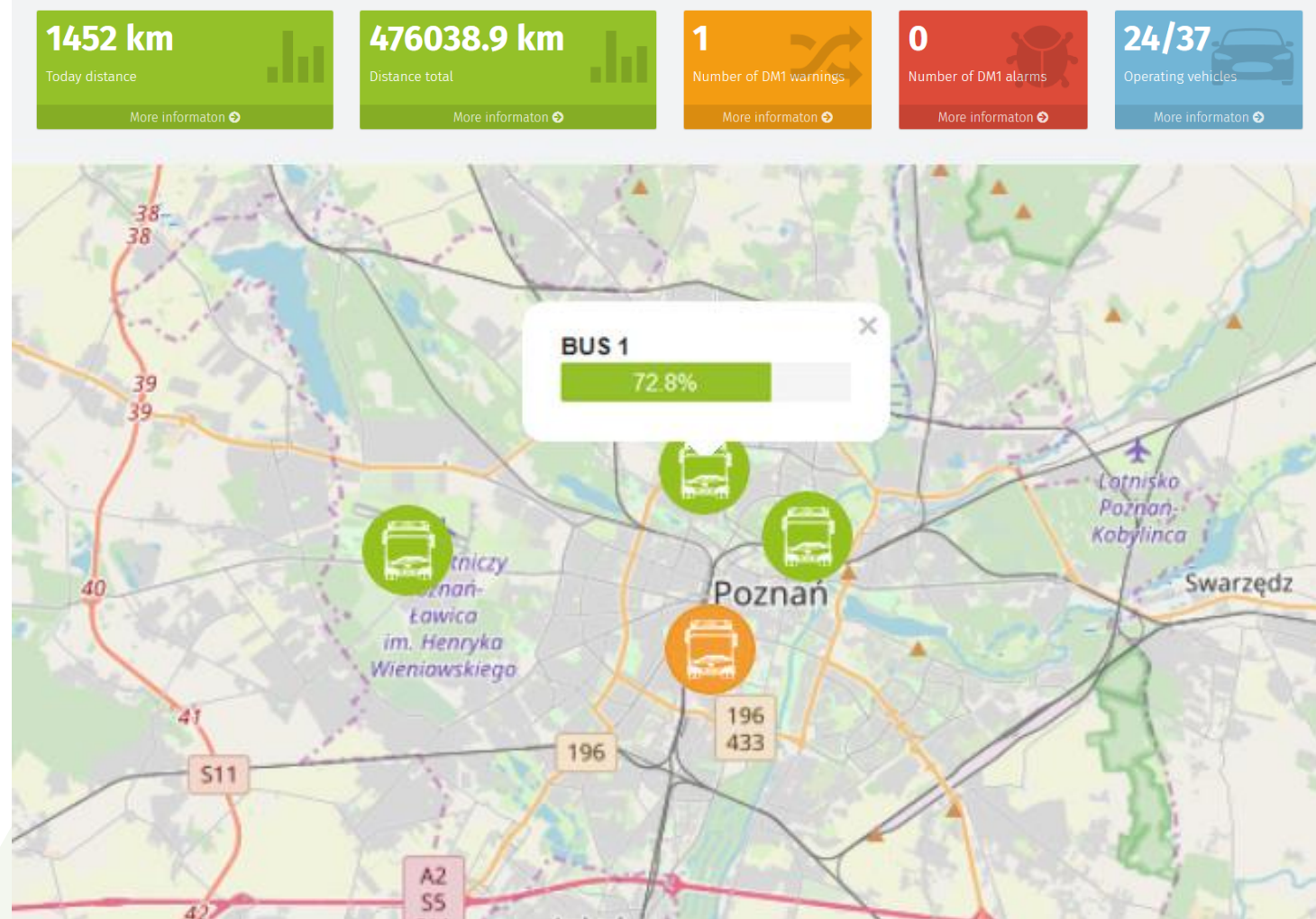


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FLEET MANAGEMENT – BUS POSITION








- The **current position** of buses of the entire fleet
- **Battery level** [SOC%]
- Vehicle activity
- A total distance travelled
- List of warnings and alarms
- Utilization of the fleet



FLEET MANAGEMENT – SUMMARY OF OPERATING PARAMETERS

- Vehicle status
- Bus name
- Battery energy state
- Current energy flow in batteries
- Distance traveled on a given day
- Time of activity
- Predicted range
- The mileage since last charging

Status

Online	Name	SOC	Current	Distance	Time	Predicted distance	The mileage since last charging	Status
Enabled	BUS 1	86%		25.2 km	0:17 h	146.3 km	25.2 km	Drive
Enabled	BUS 2	43.3%		41.2 km	3:02 h	78.7 km	41.2 km	Drive
Disabled	BUS 3	67.5%		0 km	1 day, 16:59 h	141.1 km	11.8 km	
Enabled	BUS 4	79.3%		17.7 km	1:33 h	141.2 km	17.7 km	Drive
Enabled	BUS 5	77.7%		28.6 km	0:24 h	168.3 km	28.6 km	Stop
Enabled	BUS 6	81.3%		15.6 km	1:04 h	163.3 km	15.6 km	Drive
Enabled	BUS 7	65.3%		52.6 km	0:24 h	143.4 km	52.6 km	Stop
Disabled	BUS 8	75.8%		44.5 km	1:05 h	152.8 km	44.5 km	

VEHICLE DATA MONITORING – **FAULT IDENTIFICATION**

DM1 messages (fault codes and lamp status):

- Red / Amber lamp status of ECU
- SPN – Suspect Parameter Number of ECU
- FMI – Failure Mode Identifier of ECU

The list of diagnostic messages (DM1)

Devices List

2019-05-02 8:24 - 2019-05-02 8:24 ▼

BUS 1 ▼

Device ▼

Error filter ▼

Filter

« ← 1 → »

Vehicle	Device	PL	AWL	RSL	MIL	SPN	FMI	OC	Appearance Date	Expiration Date
BUS 1	11 - Brake System Controller	0	1	0	3	1046	5	3	25 March 2019 9:16:42.422000	25 March 2019 9:43:02.769000 *

* Error expiration due to power off

« ← 1 → »



VEHICLE DATA MONITORING – FAULT IDENTIFICATION

Vehicle BUS 1
Device 11 - Brake System Controller

Appearance Date 25 March 2019 9:16:42
Expiration Date 25 March 2019 9:43:02

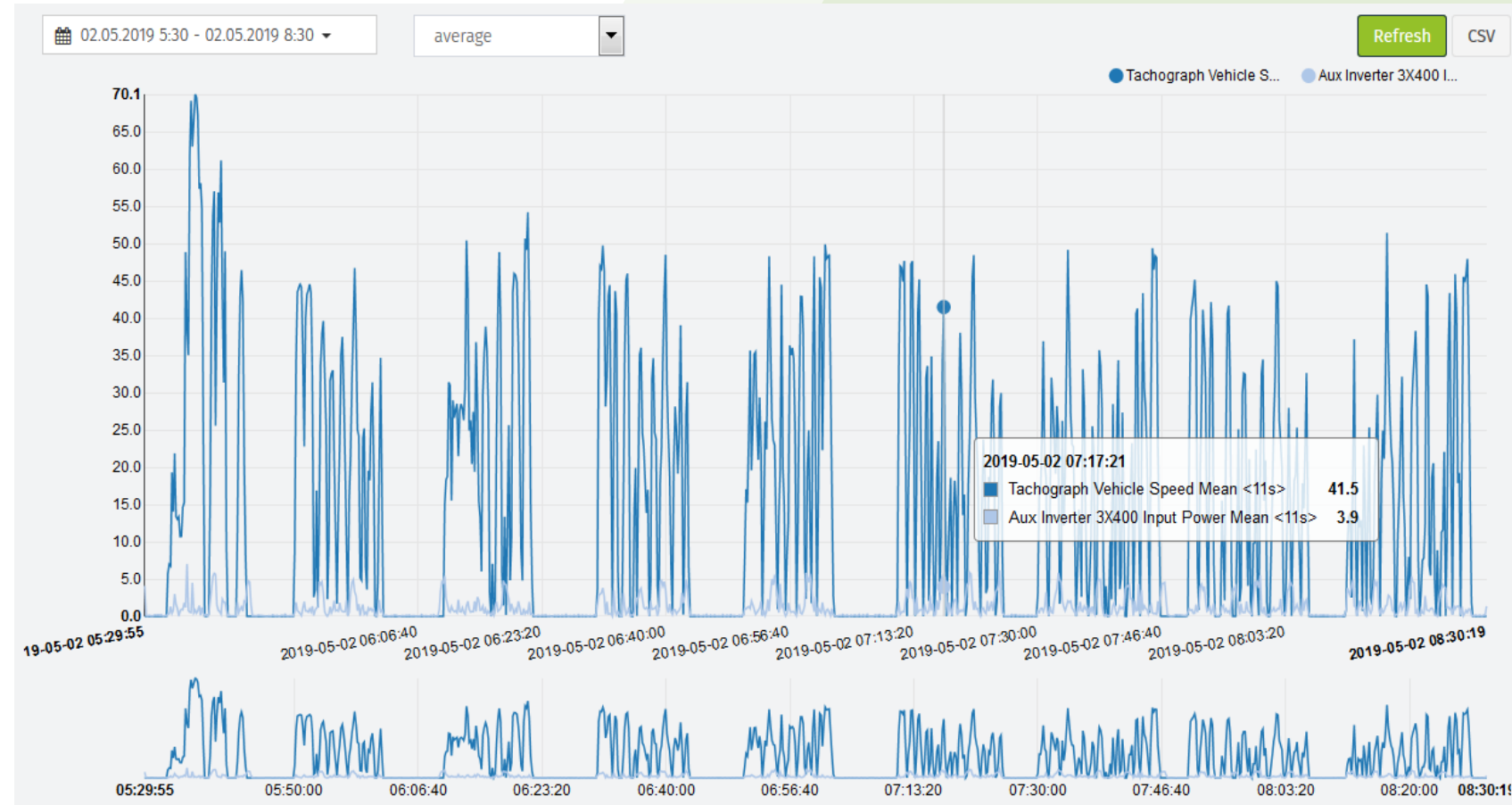
type	value	specification
FMI	5	Current Below Normal Or Open Circuit
SPN	1046	Brake Light Switch 2
OC	3	

light	status	specification
PL	0	
AWL	1	Active
RSL	0	
MIL	3	Not available



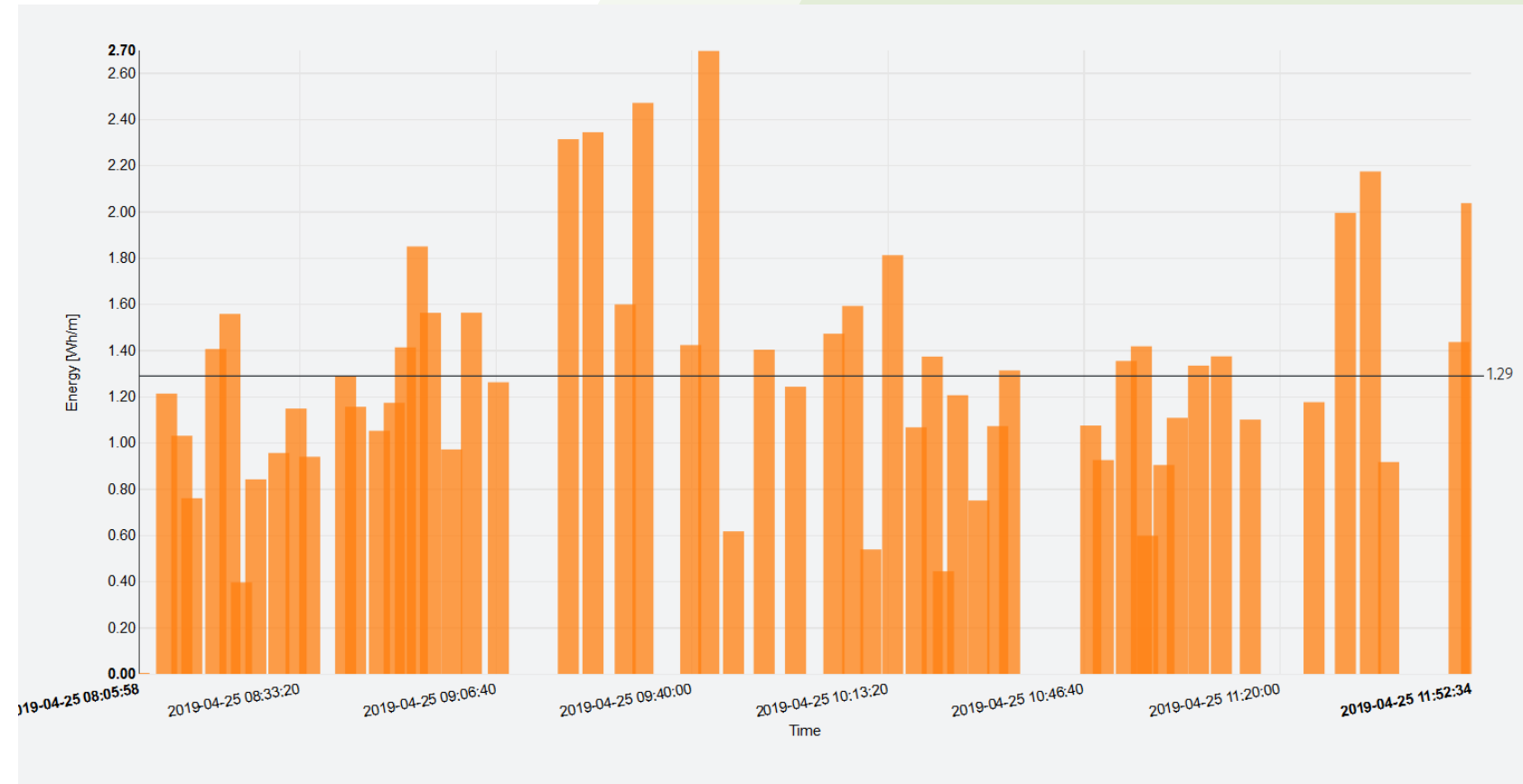
VEHICLE DATA MONITORING

- Mileage of the bus
- Speed of the bus
- Charging Energy
- Energy of discharge
- Energy of recuperation
- The power of the inverter
- Battery power
- Power of auxiliary devices (3x400V AC)
- The power of 24V DC devices
- The power of the boiler
- Battery heating status
- Air conditioning status
- The status of the air compressor



VEHICLE DATA MONITORING – ENERGY CONSUMPTION

- Energy consumption statistics
- Vehicle activity during the day





VEHICLE DATA MONITORING – REPORTS

- Display of predefined events:

Events List

2019-04-30 11:58 - 2019-04-30 11:58 ▼

Info ▼

Enabled ▼

End of Charged reached on a ▼

Filter

«

←

1

→

»

Bus	Type event	Status	Type	Attributes	Created
BUS 1	Info	Enabled	End of Charged		April 30, 2019, 2:01 a.m.
BUS 1	Info	Enabled	End of Charged		April 28, 2019, 11:20 p.m.
BUS 1	Info	Enabled	End of Charged		April 27, 2019, 9:24 p.m.
BUS 1	Info	Enabled	End of Charged		April 27, 2019, 3:48 p.m.
BUS 1	Info	Enabled	End of Charged		April 26, 2019, 3:08 p.m.
BUS 1	Info	Enabled	End of Charged		April 26, 2019, 12:55 a.m.
BUS 1	Info	Enabled	End of Charged		April 24, 2019, 11:33 p.m.
BUS 1	Info	Enabled	End of Charged		April 24, 2019, 1:39 a.m.

VEHICLE DATA MONITORING – A SUMMARY OF HISTORICAL DATA

- Summary of data on the selected vehicle
- List of distance traveled
- Statistics of energy consumption

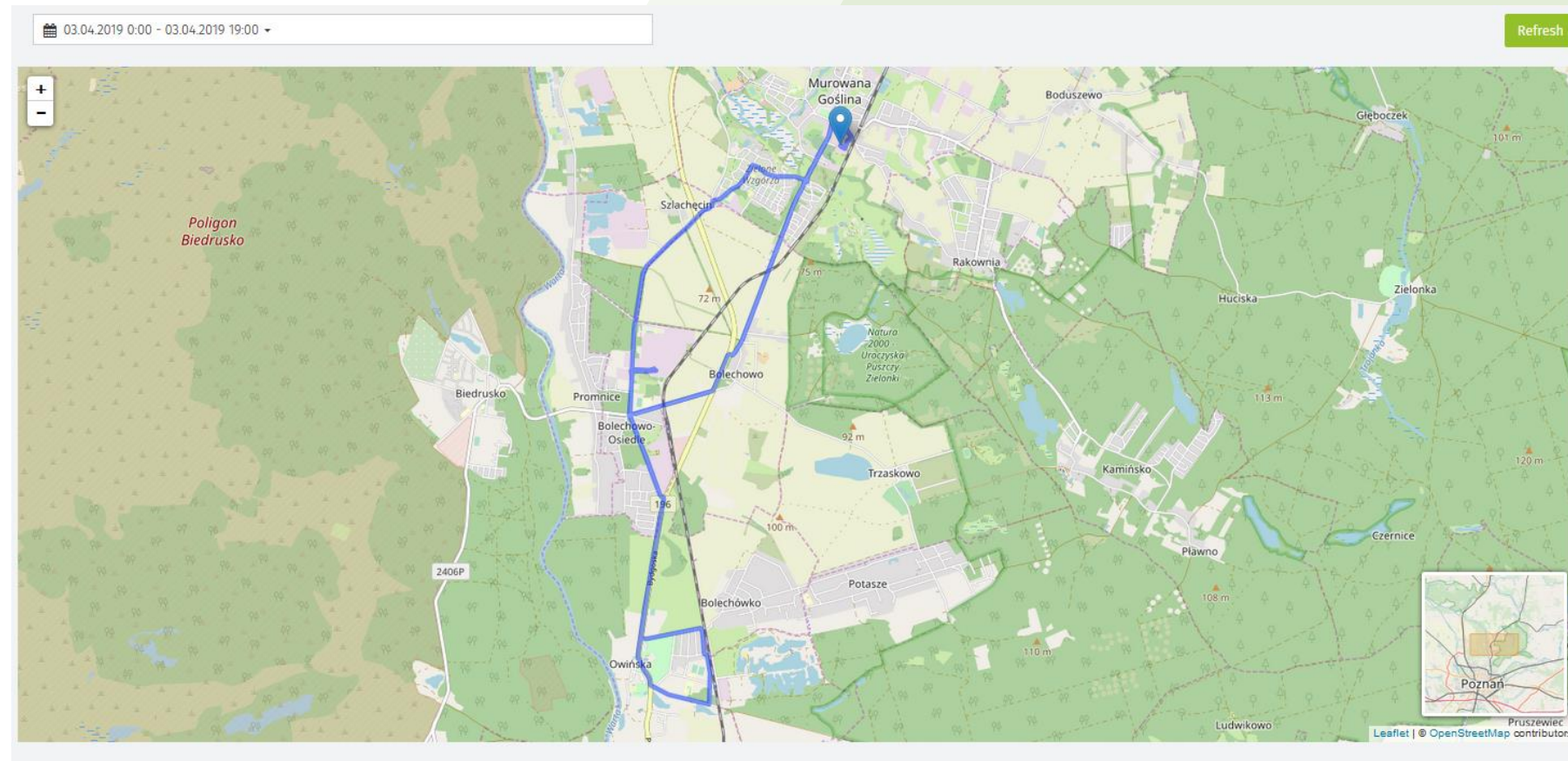
Comparison the bus parameters: **BUS 1**

« ← 1 2 → »

Total distance [km]	Total energy [MWh]	Average total consumption [Wh]	Distance today [m]	Energy today [Wh]	Average consumption today [kWh/km]	Update
5022.1	7.4	1.47	139.7	177.0	1.27	April 18, 2019
4882.4	7.2	1.48	131.3	167.0	1.27	April 17, 2019
4751.1	7.1	1.49	153.1	169.0	1.1	April 16, 2019
4598.1	6.9	1.5	133.2	159.0	1.19	April 15, 2019
4464.8	6.7	1.51	118.8	153.0	1.29	April 14, 2019
4346.1	6.6	1.51	122.4	129.0	1.05	April 13, 2019
4223.7	6.4	1.53	164.9	225.0	1.36	April 12, 2019
4058.8	6.2	1.53	157.8	181.0	1.15	April 11, 2019
3901.0	6.0	1.55	133.2	181.0	1.36	April 10, 2019
3767.8	5.9	1.56	164.6	203.0	1.23	April 9, 2019
3603.2	5.7	1.57	153.5	209.0	1.36	April 8, 2019

VEHICLE DATA MONITORING – VEHICLE POSITION ARCHIVE

- Monitoring the position of the vehicle within a selected period of time





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Any questions?