RFP SUPERVISION EV CHARGING EN

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This document is an example of a RFP for the supervision of electric vehicle charging stations adapted for PcVue. It is to be given to any person who has to write an RFP supervision (Engineering office, ...) using PcVue.

Content

Lexicon

Below is a glossary of the most commonly used terms in this document to facilitate reading and understanding:

CSMS **C**harging **S**tation **M**anagement **S**ystem
OCPP **O**pen **C**harge **P**oint **P**rotocol
OSCP **O**pen **S**mart **C**harging **P**rotocol
OCPI **O**pen **C**harge **P**oint **I**nterface
SoC **S**tate **o**f **C**harge

1. General System Features

The purpose of this chapter is to define the main functional specifications of the future CSMS system supervision software, which shall be detailed elsewhere in the document.

In general, the system shall have to allow for the efficient operation and maintenance of the CSMS bollard fleet, in particular to:

- Guarantee the best service to EV users/drivers, safety and performance of the facilities
- Optimize the management of equipment and energy
- To perpetuate the installations while allowing their evolution

The system must therefore meet the following characteristics and support the following monitoring functions:

- Real-time monitoring and control of the installations via an interface with the possibility of viewing the status, the state of the chargers, the consumption and transactions and controlling the chargers.

- Interoperability and communication with other systems such as buildings (comfort, energy, intrusion and video surveillance, access control, lifts, fire), electrical production sites, service operators for example.

- Interactive graphical interface that meets the latest UX standards
- Secure and customizable mobile technology

- Real-time feedback of events and alarms from kiosks centrally but also directly to users with mobile devices

- All of the data collected shall be archived in an open SQLServer database that can be used by other third-party systems. The supervision software shall allow various means of exploiting these archives for short, medium and long-term analysis, such as statistical extraction to Excel files, editing of reports and balances, or visualization of curve monitoring.
- Energy performance monitoring and reporting in the form of dashboard

- The supervision software must be scalable and flexible and able to adapt to changes in order to support the expansion of the park, the fleet and the building without having to redevelop everything. It shall be used for supervising one or several infrastructures.

- The supervision software shall be based on an object-oriented solution allowing to manage and easily modify the layouts of the installations:

  - An integrated environment allowing the modelling of a process or a functional unit and easy deployment via instantiation mechanisms.

- A library of pre-animated objects that can be modified online without any external tool.

- The upward compatibility of the versions of the supervision software must be ensured and allows the installation of new versions of the software, without modifying the project data

- In order to ensure continuity of service and maintenance in operational conditions, the software must have project version management

2. Quick-start Project

2.1 Pre-configured project

The supervisor shall have a functionality allowing to create the main framework of a project in few clicks.
The generated project shall integrate the main functions necessary for the operation and maintenance of one or more kiosk parks as described in this document.
The generated project can then be customized according to the specific needs of the context.

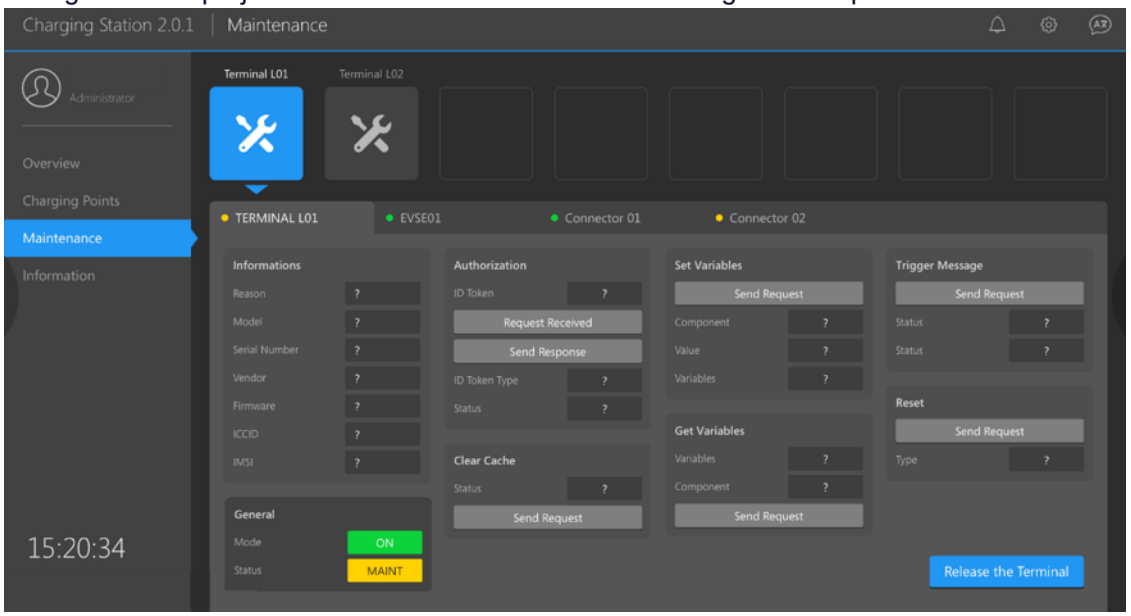


Figure 1 - Example of generated projects

2.2 Integration into an existing supervision project

The supervisor should offer the possibility of integrating EVCharge into an existing supervision project. The latter will have libraries containing images, variables, views and other configurations that can be added to the existing project with just a few clicks.

The Supervisor's instantiation function will then instantiate all these new libraries in the project and generate the elements required to set up the new system.

The supervisor will also allow to size the installation, for example, by choosing the number of bollards required. The display will automatically adapt to the number of bollards selected, to ensure a clear, uniform view. If the number of bollards is too large, a combo-box is added to the main view to allow selection of bollard(s) from a list.

It will still be possible to customize the views to suit the needs of the project.

In the existing project, the supervisor can adapt the home page to link it with the new EVcharge view(s) generated.

Integrating the EvCharge into the existing supervision system for 50 terminals will take 15 minutes for a user trained to use the supervisor.

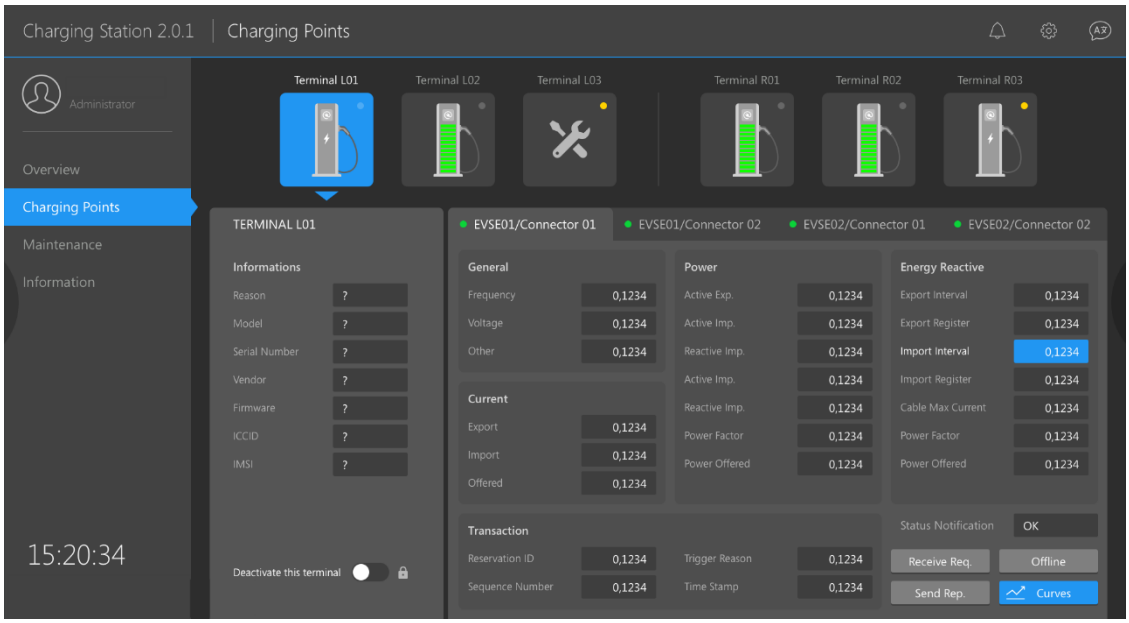


Figure 2 - Example of a charging point and its properties

3. Optimization algorithms

The supervisor shall not be satisfied with simply reporting information.
It shall integrate processing algorithms for resource management (Chargers, energy, vehicles, networks) and optimization.

It shall enable real-time operation and maintenance of the infrastructure by providing feedback on events and alarms and intelligent control of the chargers.

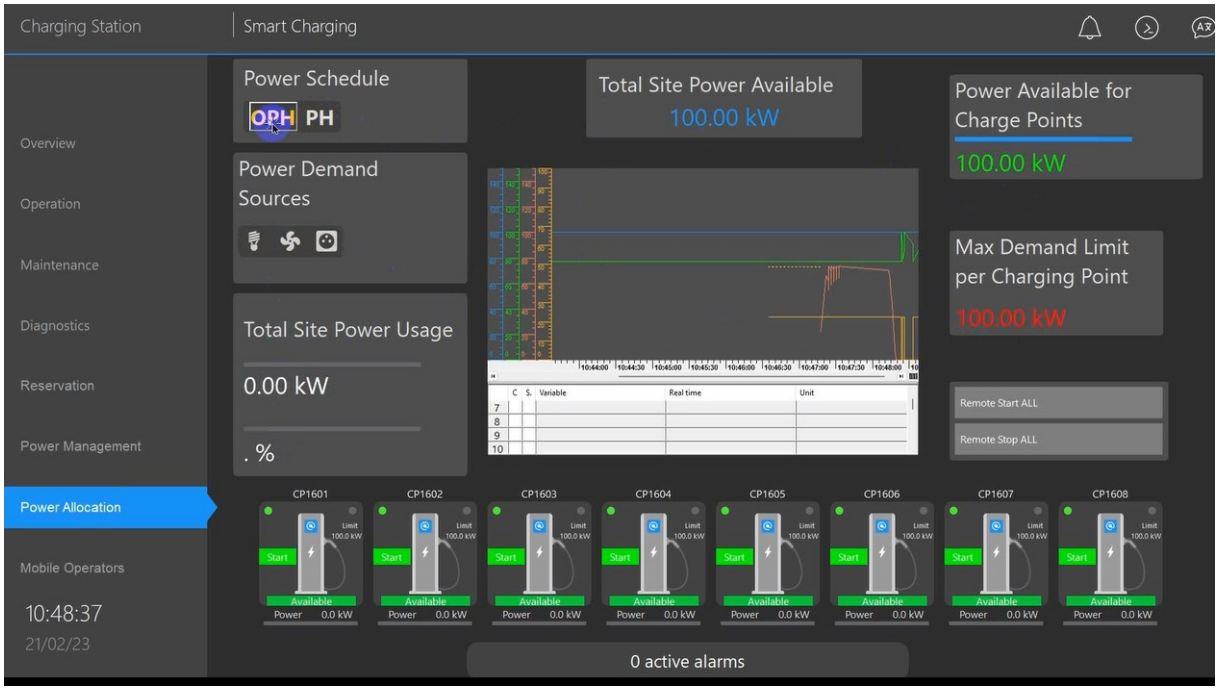


Figure 3 - Example of an optimized management view

4. Connection and interoperability

The supervisor shall be able to connect to different brands of charging station using ad-hoc protocols. It shall also be possible to upgrade the system by adding new chargers without having to redevelop everything and with a minimum of configuration. It shall also be open to other systems protocols such as OCPP 1.6 JS and OCPP 2.0.1.

The system shall support OCPP 1.6 JSON and 2.0.1. It shall be adapted to the supervision of all types of electric vehicles: light, medium and heavy vehicles - buses and trucks.
All OCPP functionalities shall be supported.

PROFILES	SUPPORTED MESSAGES		MISC	
			Initiated by...	Proceeded/Responded by...
CORE	Authorize	✓	C	SV
	BootNotification	✓	C	MGR
	ChangeAvailability	✓	S	
	ChangeConfiguration	✓	S	
	ClearCache	✓	S	
	DataTransfer	✓	C/S	MGR
	GetConfiguration	✓	S	
	Heartbeat	✓	C	MGR
	MeterValues	✓	C	MGR
	RemoteStartTransaction	✓	S	
	RemoteStopTransaction	✓	S	
	Reset	✓	S	
	StartTransaction	✓	C	SV
	StatusNotification	✓	C	MGR
	StopTransaction	✓	C	SV
	UnlockConnector	✓	S	
FIRMWARE MANAGEMENT	GetDiagnostics	✓	S	
	DiagnosticsStatusNotification	✓	C	MGR
	FirmwareStatusNotification	✓	C	MGR
	UpdateFirmware	✓	S	
LOCAL AUTH LIST MANAGEMENT	GetLocalListVersion	✓	S	
	SendLocalList	✓	S	
RESERVATION	CancelReservation	✓	S	
	ReserveNow	✓	S	
SMART CHARGING	ClearChargingProfile	✓	S	
	GetCompositeSchedule	✗	S	
	SetChargingProfile	✓	S	
REMOTE TRIGGER	TriggerMessage	✓	S	

✓ Supported
✗ Not supported

C = Client (Charge Point)
S = Server (Central System)

MGR = Supervisor OCPP Driver
SV = Supervisor (the SV project is supposed to trigger a call response)

Figure 4 - List of supported OCPP features

4.1 Other communication protocols

The supervisor shall allow to connect to the Chargers using other protocols or exchange standards such as (non-exhaustive list):

- Modbus TCP/IP
- OPC UA
- …

4.2 Interoperability

The supervisor shall allow a high degree of interoperability to integrate in a single interface, in addition to the management of the Chargers, information from various systems such as buildings, electrical production sites, service operators for example.

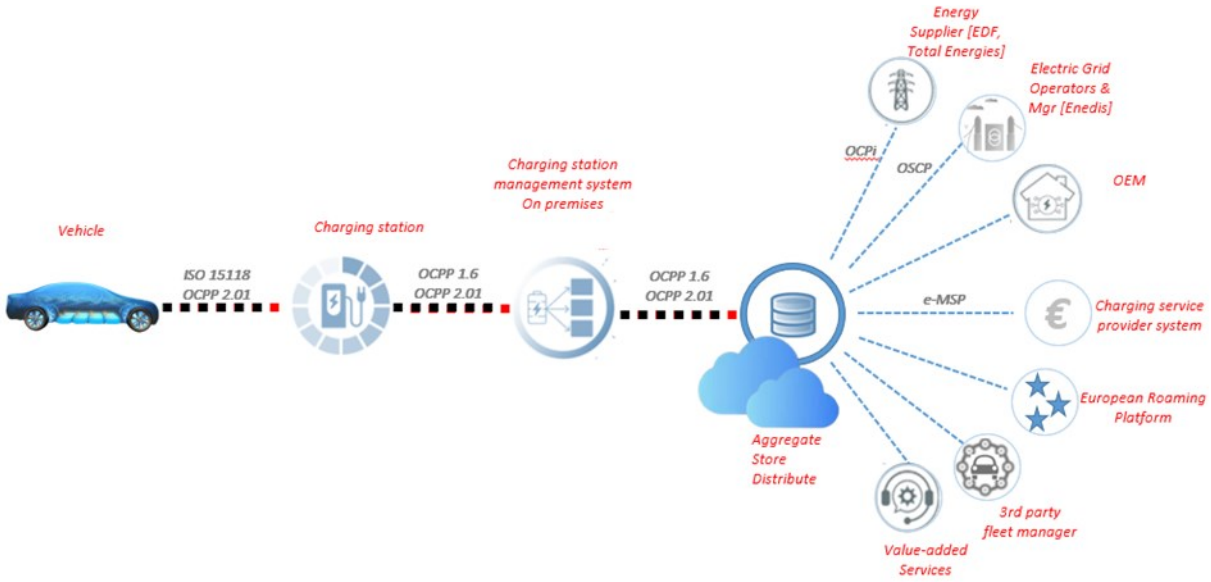


Figure 5 - Interoperability scheme

The supervisor shall have to ensure interoperability with the following systems, as well as with roaming platforms such as Gireve, Hubject, Enel:

- Specific protocols for the CSMS market
  . OCPI Open charge Point Interface
  . OSCP Open Smart Charge point
  . e-MSP electric Mobility Service Providers (Third-party suppliers of services)
- Web services
- API REST
- OPC UA Open Platform communication
- Electrical Management systems: natives protocols
  - OCPP 1.6 JS - OCPP 2.0.1 - ISO 15118
  - IEC 60870-5-104 Client-Server
  - IEC 60870 - 101 Client

- IEC 61850 Client DNV-GL (former KEMA) certified
- IEC60870-6/TASE.2 (ICCP)
- DNP3
- IEC 61400-25, OPC, Modus TCP/IP,100+ others…

- Buldings Management Systems
  - BACnet
  - KNX
  - LonWorks
  - SNMP
  - …
- IoT
  - LoRa
  - MQTT
  - …
- Advenir (For France only) / Government authorities

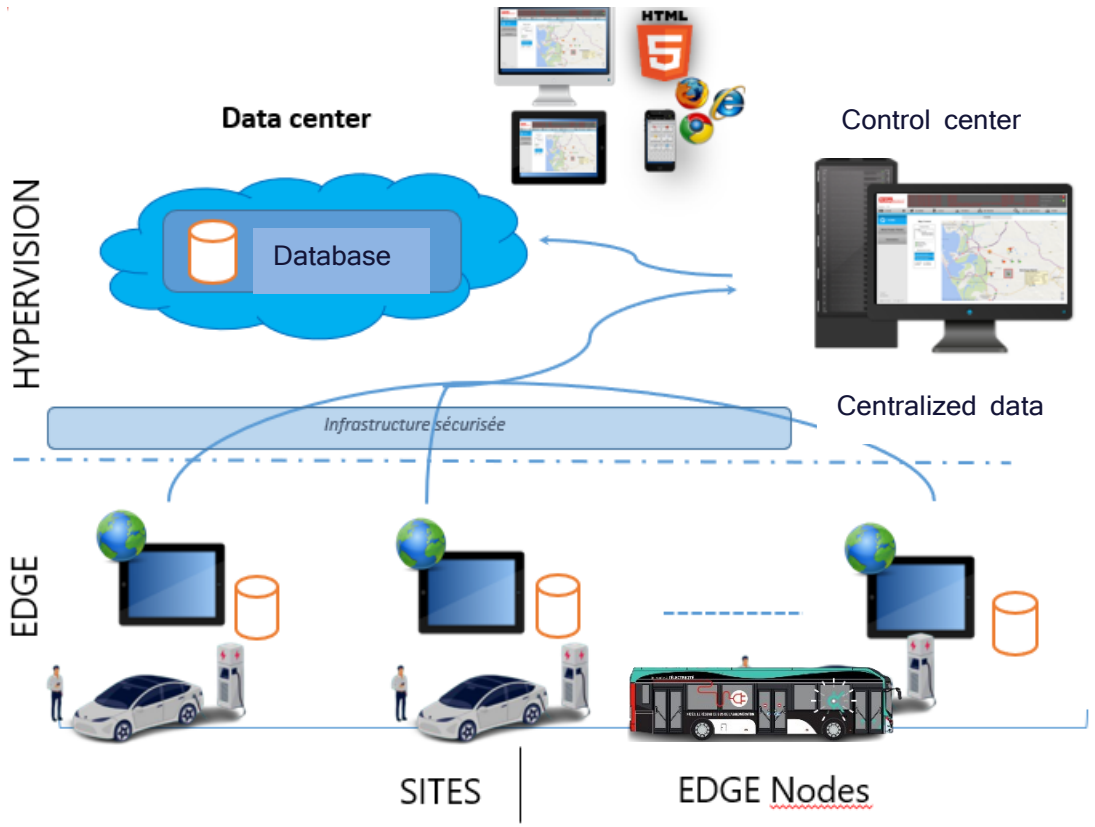
Figure 6 - Multi-system hypervision view

5. Architectures and deployment

The supervisor shall allow several types of architecture and deployment:

- Local supervision of parks' chargers
- Hypervision of several geographically dispersed sites
- Deployment in the cloud

5.1 Architecture's example



In this architecture, the supervisor is hosted on site in a control center within an architecture that may include multiple data acquisition servers and clients.
Data is hosted in a cloud database.
Data from local sites via a secure WAN/VPN using TCP/IP messaging or other protocols and acts as a server for web and mobile clients.
This architecture allows:

- Hosting data in the cloud and delegating data maintenance and security
- Integration of a cloud infrastructure into an existing architecture

6. Features included

6.1 Smart Charging – Dynamic power management

The supervisor's regulation and power management system shall be based on the management of Smart Charging profiles including:

- Regulation in watts or amperes
- Limiting/regulating the maximum load of each charger according to a list of load partition criteria
- Management of potential profile conflicts

The supervisor shall also offer the following additional advanced features:

- Maximum power limit not to be exceeded

- Consideration of a power limit per sub-group and at the level of a single charger if necessary

- Consideration of vehicle pre-conditioning according to applicable conditions

- Recalculation of the power allocation according to the power demand at a time t

- Take into account the residual power available if necessary and redistribute it (e.g. at the end of a charge)

- Take into account different target SoCs, different charger powers, and different needs at a time t, in its dynamic power allocation calculation, with the objective of optimization

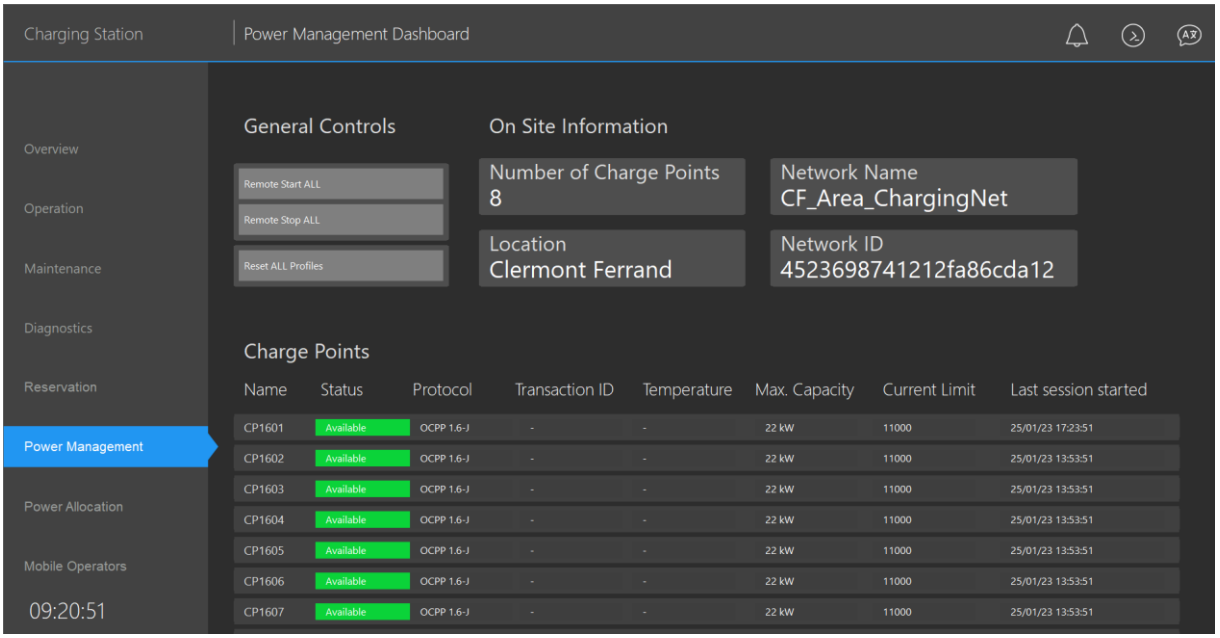


Figure 7 - Dynamic power management view

6.1.1 Planning of charging

The system shall have a planning tool to optimize equipment, optimize energy, optimize vehicle recharging, in a search for performance and service.

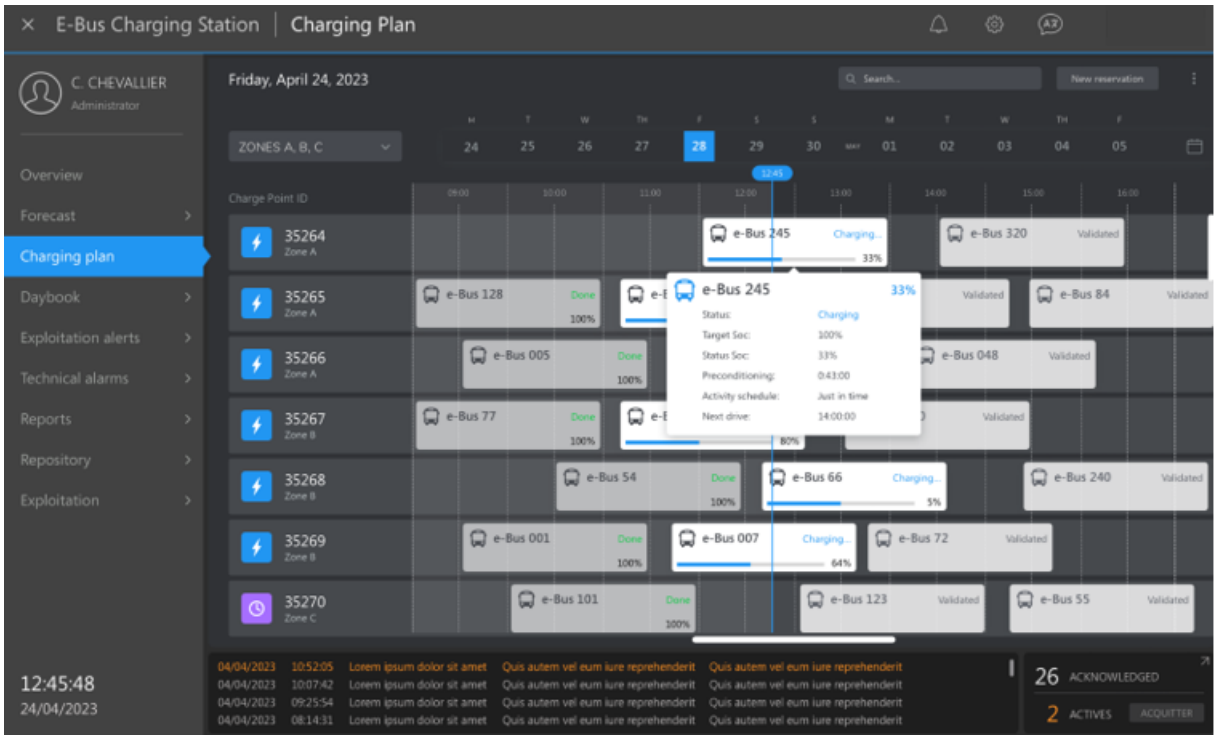


Figure 8 - Vehicle charging planning tool

Figure 9 - Dynamic ground plan of EV Charging

6.1.2 Managing Chargers usage profiles

The supervisor shall make it possible to manage different load profiles used for different users (sales representatives, technicians, management, office workers, etc,…)

The profiles shall incorporate the standard OCPP properties:

- Profil ID
- Stack level
- Profil's usage
- Type of profil
- Validity period
- Calendar, scheduling
- …

It shall be possible to create, modify and upload profiles..

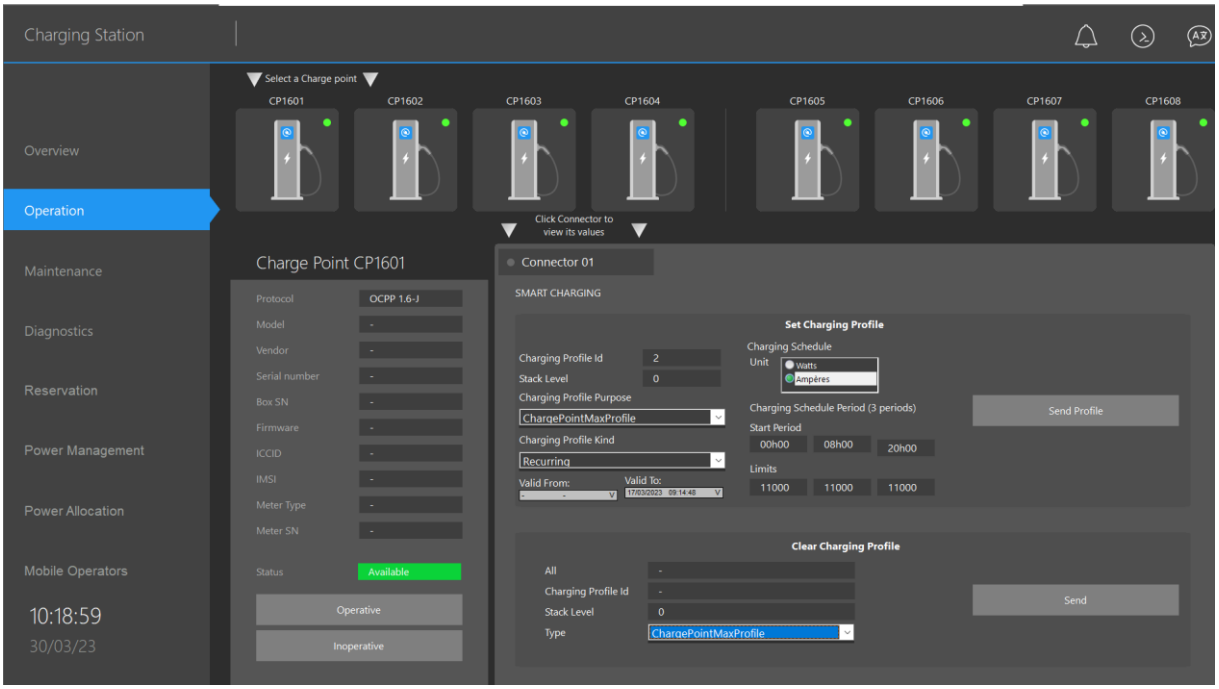


Figure 10 - Static profile view

6.1.3 Service continuity

The supervisor shall need to be robust to ensure continuity of service in monitoring the correct operation of the load 24/7.
To achieve this, it shall implement the following functions:

- Monitoring and automatic restart of the load if a timeout is detected
- Restoration of communication to pre-stop configuration
- Automatic and manual operating modes can be controlled
- Taking into account the launch of charging during staggered hours and/or according to the occupancy rate of the park

6.2 Operation and maintenance of Chargers

The supervisor shall have a set of functions allowing real-time monitoring of the status of the Chargers and their correct operation.

6.2.1 Operation

In particular, it shall:

- Display the status of the chargers in real-time
- Report the transaction data (Tag ID, start-to-finish charge time, start-to-finish SoC, power delivered)
- Provide data in SQL format, exportable to Excel, CSV file if required

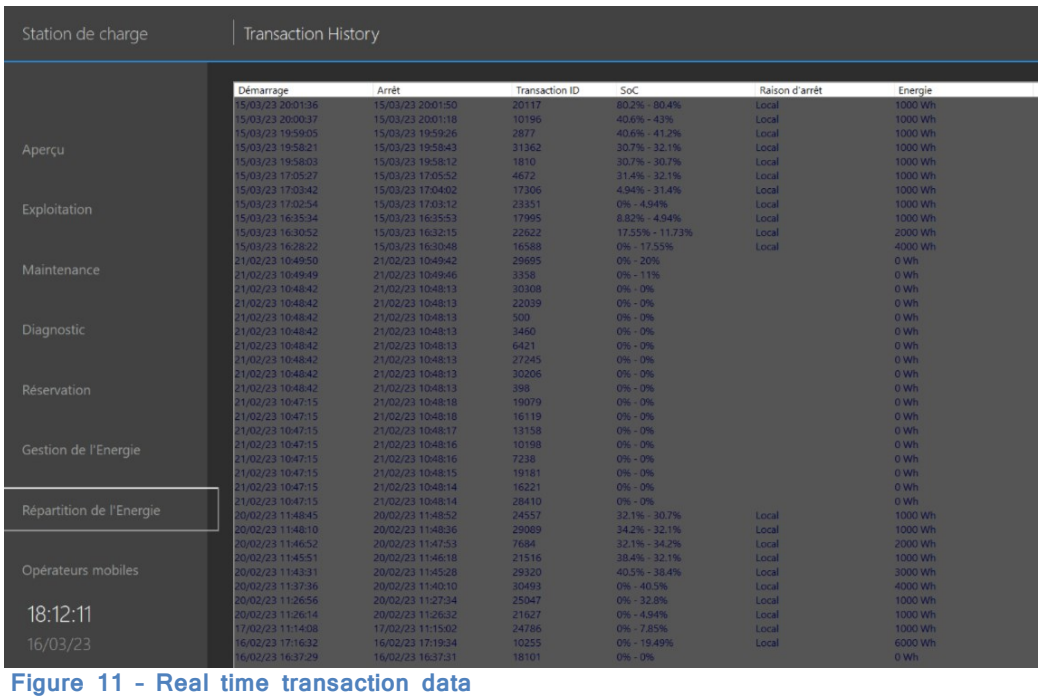


Figure 11 - Real time transaction data

6.2.2 Maintenance

- Real-time alarms and notifications
- Loss of communication taken into account
- Automatic restart under certain conditions

- Sending text or email messages

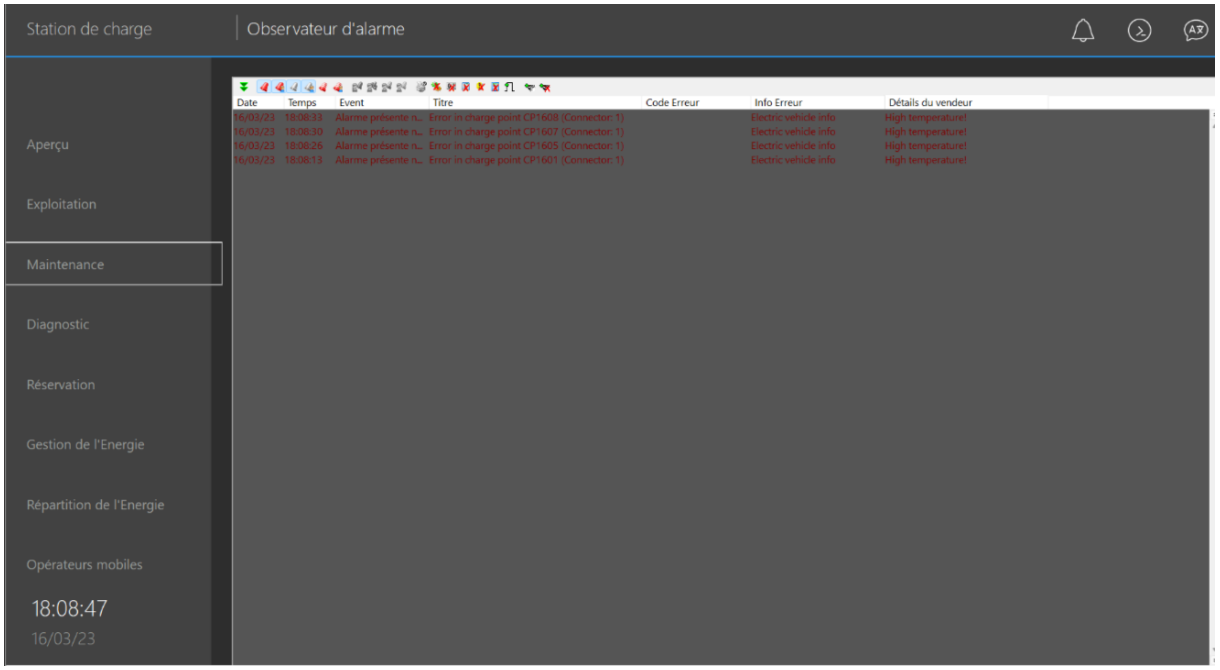


Figure 12 - Alarmes Notifications

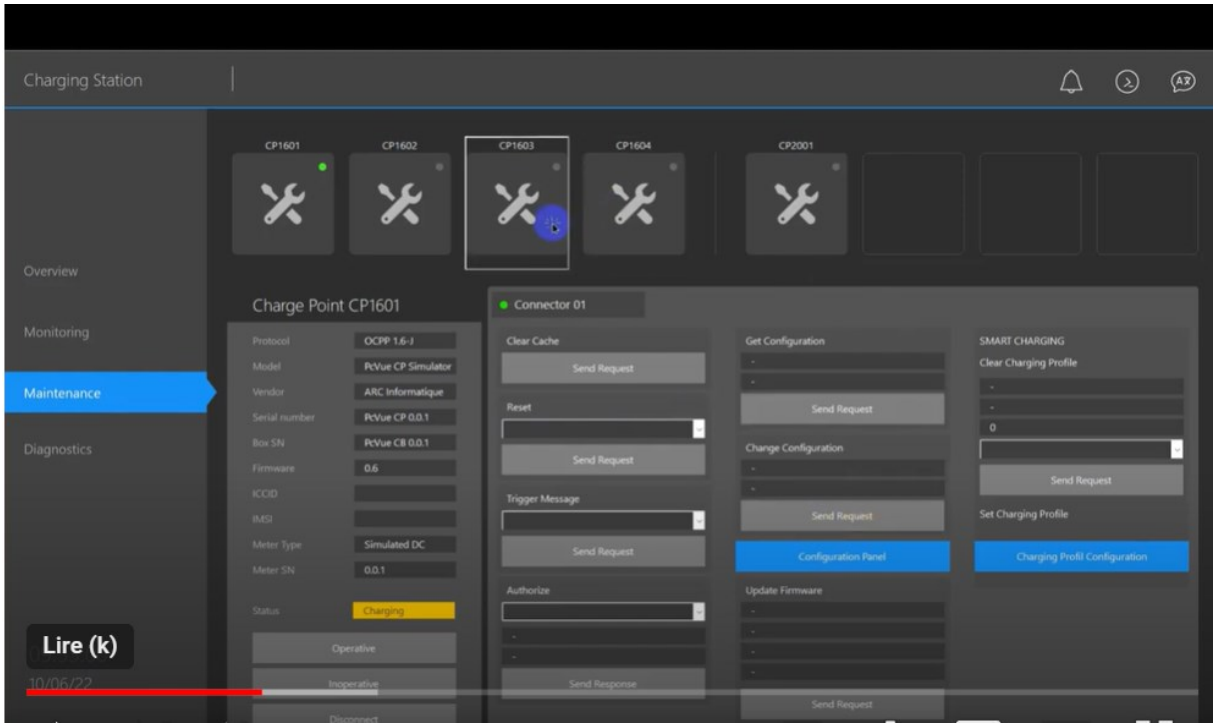


Figure 13 - Maintenance' Interface for CSMS - Charging Stations

6.3 Users Services

6.3.1 Reservation – Booking system

The supervisor shall offer different ways to inform users of the availability of the kiosks and to enable booking.
In addition to the standard OCPP immediate reservation solution, an advanced mobile reservation management solution shall provide the following services:

- Slot allocation when the car enters the park
- First in, first out management system
- Notification to the driver when a station is free
- Notification to the driver when charging is complete
- Ability to move to the next slot if the driver is unavailable
- Power supplied reported to the accounting department (in kwatt)
- EV charger status reported to maintenance teams

The solution shall address the following scenarios :

Assistance with station allocation
At the entrance of the parking lot, the drivers:

- Have information about the estimated waiting time
- Are notified when a station is ready to be used
- Possibility from the application to move to the next available time slot if the car driver is not ready

Loading of the vehicle

- The application allows drivers to use the station (access or payment process)
- Drivers select the charge and are informed of the remaining time
- They receive notifications and online support in case of problems

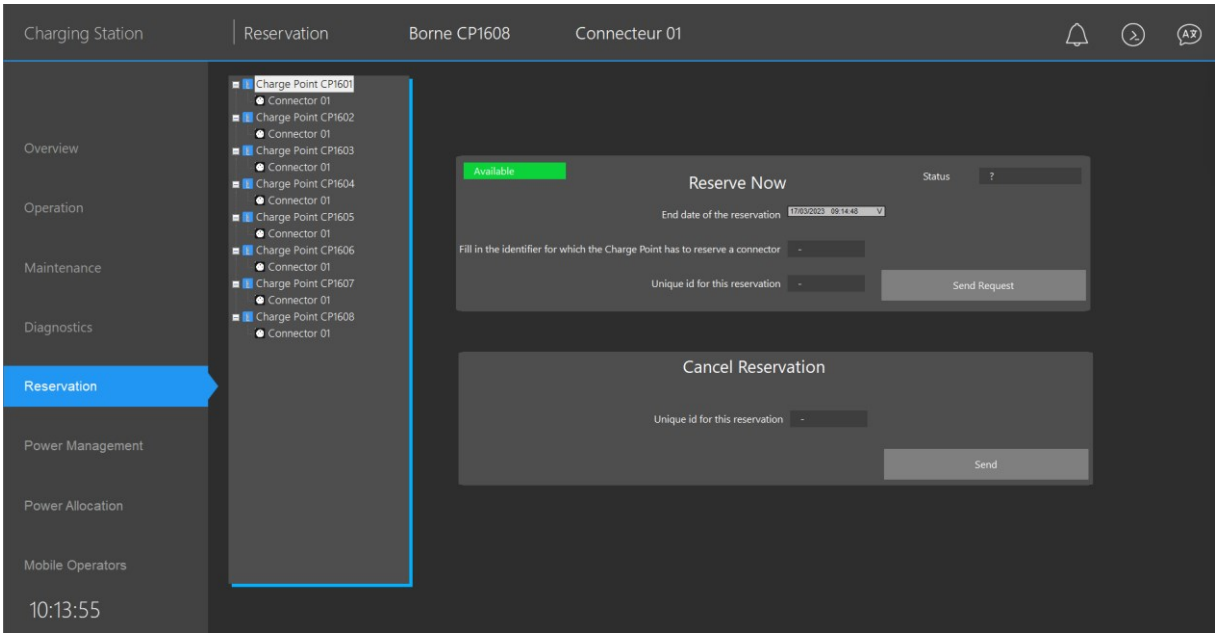


Figure 14 - Instant Booking view

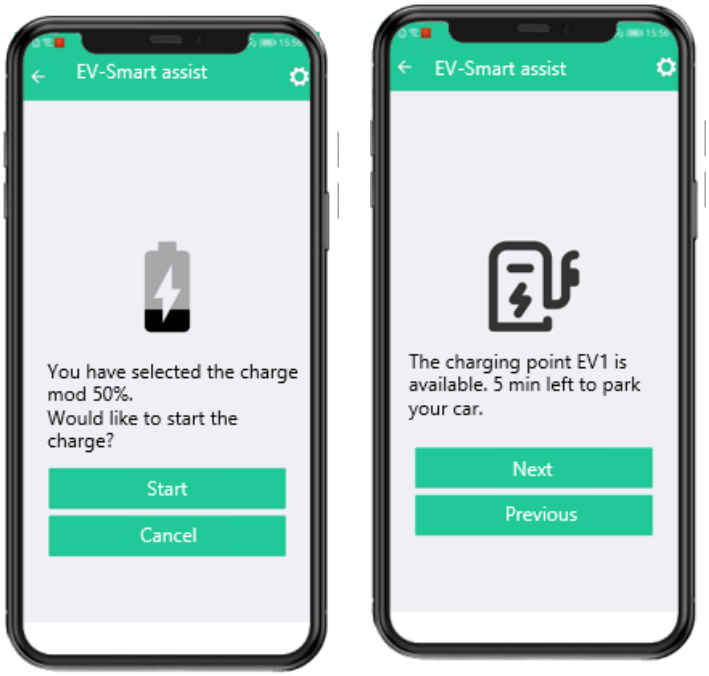


Figure 15 - View of the mobile driver assistance application

6.3.2 Badge/reservation management

The supervisor shall allow the management of access badges to the Chargers with the support of the following functions: Badge/reservation management OCPP "Authorized" function

- Link with the company's contact directory (Active Directory), allowing in particular
  - o Invoicing of benefits in kind
  - o Compensation
  - o User notification

6.3.3 Billing system

Real-time transaction data shall be collected, exposed in SQL format, and exportable in different formats (Excel, CSV files, others) to be filtered, sorted. It shall be used for billing and analysis purposes.

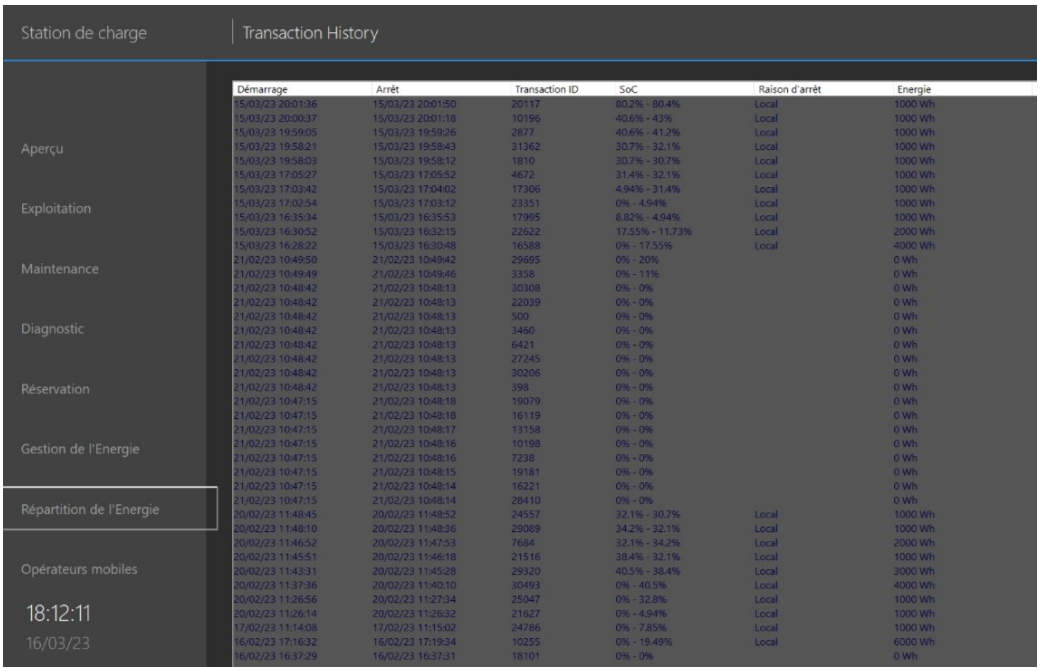


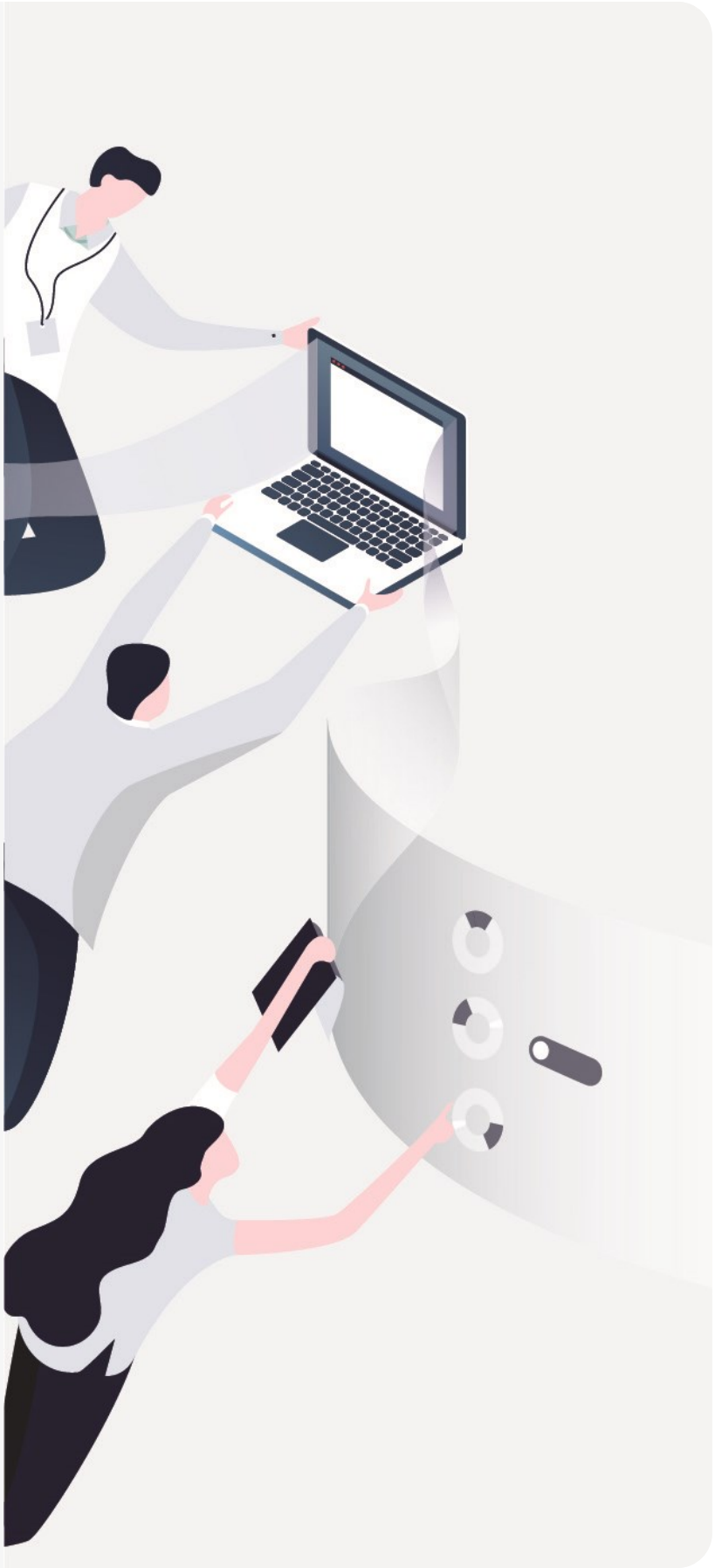
Figure 16 - Real-time transaction data view for billing

7. Advenir labelling (depending on the region)

The supervisor must be Advenir certified and have the corresponding connector.

The ADVENIR program supports the installation of electric vehicle charging stations. Thanks to the energy certificate mechanisms, it complements public initiatives to support electric mobility. The scheme offers financial assistance for the deployment of charging stations on roads, in companies.

References



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