



# PCVUE FEATURES EV CHARGE EN

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# Lexicon

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

**CSMS** Charging Station Management System

**OCPP** Open Charge Point Protocol

**OSCP** Open Smart Charging Protocol

**OCPI** Open Charge Point Interface

**SoC** State of Charge

# 1. General System Features

The purpose of this chapter is to define PcVue's main functional specifications for IRVE integration, which will be detailed elsewhere in the document.

Generally speaking, PcVue enables the efficient operation and maintenance of the IRVE terminal park, in order to :

- Guarantee the best possible service to EV users/drivers, safety and performance of installations
- Optimize equipment and energy management
- Ensure the long-term operability of installations, while enabling their upgrading.

PcVue meets the following requirements and supports the following supervision functions:

- Real-time monitoring and control of installations via an interface, with the ability to view status, terminal status, consumption and transactions, and to act on terminals.
- Interoperability and communication with other systems such as buildings (comfort, energy, PSC, intrusion and video surveillance, access control, elevators, fire), electrical production sites, service operators, etc.
- Interactive graphic interface meeting the latest UX standards.
- Secure, customizable mobile technology.
- Real-time feedback of kiosk events and alarms, both centrally and directly to users equipped with mobile devices.
- All data must be archived in an open SQLServer database for use by other third-party systems. PcVue will enable various means of exploiting these archives for short-, medium- and long-term analysis, such as statistical extraction to Excel files, editing of reports and balance sheets, or visualization of curve monitoring.
- Energy performance can be tracked and displayed in the form of dashboards.
- PcVue is scalable and flexible and is also 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.
- PcVue is based on an object-oriented solution called Application Architect, enabling easy management and modification of plant layouts:
  - An integrated environment for modeling a process or functional unit, and easy deployment via instantiation mechanisms.

- A library of pre-animated objects that can be modified online without the need for external tools,
  
- Upward compatibility of PcVue versions is ensured, so that new versions of the software can be installed without modifying project data.
  
- To ensure continuity of service and maintenance in operational conditions, PcVue also features project version management.

## 2. Quick-start Project

### 2.1 Pre-configured project

PcVue features a function that allows to create the main framework of a project in just a few clicks.

The generated project will integrate the main functions required to operate and maintain one or more kiosk fleets, as described in this document.

The generated project can then be customized according to context-specific requirements.

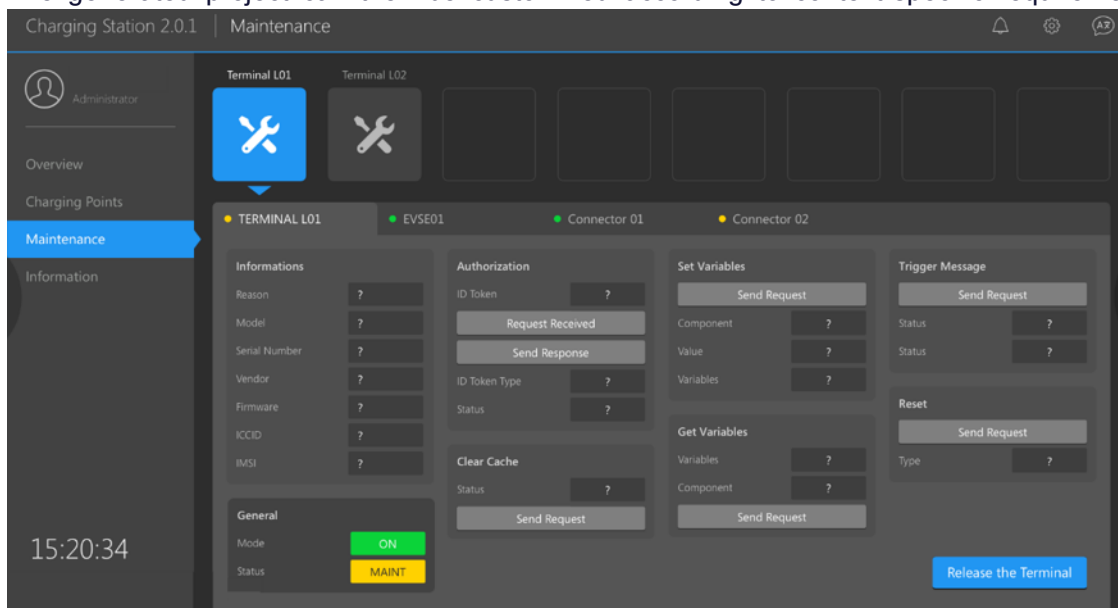


Figure 1 - Example of generated projects

### 2.2 Integration into an existing supervision project

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

PcVue, through its instantiation functionality based on the Application Architect tool, will instantiate all these new libraries in the project and generate the elements required to set up the new system.

PcVue also allows 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 and consistent 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, it's possible to adapt the home page to link it to the new EV Charge view(s) generated.

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

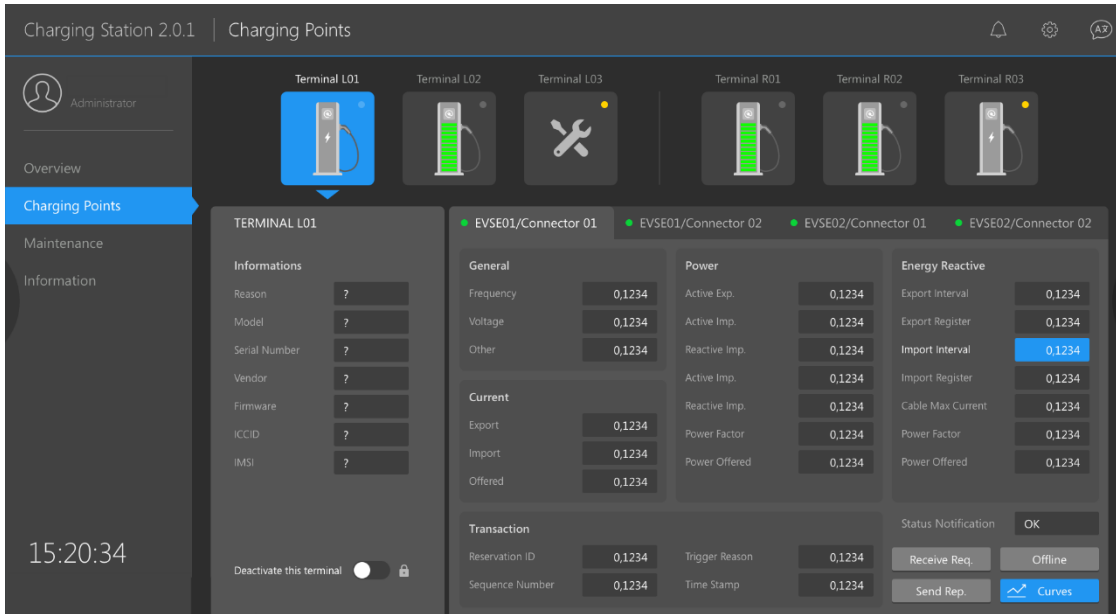


Figure 2 - Example of a charging point and its properties

### 3. Optimization algorithms

PcVue will do more than simply report information.

It will integrate processing algorithms for resource management (bollards, energy, vehicles, networks) and optimization.

It will enable real-time operation and maintenance of infrastructures, with event and alarm feedback, and intelligent terminal control.

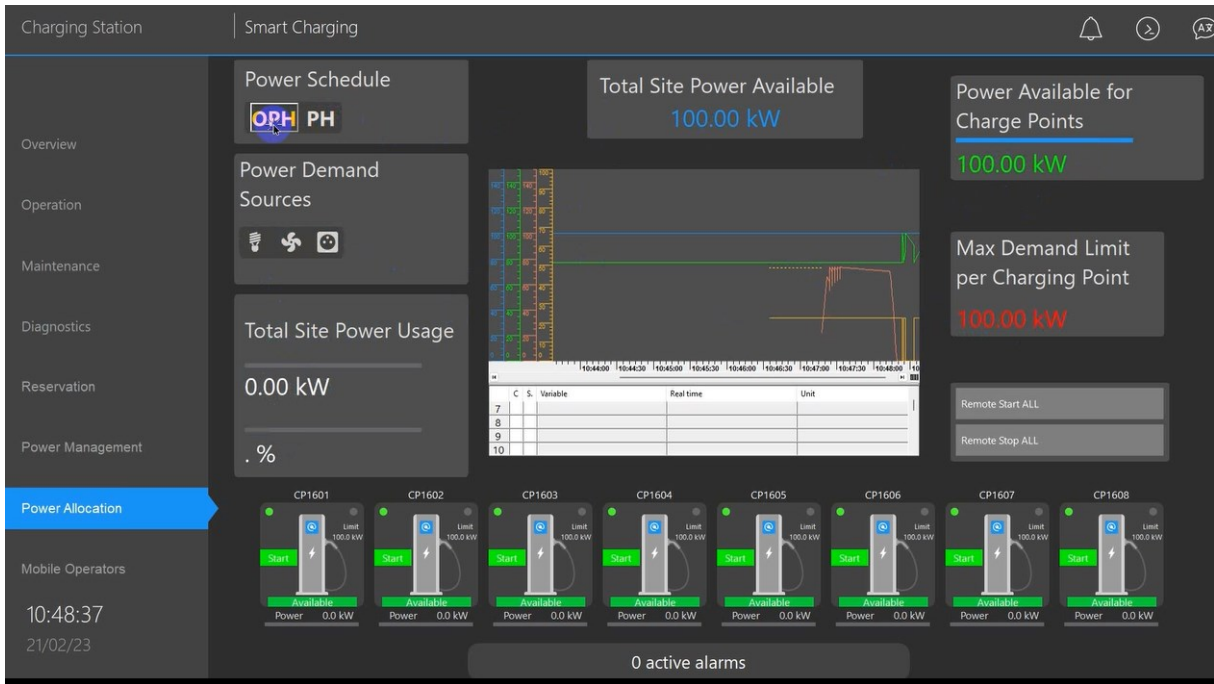


Figure 3 - Example of an optimized management view



# 4. Connection and interoperability

PcVue will be able to connect to charging stations of different brands using ad 'hoc protocols. It will also be possible to upgrade the system by adding new charging stations without having to redevelop everything, and with a minimum of configuration. It should also be open to other systems.

## 4.1 OCPP 1.6 JS & OCPP 2.0.1 protocols

PcVue supports OCPP versions 1.6 JSON and 2.0.1. It will be adapted to the supervision of all types of electric vehicles: Light, medium and heavy vehicles - buses and trucks -. All OCPP functionalities are 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
LOCAL AUTH LIST MANAGEMENT	UpdateFirmware	✓	S	
	GetLocalListVersion	✓	S	
RESERVATION	SendLocalList	✓	S	
	CancelReservation	✓	S	
SMART CHARGING	ReserveNow	✓	S	
	ClearChargingProfile	✓	S	
	GetCompositeSchedule	✗	S	
REMOTE TRIGGER	SetChargingProfile	✓	S	
	TriggerMessage	✓	S	

Figure 4 - List of supported OCPP features

✓ 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)

## 4.2 Other communication protocols

PcVue also allows to connect to the Chargers using other protocols or exchange standards such as (non-exhaustive list):

- Modbus TCP/IP
- OPC UA
- ...

## 4.3 Interoperability

PcVue allows 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.

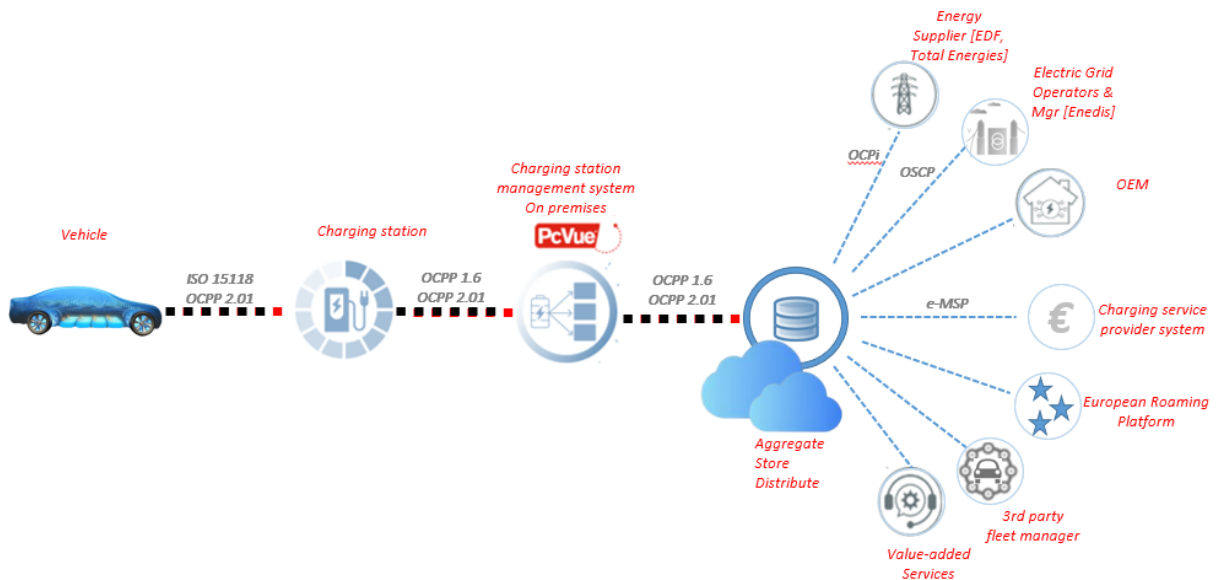


Figure 5 - Interoperability scheme

PcVue ensures 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, Modbus TCP/IP, 100+ others...
- Buildings Management Systems
  - BACnet
  - KNX
  - LonWorks
  - SNMP
  - ...
- IoT
  - LoRa
  - MQTT
  - ...
- Advenir (For France only) / Government authorities

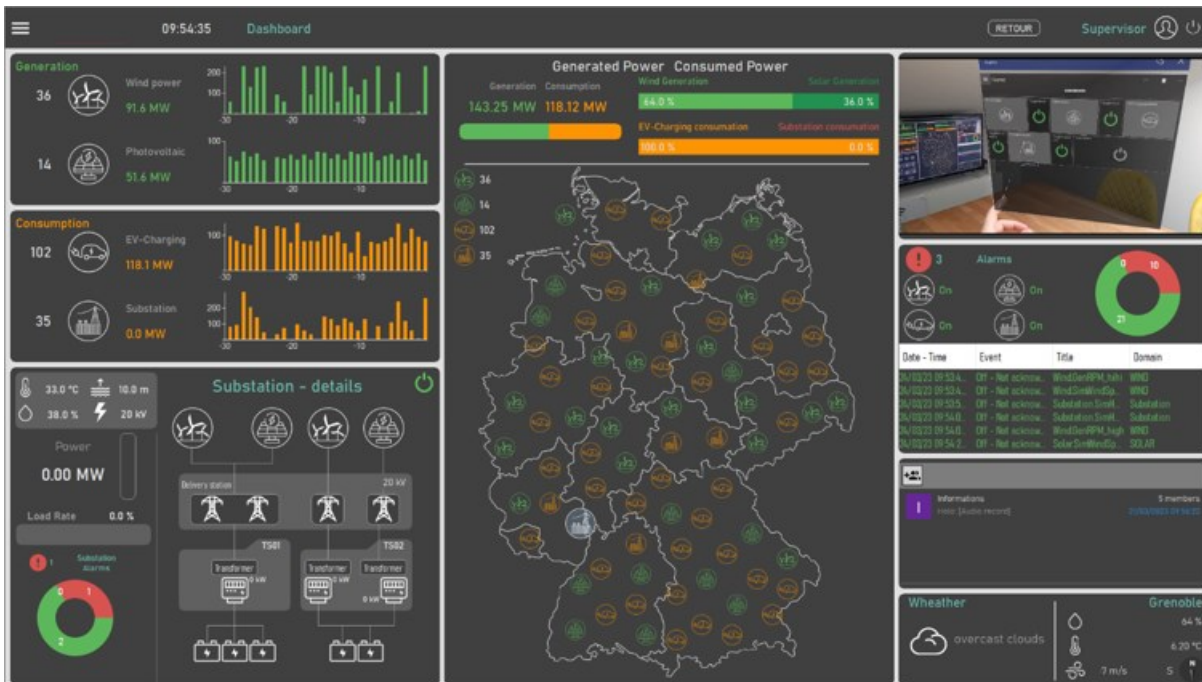


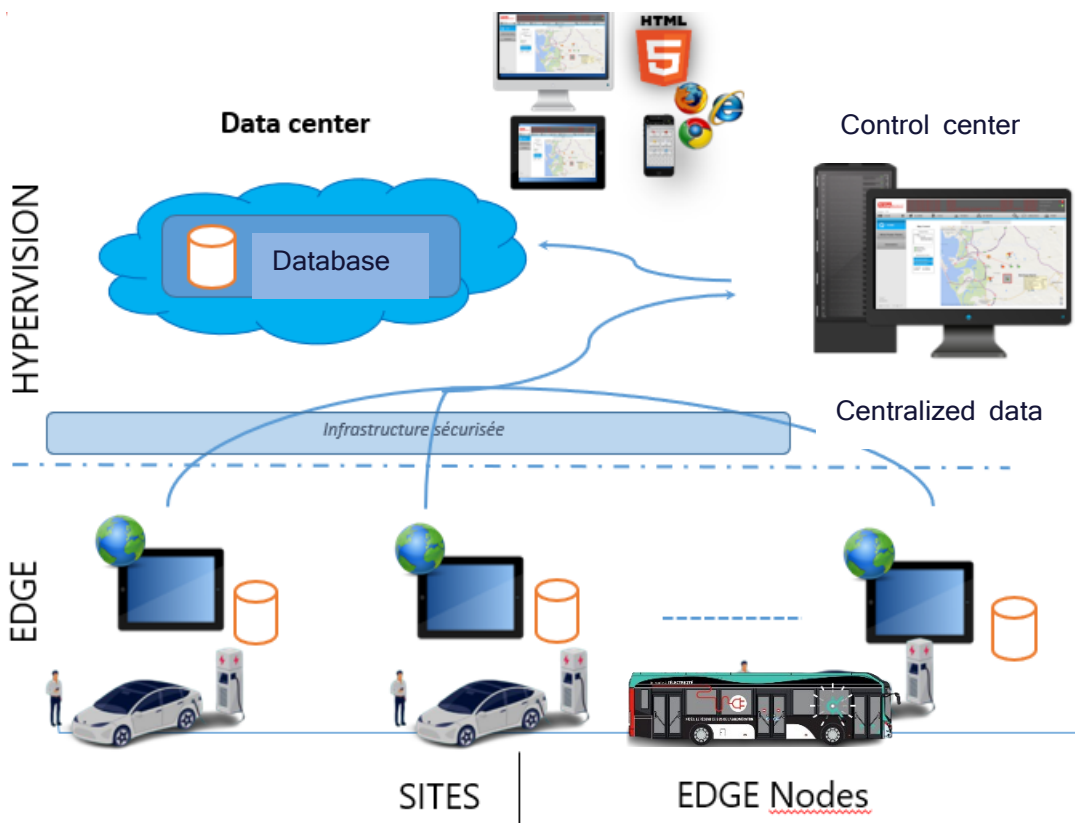
Figure 6 - Multi-system hypervision view

# 5. Architectures and deployment

PcVue allows 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, PcVue 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

PcVue'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

It also offers 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

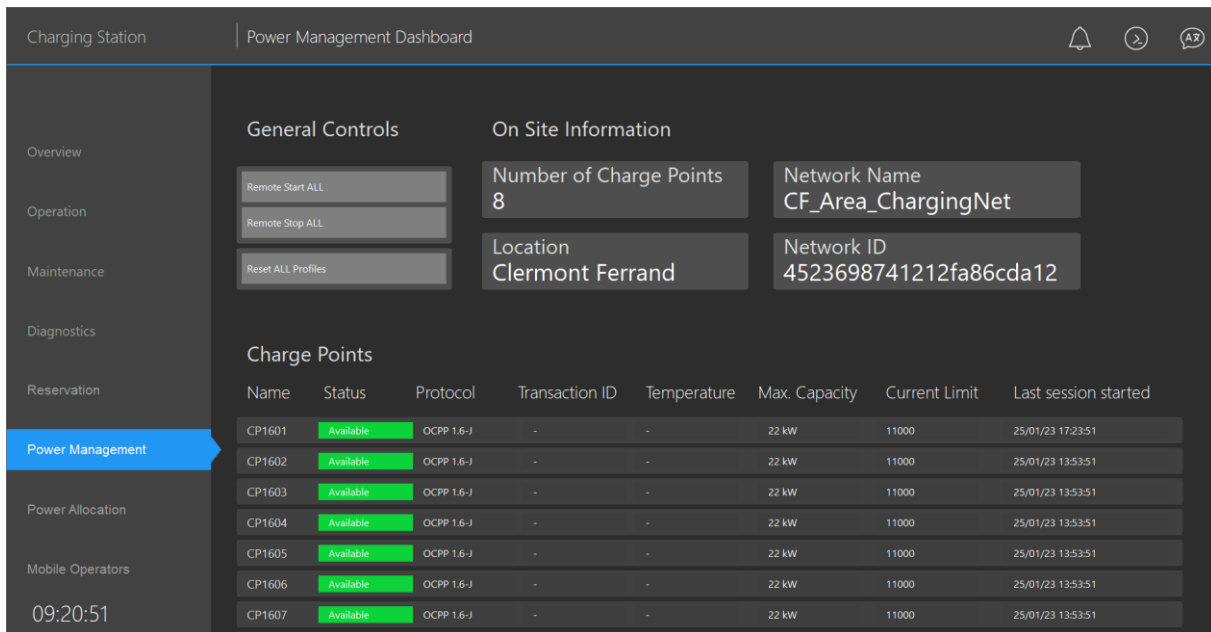


Figure 7 - Dynamic power management view

### 6.1.1 Planning of charging

PcVue has a planning tool to optimize equipment, optimize energy, optimize vehicle recharging, in a search for performance and service.

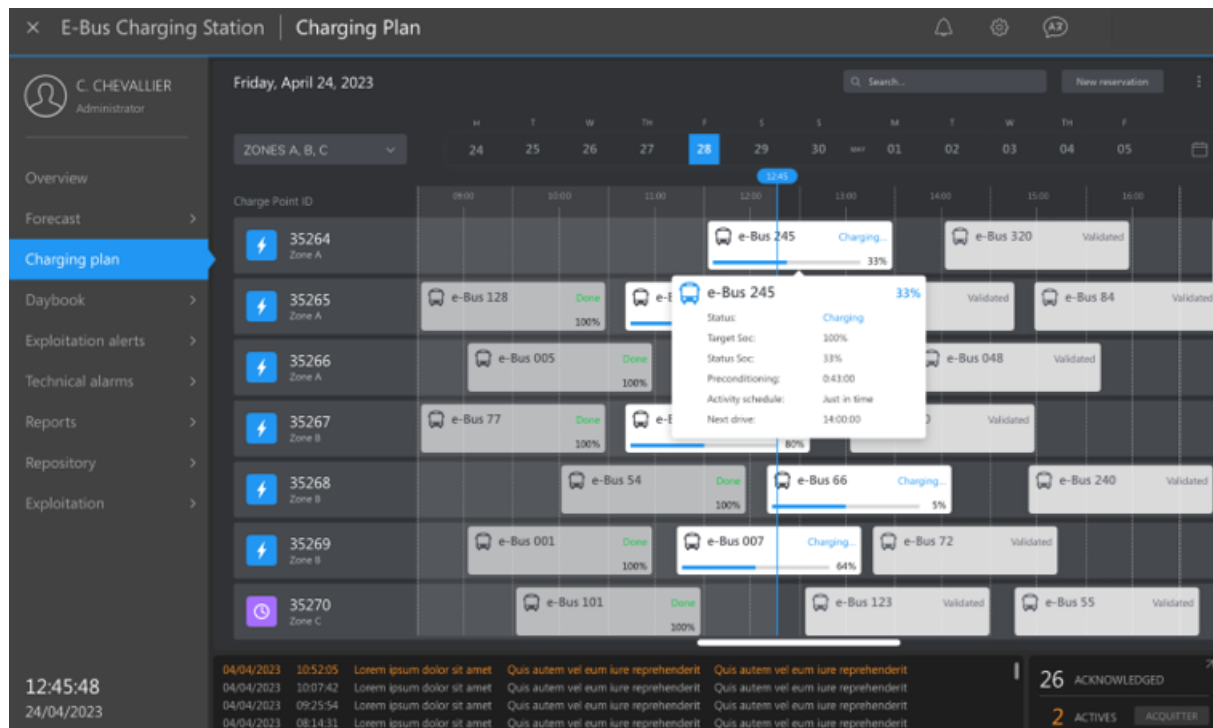


Figure 8 - Vehicle charging planning tool



Figure 9 - Dynamic ground plan of EV Charging



## 6.1.2 Managing Chargers usage profiles

PcVue also makes 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..

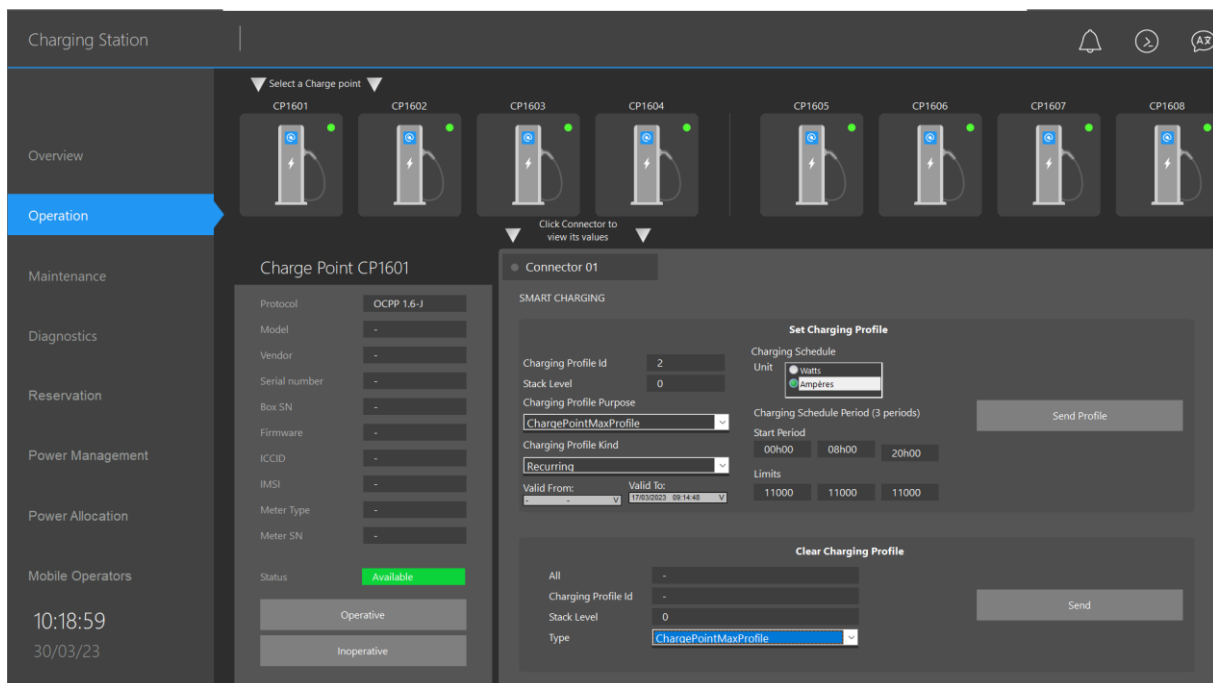


Figure 10 - Static profile view



### 6.1.3 Service continuity

PcVue needs to be robust to ensure continuity of service in monitoring the correct operation of the load 24/7.

To achieve this, PcVue implements 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

PcVue has also 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

Station de charge	Transaction History					
	Démarrage	Arrêt	Transaction ID	SoC	Raison d'arrêt	Energie
Aperçu	15/03/23 200136	15/03/23 200150	20117	80.2% - 80.4%	Local	1000 Wh
	15/03/23 200037	15/03/23 200118	10196	40.6% - 43%	Local	1000 Wh
	15/03/23 195905	15/03/23 195926	2577	40.6% - 41.2%	Local	1000 Wh
	15/03/23 195821	15/03/23 195843	31362	30.7% - 32.1%	Local	1000 Wh
	15/03/23 195803	15/03/23 195812	1810	30.7% - 30.7%	Local	1000 Wh
Exploitation	15/03/23 170527	15/03/23 170552	4672	31.4% - 32.1%	Local	1000 Wh
	15/03/23 170342	15/03/23 170402	17306	4.94% - 31.4%	Local	1000 Wh
	15/03/23 170254	15/03/23 170312	23351	0% - 4.94%	Local	1000 Wh
Maintenance	15/03/23 163534	15/03/23 163553	17995	8.82% - 4.94%	Local	1000 Wh
	15/03/23 163052	15/03/23 163215	22622	17.55% - 11.73%	Local	2000 Wh
	15/03/23 162622	15/03/23 163048	16368	0% - 13.55%	Local	4000 Wh
Diagnostic	21/02/23 104950	21/02/23 104942	29695	0% - 20%	Local	0 Wh
	21/02/23 104949	21/02/23 104946	3358	0% - 11%	Local	0 Wh
	21/02/23 104842	21/02/23 104813	30308	0% - 0%	Local	0 Wh
Réservation	21/02/23 104842	21/02/23 104813	22039	0% - 0%	Local	0 Wh
	21/02/23 104842	21/02/23 104813	500	0% - 0%	Local	0 Wh
	21/02/23 104842	21/02/23 104813	3460	0% - 0%	Local	0 Wh
Gestion de l'Energie	21/02/23 104842	21/02/23 104813	6421	0% - 0%	Local	0 Wh
	21/02/23 104842	21/02/23 104813	27245	0% - 0%	Local	0 Wh
	21/02/23 104842	21/02/23 104813	30206	0% - 0%	Local	0 Wh
Répartition de l'Energie	21/02/23 104842	21/02/23 104813	398	0% - 0%	Local	0 Wh
	21/02/23 104715	21/02/23 104818	19079	0% - 0%	Local	0 Wh
	21/02/23 104715	21/02/23 104818	16119	0% - 0%	Local	0 Wh
Opérateurs mobiles	21/02/23 104715	21/02/23 104817	13158	0% - 0%	Local	0 Wh
	21/02/23 104715	21/02/23 104816	10198	0% - 0%	Local	0 Wh
	21/02/23 104715	21/02/23 104816	7238	0% - 0%	Local	0 Wh
Opérateurs mobiles	21/02/23 104715	21/02/23 104815	19181	0% - 0%	Local	0 Wh
	21/02/23 104715	21/02/23 104814	16221	0% - 0%	Local	0 Wh
	21/02/23 104715	21/02/23 104814	26410	0% - 0%	Local	0 Wh
Opérateurs mobiles	20/02/23 114845	20/02/23 114852	24557	32.1% - 30.7%	Local	1000 Wh
	20/02/23 114810	20/02/23 114836	29089	34.2% - 32.1%	Local	1000 Wh
	20/02/23 114652	20/02/23 114753	7684	32.1% - 34.2%	Local	2000 Wh
Opérateurs mobiles	20/02/23 114551	20/02/23 114618	21516	38.4% - 32.1%	Local	1000 Wh
	20/02/23 114331	20/02/23 114528	29320	40.5% - 38.4%	Local	3000 Wh
	20/02/23 113736	20/02/23 114010	30493	0% - 40.5%	Local	4000 Wh
Opérateurs mobiles	20/02/23 112656	20/02/23 112734	25047	0% - 32.8%	Local	1000 Wh
	20/02/23 112614	20/02/23 112632	21627	0% - 4.94%	Local	1000 Wh
	17/02/23 111408	17/02/23 111502	24766	0% - 7.85%	Local	1000 Wh
Opérateurs mobiles	16/02/23 171632	16/02/23 171934	10255	0% - 19.49%	Local	6000 Wh
	16/02/23 163729	16/02/23 163731	18101	0% - 0%	Local	0 Wh

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

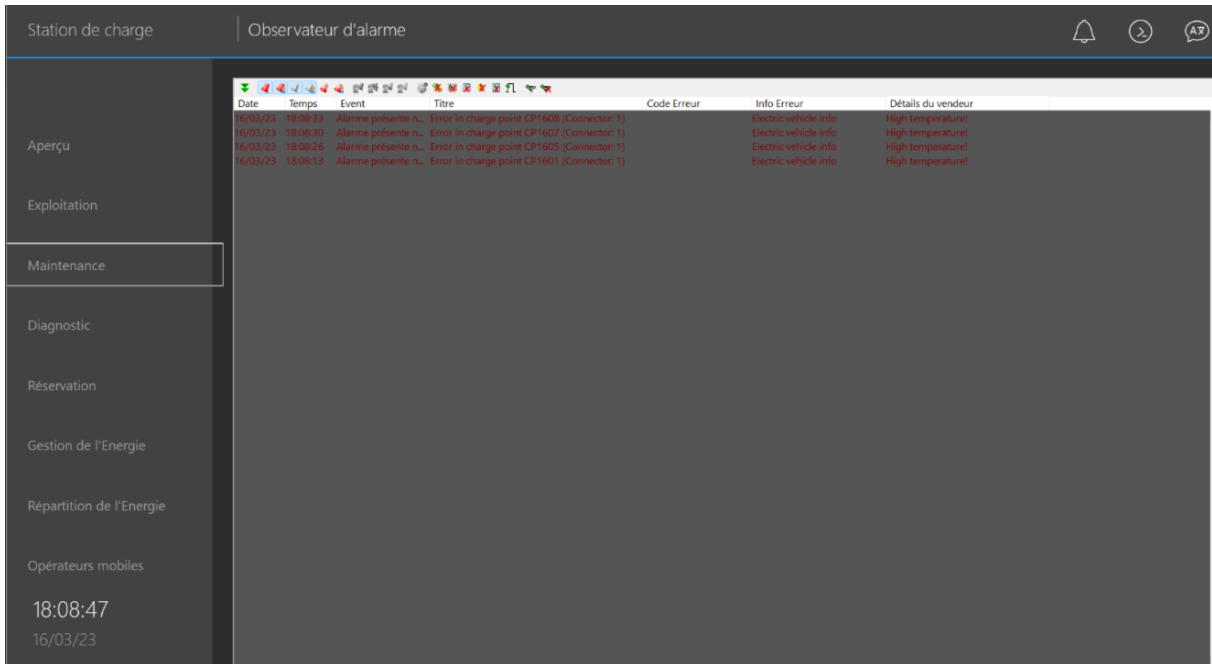


Figure 12 - Alarmes Notifications

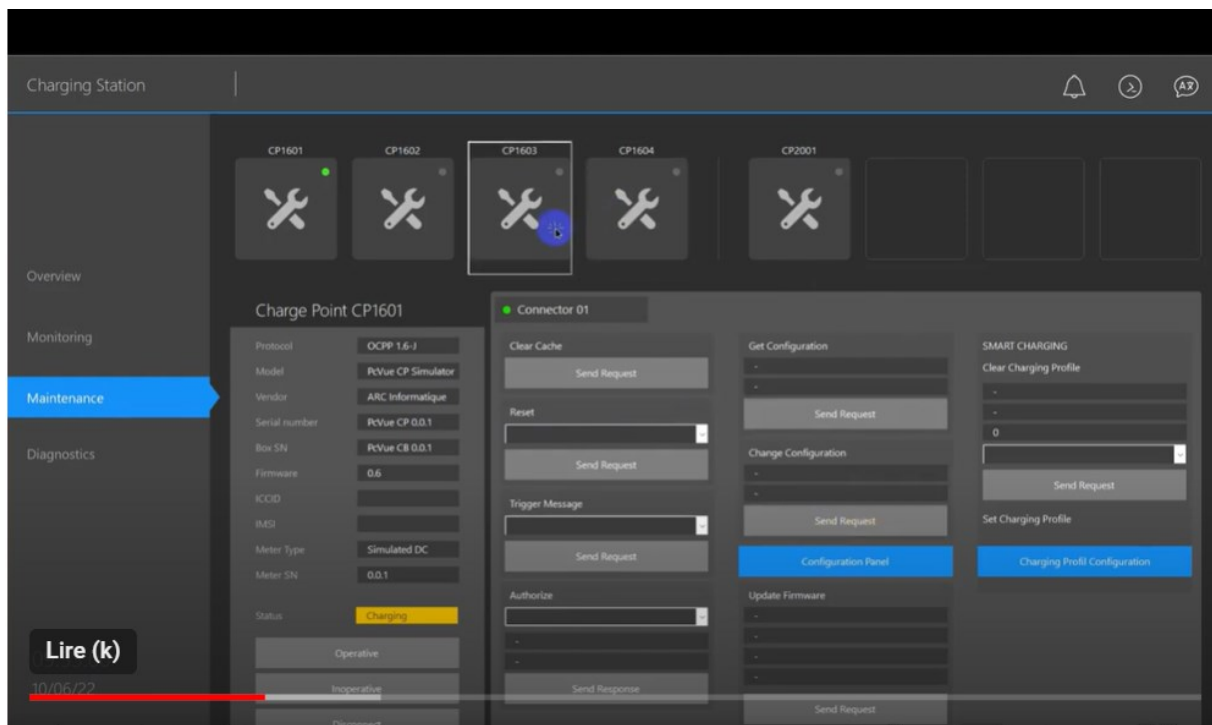


Figure 13 - Maintenance' Interface for CSMS - Charging Stations

## 6.3 Users Services

### 6.3.1 Reservation – Booking system

PcVue offers different ways to inform users of the availability of the charging stations and to enable booking.

In addition to the standard OCPP immediate reservation solution, an advanced mobile reservation management solution named Snapvue provides 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

And it can 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

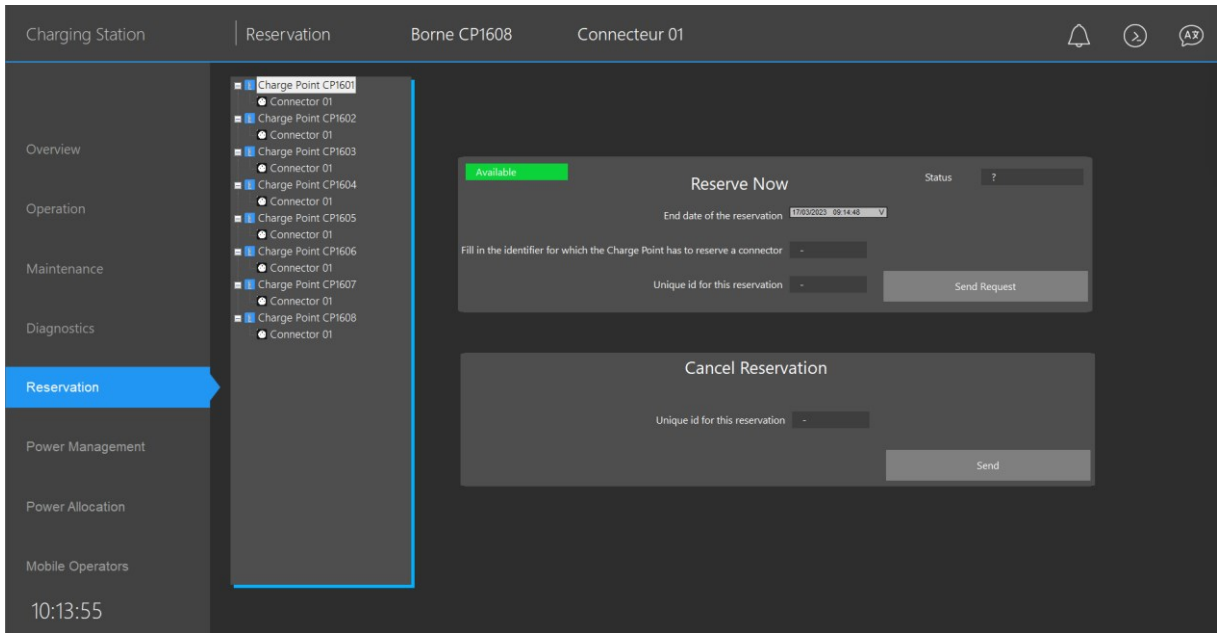


Figure 14 - Instant Booking view

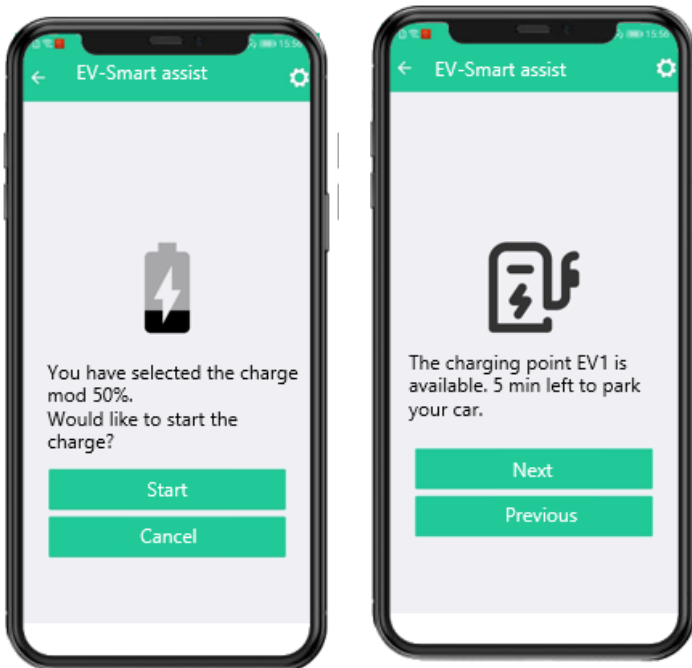


Figure 15 - View of the mobile driver assistance application SnapVue

### 6.3.2 Badge/reservation management

PcVue can 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.

Station de charge	Transaction History					
	Démarrage	Arrêt	Transaction ID	SoC	Raison d'arrêt	Energie
Aperçu	15/03/23 200136	15/03/23 200150	20117	60.2% - 60.4%	Local	1000 Wh
	15/03/23 200037	15/03/23 200118	10196	40.6% - 43%	Local	1000 Wh
	15/03/23 195905	15/03/23 195926	2877	40.6% - 41.2%	Local	1000 Wh
	15/03/23 195821	15/03/23 195843	31362	30.7% - 32.1%	Local	1000 Wh
	15/03/23 195803	15/03/23 195812	1810	30.7% - 30.7%	Local	1000 Wh
Exploitation	15/03/23 170527	15/03/23 170552	4672	31.4% - 32.1%	Local	1000 Wh
	15/03/23 170342	15/03/23 170402	17306	4.94% - 31.4%	Local	1000 Wh
	15/03/23 170254	15/03/23 170312	23351	0% - 4.94%	Local	1000 Wh
Maintenance	15/03/23 163534	15/03/23 163553	17995	8.82% - 4.94%	Local	1000 Wh
	15/03/23 163052	15/03/23 163215	22622	17.55% - 11.73%	Local	2000 Wh
	15/03/23 162822	15/03/23 163048	16588	0% - 17.55%	Local	4000 Wh
	21/02/23 104950	21/02/23 104942	29695	0% - 20%		0 Wh
Diagnostic	21/02/23 104949	21/02/23 104946	3358	0% - 11%		0 Wh
	21/02/23 104842	21/02/23 104813	30308	0% - 0%		0 Wh
	21/02/23 104842	21/02/23 104813	22039	0% - 0%		0 Wh
	21/02/23 104842	21/02/23 104813	500	0% - 0%		0 Wh
	21/02/23 104842	21/02/23 104813	3460	0% - 0%		0 Wh
Réservation	21/02/23 104842	21/02/23 104813	6421	0% - 0%		0 Wh
	21/02/23 104842	21/02/23 104813	27245	0% - 0%		0 Wh
	21/02/23 104842	21/02/23 104813	30206	0% - 0%		0 Wh
Gestion de l'Energie	21/02/23 104842	21/02/23 104813	398	0% - 0%		0 Wh
	21/02/23 104715	21/02/23 104818	19079	0% - 0%		0 Wh
	21/02/23 104715	21/02/23 104818	16119	0% - 0%		0 Wh
	21/02/23 104715	21/02/23 104817	13158	0% - 0%		0 Wh
	21/02/23 104715	21/02/23 104816	10198	0% - 0%		0 Wh
Répartition de l'Energie	21/02/23 104715	21/02/23 104816	7238	0% - 0%		0 Wh
	21/02/23 104715	21/02/23 104815	19181	0% - 0%		0 Wh
	21/02/23 104715	21/02/23 104814	16221	0% - 0%		0 Wh
	21/02/23 104715	21/02/23 104814	28410	0% - 0%		0 Wh
Operateurs mobiles	20/02/23 114845	20/02/23 114852	24557	32.1% - 30.7%	Local	1000 Wh
	20/02/23 114810	20/02/23 114826	29069	34.2% - 32.1%	Local	1000 Wh
	20/02/23 114652	20/02/23 114753	7684	32.1% - 34.2%	Local	2000 Wh
	20/02/23 114551	20/02/23 114618	21516	38.4% - 32.1%	Local	1000 Wh
	20/02/23 114331	20/02/23 114528	29320	40.5% - 38.4%	Local	3000 Wh
	20/02/23 113736	20/02/23 114010	30493	0% - 40.5%	Local	4000 Wh
	20/02/23 112656	20/02/23 112734	25047	0% - 32.8%	Local	1000 Wh
	20/02/23 112614	20/02/23 112632	21627	0% - 4.94%	Local	1000 Wh
	17/02/23 111408	17/02/23 111502	24786	0% - 7.85%	Local	1000 Wh
	16/02/23 171632	16/02/23 171934	10255	0% - 15.49%	Local	6000 Wh
16/02/23 163729	16/02/23 163731	19101	0% - 0%		0 Wh	

Figure 16 - Real-time transaction data view for billing

## 7. Advenir labelling (depending on the region)

PcVue is Advenir certified and has 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 and in condominiums.



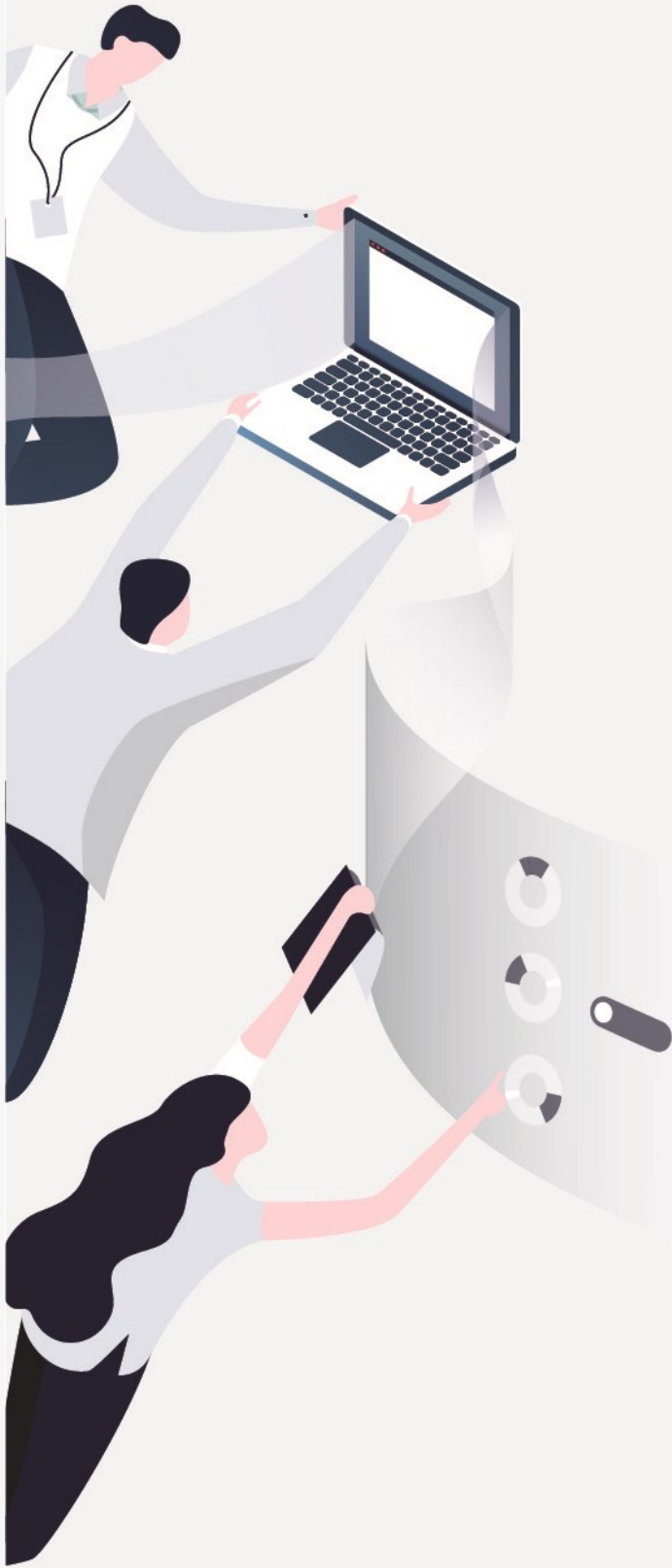
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## PCVUE FEATURES EV CHARGE EN



ARC Informatique  
Private limited company  
capitalized at 1 250 000 €  
RCS Nanterre B 320 695 356  
APE 5829C  
SIREN 320 695 356  
VAT N°FR 19320695356  
Headquarters and Paris office  
2 avenue de la Cristallerie,  
92310 Sèvres, France  
Tel: +331 4114 3600  
Hotline: +331 4114 3625  
Email: [arcnews@arcinfo.com](mailto:arcnews@arcinfo.com)  
[www.pcvuesolutions.com](http://www.pcvuesolutions.com)



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