GENESIS MOBO

Presentation

Electric Bus Fleet Management

genesismobo.com

GENESIS MOBO

Map Module

Topology, location of chargers on a map,
route of vehicles.
• real-time feedback

Telemetry Module

Collecting and analyzing data
from vehicles and chargers.
• data collecting
• alarms
• analysis

VDV 261

We meet the standard,
the connection of devices
in the vehicle with external
applications.

OCPP

Data and specifications from chargers.
Data management, intelligent algorithm,
charge optimization.
• chargers management
• schedule

Schedule Module

Passenger transport planning.
Course schedule, brigade planning etc.
• planning
• schedule
• printouts

Management System (structure)

WEB platform

Hi-tech system - Client Server

- remote access
- multi-user access
- data security

Planning
realization of transport reports and analyses

Maintaining the continuity of passenger transportation, costs optimization.

Based on connections graph and statistical data.

- **Planner**
- **Optymizer**

Control and verification. Ability to fast respond in emergency situations.

- **Telemetry**
- **Map and line graph**
- **Alarm system**

Collation of telemetry parameters - e.g. batteries' SOC, average electricity consumption.

- **Telemetry reports**
- **Transport realization reports**
- **Aggregated reports generator**

1. PLANNING
2. REALIZATION
3. REPORTS

1

Planning

1. Possibility to check if a given vehicle is able to complete a given transport task considering chargers in the city and at the depot.

2. Counting actual consumption on a base of:
   - connections graphs of schedule (connection geometry)
   - average speed of previous completed trips.

TOOLS:

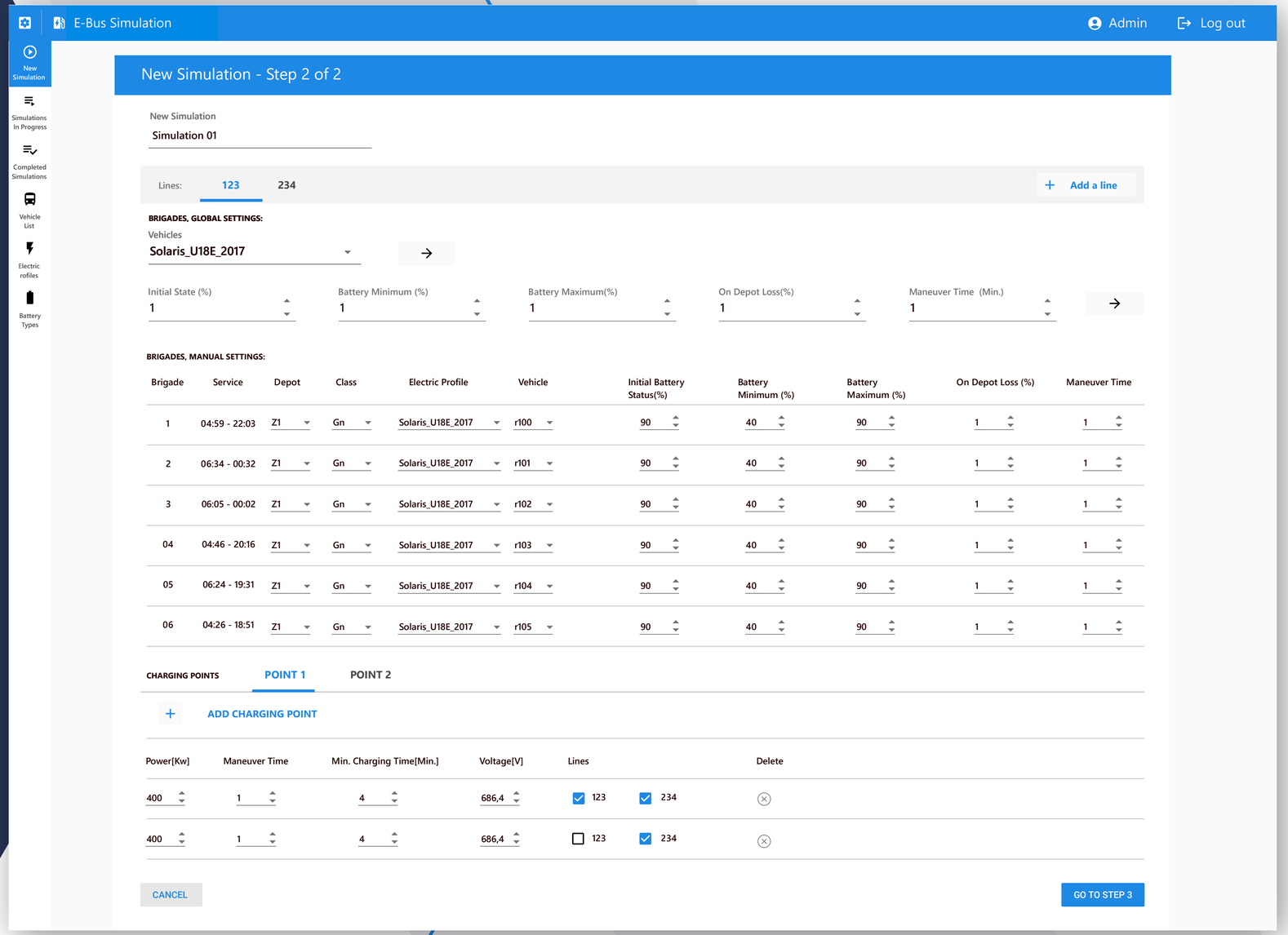
ELECTRIC TRANSPORT PLANNER

ELECTRIC TRANSPORT OPTIMIZER

1

Electric transport planner

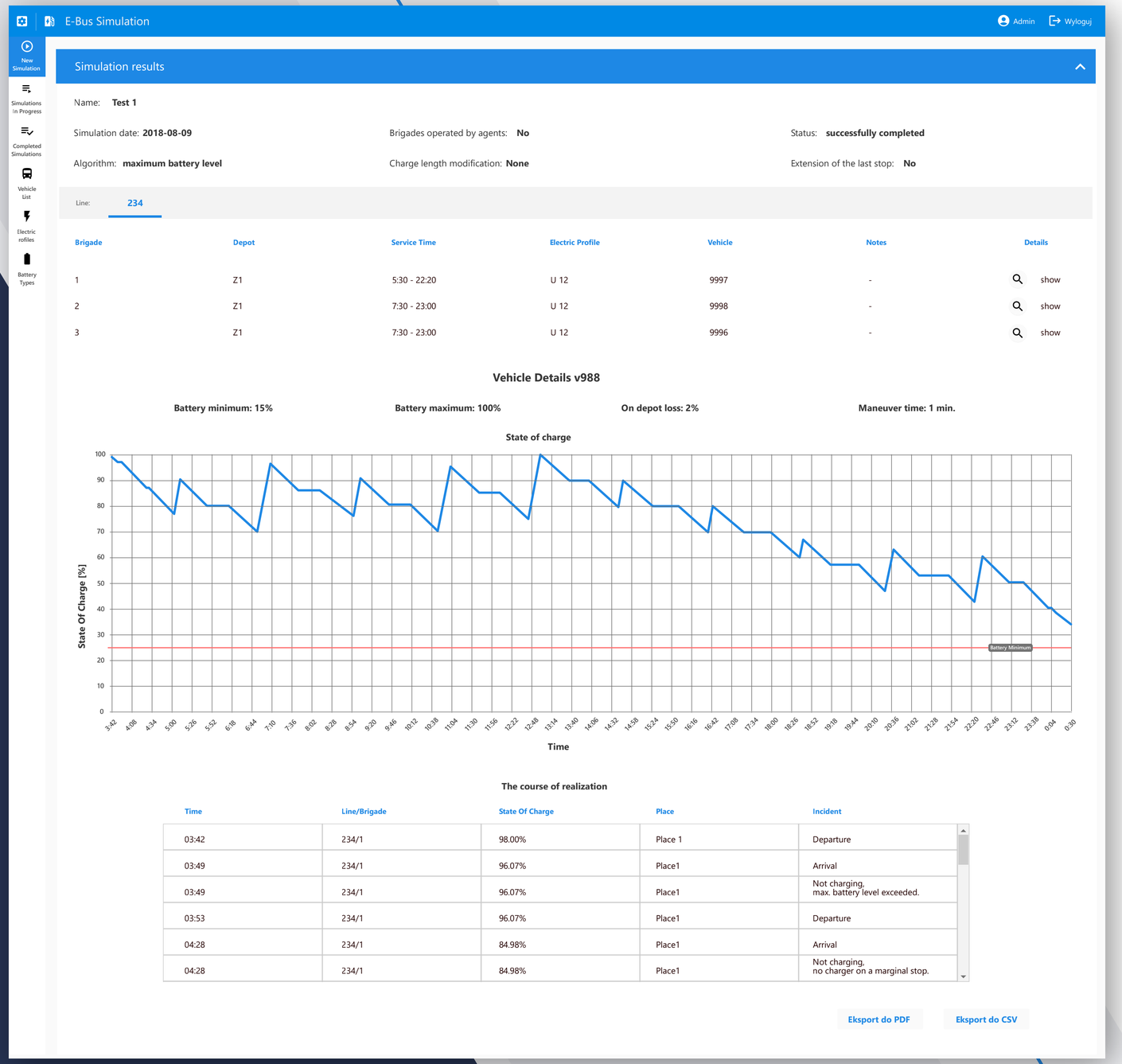
Enables effective schedule planning with electric fleet. Takes into consideration electric chargers (e.g. charging power, charging time, location), schedules and electric vehicles (including electric battery parameters, battery consumption indicator).



1

Planner
- simulation results

The planner generates a work schedule for electric vehicles that extends the notion of a schedule by adding breaks due to the need for charging.



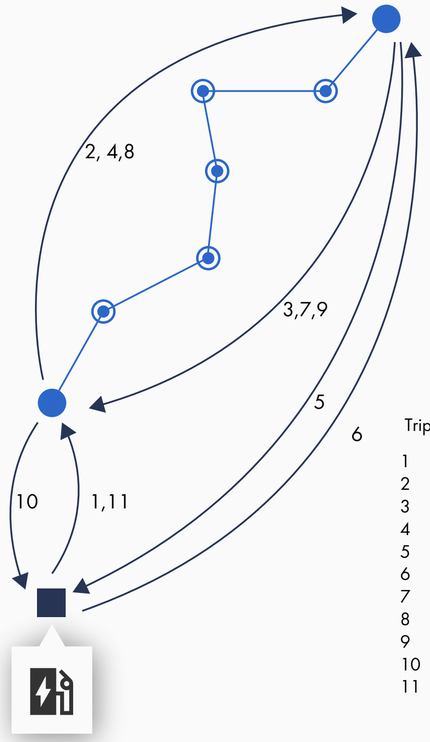
1

Planning

Electric transport optimizer

Additionally, it minimizes the time, or vehicle-kilometers, required to execute the schedule so that the cost of execution using electric fleet is as low as possible. The optimizer is applicable when the target customer does not have chargers at marginal stops, but only at the depots. At that time the cost of trips and accesses begins to be significant to the cost estimate associated with the schedule execution.

Example schema 1

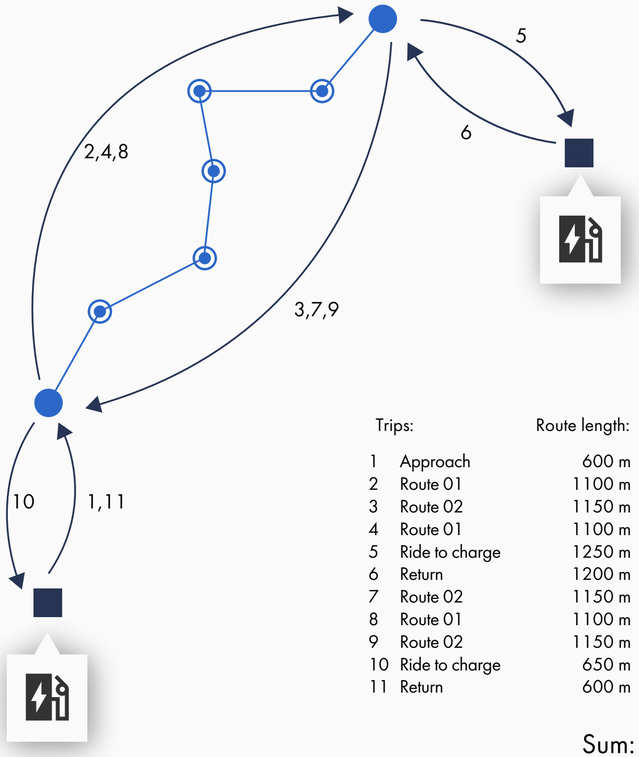


Trips:		Route length:
1	Approach	600 m
2	Route 01	1100 m
3	Route 02	1150 m
4	Route 01	1100 m
5	Ride to charge	1800 m
6	Return	1700 m
7	Route 02	1150 m
8	Route 01	1100 m
9	Route 02	1150 m
10	Ride to charge	650 m
11	Return	600 m

Sum:

12 100 m

Example schema 2 - Optimization



Trips:		Route length:
1	Approach	600 m
2	Route 01	1100 m
3	Route 02	1150 m
4	Route 01	1100 m
5	Ride to charge	1250 m
6	Return	1200 m
7	Route 02	1150 m
8	Route 01	1100 m
9	Route 02	1150 m
10	Ride to charge	650 m
11	Return	600 m

Sum:

11 050 m

2

Realization

1. Controlling power level and charging priority in chargers if the power of connected vehicles exceeds the power of chargers.

2. Checking on an ongoing basis that the vehicle is realizing trip according to the plan and that the course is not at risk due to the possibility of running out of energy.

TOOLS:

TELEMETRY

MAP AND LINE GRAPH

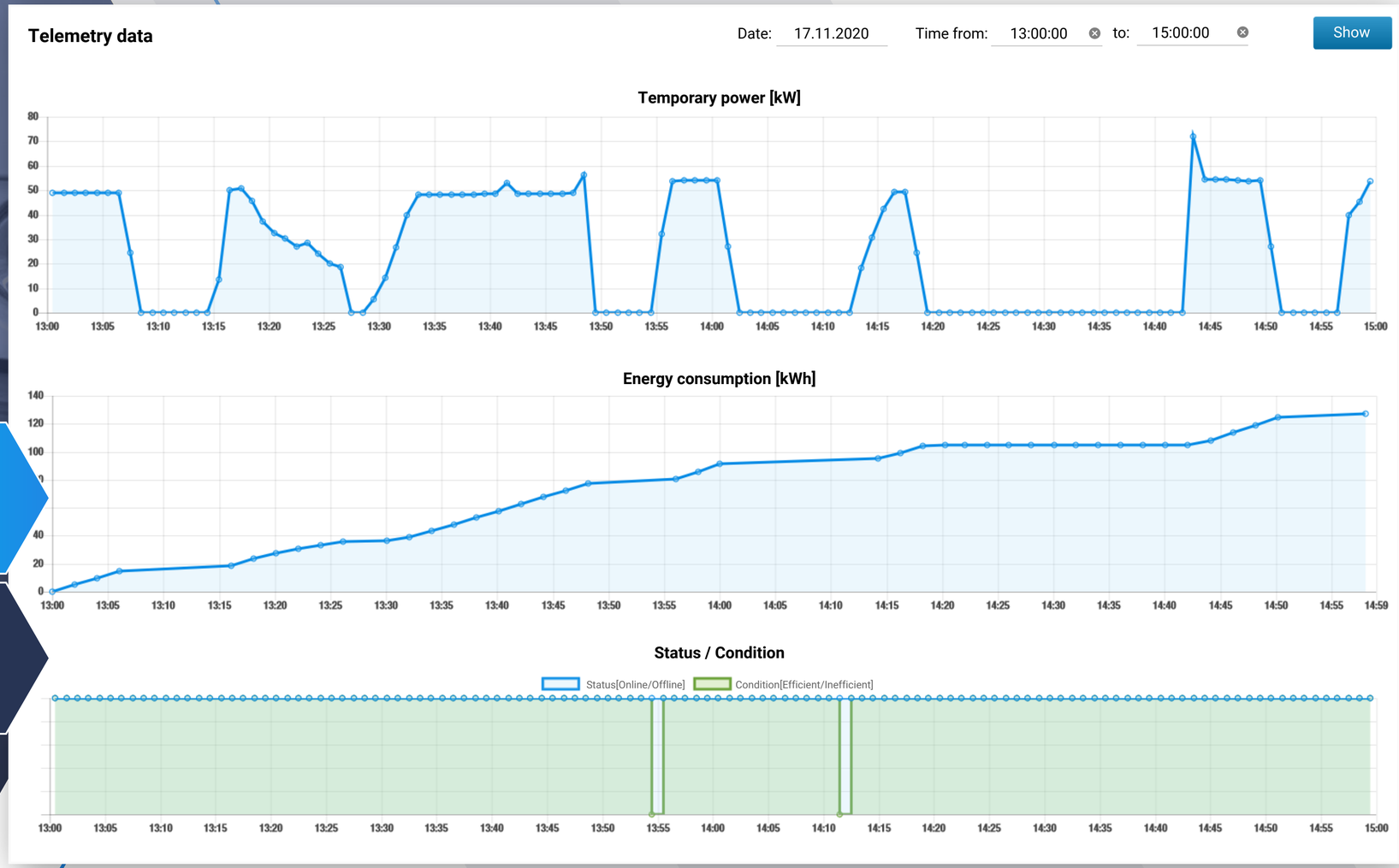
ALARM SYSTEM

2

Realization

Telemetry

The module allows observation of technical parameters of currently carrying out transport tasks, as well as the analysis of history of signals.

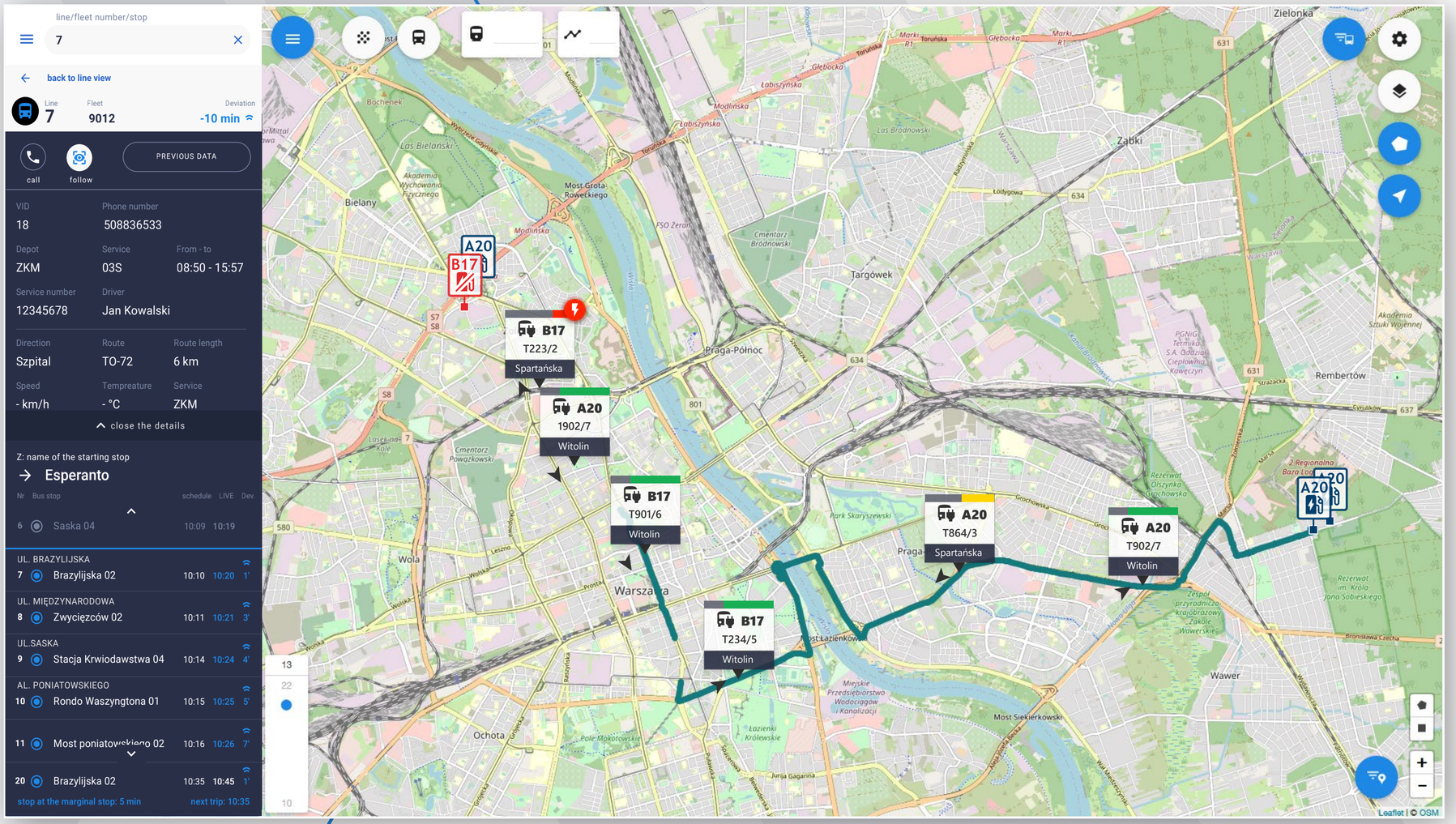


2

Realization

Map and line graph

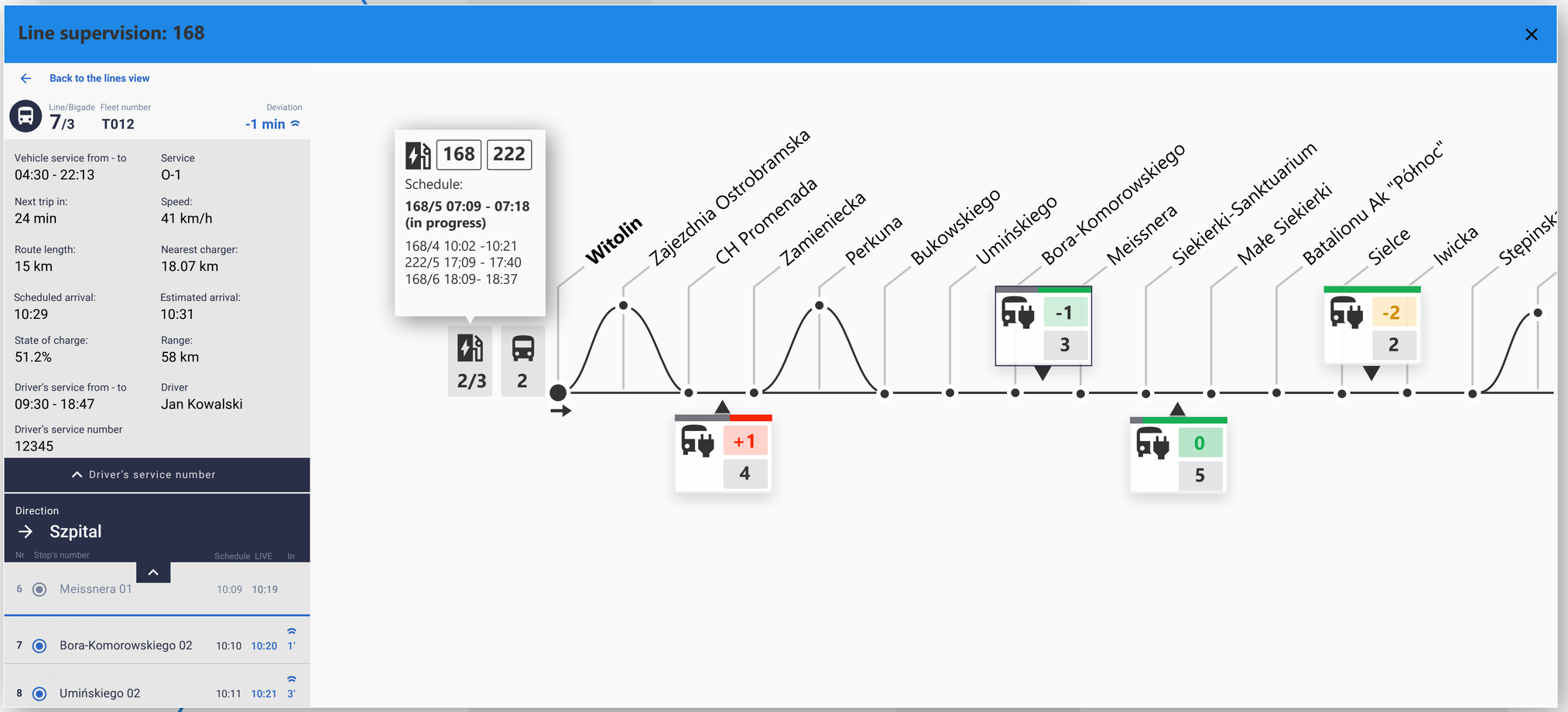
They allow real-time control of transport tasks and support dispatchers' decisions in case of difficult situations. Both the map and the line graph show the vehicles. The line chart relates the vehicles to the schedule and the currently running transport tasks and illustrates the situation on the line, enables the coordination of activities on the line



2

Realization

Map and line graph



2

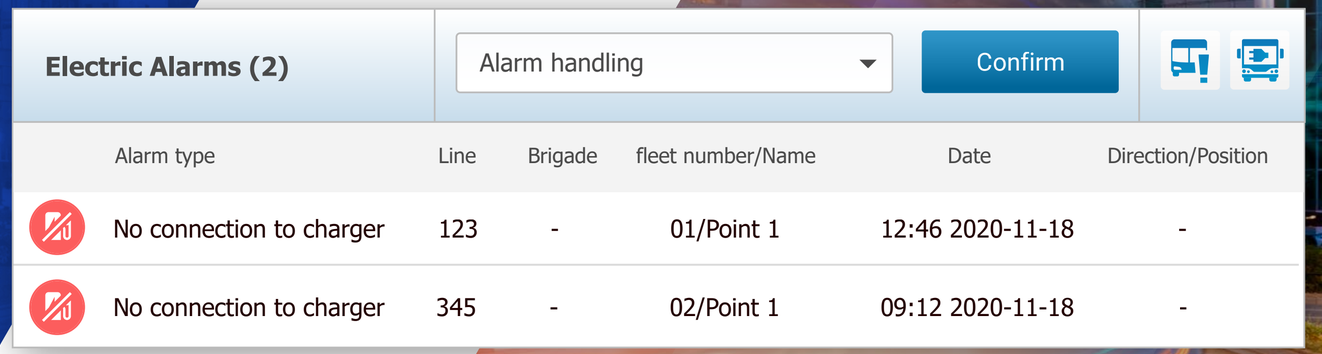
Realization

Alarm System

Any dangers or irregularities during route are presented in the form of alarms.
Alarms are divided into:

Informational - those that report abnormal situations, however, they are not critical. An example of such an alarm can be too low electric balance of the vehicle. This is interesting information, especially in a broader perspective, but it does not require immediate reaction.

Operational - these are critical alarms that require service. An example of such an alarm for an electric vehicle can be lack of range to reach the nearest charging point.



2

GENESIS MOBO

Realization

Alarm System -operational

Operational alarms cannot be missed, and the system user is not forced to constantly observe technical parameters of the electric fleet in search of possible irregularities.

CHARGER ERROR

The charger indicates an error if there is no contact with the charger or its available power has been reduced.

UNREALIZED CHARGING

The vehicle should start charging according to the schedule, which did not happen - no charging according to the schedule.

LACK OF RANGE

The SOC of the vehicle's battery considering the closest trip and direct route to the charging point is insufficient to reach this point.

2

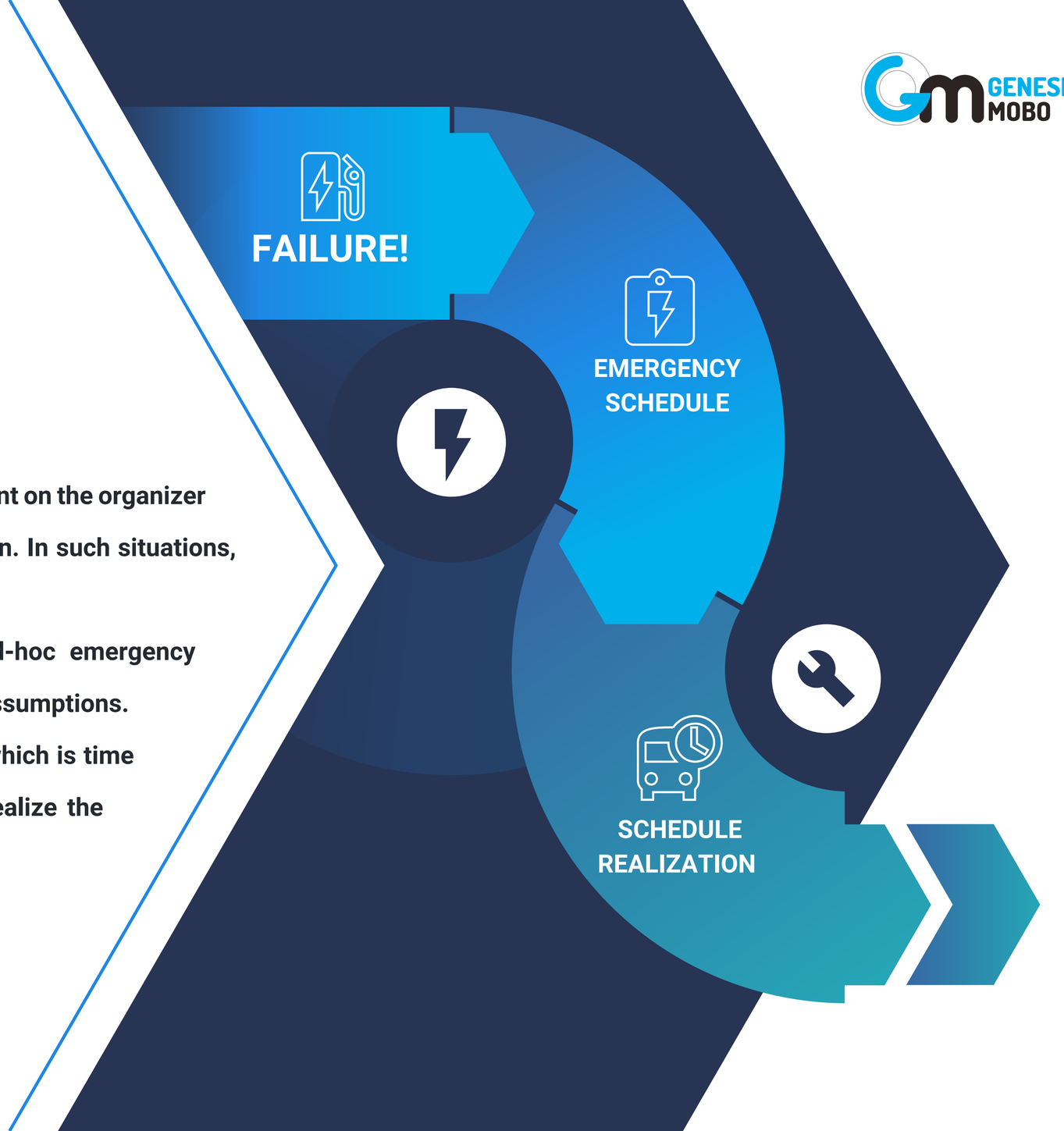
Realization

EMERGENCIES

Examples of emergency situations are all kinds of failures, independent on the organizer or operator, which are associated with a time deviation from the plan. In such situations, the previously assumed schedule cannot be realized.

At the request of the dispatcher the scheduler generates an ad-hoc emergency schedule, which is supposed to realize the timetable with changed assumptions.

The generated schedule will not include the most optimal solution which is time consuming to prepare by the optimizer, however, it will allow to realize the schedule according to the new assumptions.



3

GENESIS MOBO

Reports

Save to formats:

PDF DOCX CSV XML

- **TELEMETRY**
- **TRANSPORT REALIZATION**
- **AGGREGATED REPORTS GENERATOR**

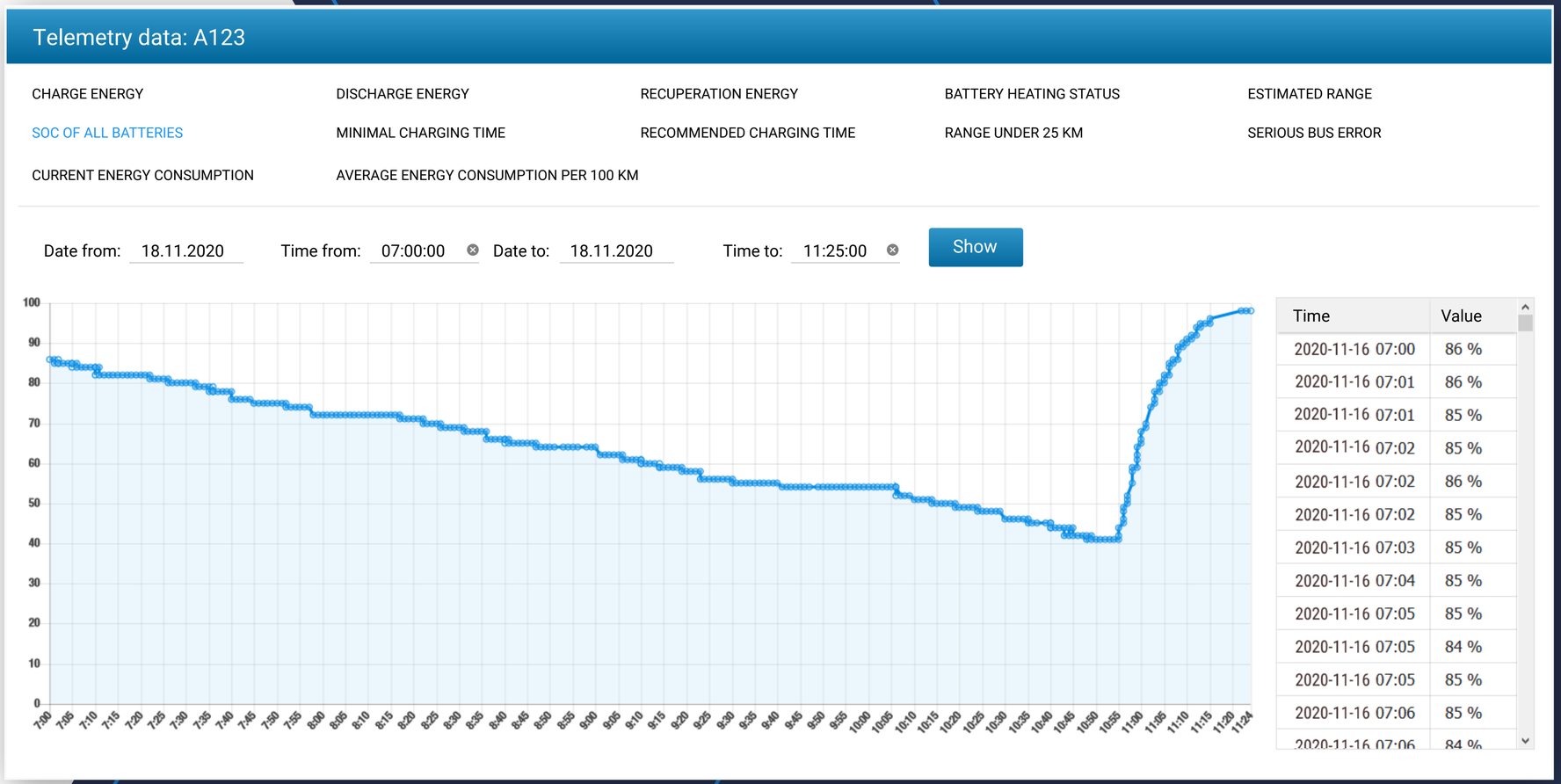
3

GENESIS MOBO

Reports

Telemetry Reports

Reports allow any combination of telemetry parameters - e.g. battery SOC, average power consumption.



3

GENESIS MOBO

Reports

Telemetry Reports

They allow to relate telemetry parameters to the operation of specific lines - e.g. average energy consumption from 08:00 to 10:00 on line X.

Electricity consumption report

Vehicle	Type	Line	Brigade	From	To	Average charged energy	Total charged energy	Average energy used	Total energy used	Average energy of recuperation	Total energy of recuperation
P120	Brand U18E (A)	A21	2	2020-11-16 04:47	2020-11-16 14:26	60.13	191.51	182.08	368.38	45.21	104.47
P123	Brand U18E (A)	A21	9	2020-11-16 00:00	2020-11-16 14:26	82.93	308.14	156.94	510.25	50.37	176.99
P123	Brand U18E (A)	A21	12	2020-11-16 06:09	2020-11-16 14:26	39.57	127.42	112.36	243.11	34.39	77.31
P127	Brand U18E (A)	A21	3	2020-11-16 06:25	2020-11-16 14:26	33.56	93.09	88.38	208.40	27.03	68.23
P120	Brand U18E (A)	A21	5	2020-11-16 06:47	2020-11-16 14:26	22.90	63.98	48.73	135.19	15.97	46.49
P121	Brand U18E (A)	A21	014	2020-11-16 00:00	2020-11-16 00:11	131.81	0.00	258.42	0.18	85.10	0.00
P124	Brand U18E (A)	A21	7	2020-11-16 04:23	2020-11-16 13:55	33.86	91.28	98.87	268.61	28.72	84.10
P125	Brand U18E (A)	A21	11	2020-11-16 04:10	2020-11-16 14:26	52.42	116.60	115.54	271.19	31.80	80.16
P128	Brand U18E (A)	A21	1	2020-11-16 04:21	2020-11-16 14:26	49.90	147.93	124.77	277.42	38.67	94.64
P180	Brand U18E (A)	A21	014	2020-11-16 13:59	2020-11-16 14:26	8.92	0.00	115.14	5.33	38.54	0.49
P280	Brand U18E (A)	A21	8	2020-11-16 06:31	2020-11-16 14:26	41.52	111.18	103.49	228.52	33.17	77.76
P233	Brand U18E (A)	A21	1	2020-11-16 00:00	2020-11-16 00:01	313.36	1.26	666.40	0.00	171.34	0.00
P236	Brand U18E (A)	A21	7	2020-11-16 13:24	2020-11-16 13:31	1.26	4.08	6.03	7.75	0.00	0.00
P238	Brand U18E (A)	A21	8	2020-11-16 03:14	2020-11-16 08:23	0.01	1.27	43.17	118.27	10.69	32.18
P250	Brand U18E (A)	A21	10	2020-11-16 06:41	2020-11-16 14:25	31.08	85.76	81.76	185.20	22.62	53.62
P252	Brand U18E (A)	A21	10	2020-11-16 00:00	2020-11-16 00:15	254.57	14.54	438.16	0.00	137.57	0.00
P253	Brand U18E (A)	A21	4	2020-11-16 04:12	2020-11-16 14:26	52.70	132.18	129.88	288.13	34.30	85.36

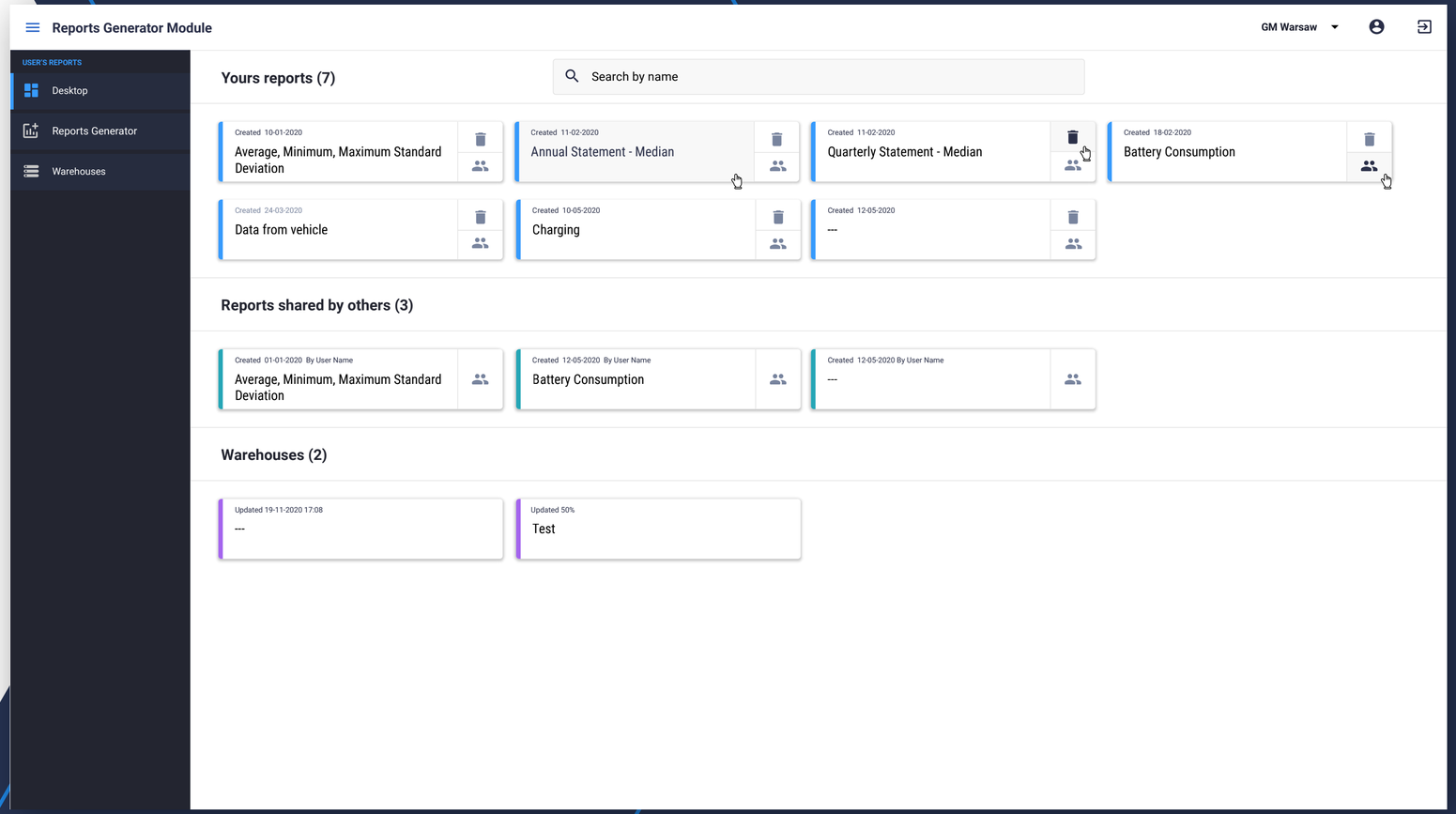
3

Reports

Aggregated reports generator

Reports can be run according to a schedule. The user can enter his own report templates. Generator allows the user to prepare any collations. The operation of the generator is based on early preparation of data for aggregation in a daily cycle, and then generating reports based on previously prepared. According to its construction, the generator can create aggregated reports with the use of statistical function from very large data periods.

An example of a report might be average, minimum, maximum, standard deviation, median battery consumption by battery type and line in monthly comparison.



GENESIS MOBO

Thank you for your attention.

We invite you to cooperation!