



# Technical Guide for EV infrastructure in multi-unit residential buildings

eMobility solutions from Schneider Electric



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# How to use

In this document, each blue area indicates a clickable navigation element



Tips : click on the + to discover the tip

Key steps of a project

Button : sends you directly to the content

Quick way to reach a section

- The green part indicates where you are
- The blue one indicates where you can go
- The house indicates a way back to summary page

You will find two different menus, depending on your progress in the document

Detail : click on the + to find more details



Here you can go to next or previous slide





**Introduction**

**What should owner-corporations consider?**

**Key steps for a project**

**eMobility solutions for residential buildings**

**Our local solution**

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# Introduction

## A more sustainable way of driving, and living

### Residential buildings context



- Most of residential buildings are **not yet ready for EV charging**
- Existing residential buildings **can be challenging** due to the potential lack of electrical infrastructure
- Potential high costs combined with the fact that building managers may prioritize repairs and renovations can make the **cost of EV charging installations a significant barrier.**

- **Rules are complex**
- **Multiple players**, such as tenants, building managers, utilities and charging technology providers must all coordinate to pursue EV charging installations. It is difficult for condominiums to identify a single interlocutor
- **Potential conflicts** if EV uptake among residents and committee members is low.



# Introduction

## A more sustainable way of driving, and living

### Reasons to install an EV charging infrastructure

- **Increased property value:** most EV owners prefer to charge at home, increasing the demand for EV chargers in residential buildings. Getting your building EV ready will make it more desirable for EV owners.
- EV infrastructures **can generate new revenues** by offering paid services
- Electric vehicle (EVs) sales increase every year: EV owners look for alternative buildings that do offer these services. **Getting your building EV ready will make it more desirable for EV owners**
- Reduced costs with **individual billing for residents:** charging at home is often cheaper than public charging and billing can be managed.
- A healthier environment for all residents that **contributes to a more sustainable future.**
- States and governments offer a range of incentives for installing EV charging stations including **rebates, tax credits, and grants.**



# Key figures

EV drivers will charge when they stop, not stop to charge



At Home / At Work / At Destination  
**95%**



In Transit  
**5%**

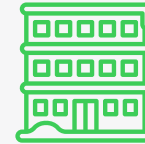
It is cheaper to charge indoors



**20% - 50%**

**Savings**  
to charge at a building vs,  
in transit

**78%** of charging will be  
in residential



Residential  
Buildings

**41 %**



Homes

**37 %**



EV charging will represent **up to 35%** building electricity consumption by 2030

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# What should owner-corporations consider?

Key points to be addressed

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Learn more



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# What should owner-corporations consider?

## Key points to be addressed

### 1 Residents' Usages

- What are the building and residents' level of EV-readiness?
- What are the EV drivers' practices?
- What is the configuration of the car parks?
- What is the expected type and number of chargers?
- What should be the capacity per charge point?

### 2 Utility supply and electrical network

- What should be the power capacity dedicated to the EV infrastructure?
- How should it be supplied?
- Is there any electrical standard to be considered?

### 3 Energy management strategy

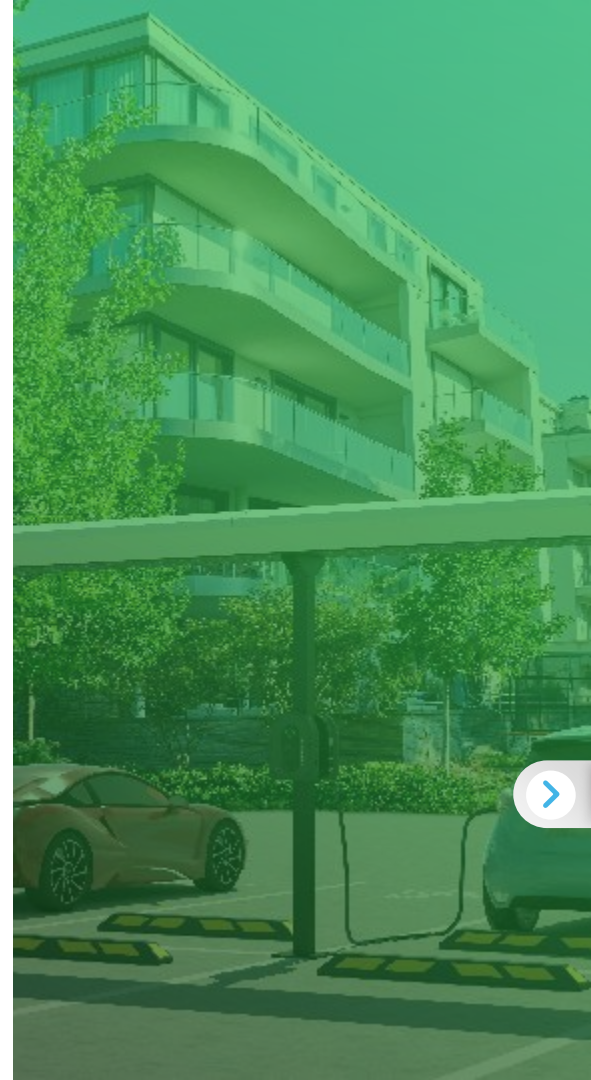
- Could the EV power demand exceed the power capacity of the building?
- Is there a need of dynamic optimization for power availability?
- Is there any local energy production to consider?

### 4 Operation and maintenance needs

- How is the EV infrastructure going to be managed?
- What are the expected services?
- How will the charge be monitored and paid?
- What shall be considered to implement an efficient communication network that complies with cybersecurity rules?



Key steps of a project



## Make your building and residents' mind-set EV-ready

To determine building suitability, you can start identifying whether there are suitable carparks on the premises that can allow EVs to charge when parked. In most cases, then buildings are suitable.

To avoid under-estimate the EV infrastructure installation costs, in the context of stackable car spaces and to assess the state of the existing electrical infrastructure it is recommended to get guidance from an electrical engineer and/or an EV charging company.

The electrical assessment will determine the level of EV-readiness of the building, impacting the amount of work and costs. [Learn more on Utility supply and electrical distribution](#)

To estimate the level of interest of the residents, you can undertake a survey to identify:



The number of EV owners



How they charge their EV?



Where they would prefer to charge?

What is the average distance the EV owners drive per day?



Is it a professional or a personal EV?

What type of EV is it? (hybrid or full EV)



How much they spend to charge their EV?



What services they would expect? (billing, authentication, maintenance, booking...)



### Tips



Is your building EV-ready?

#### EV-ready

There is enough electrical capacity with wiring and a power outlet to support future EV chargers at parking spaces. Much of the upfront installation costs are already covered.

#### EV-capable

The building has enough electrical capacity and appropriate wiring to support future EV chargers at parking spaces. You will likely save substantial retrofitting costs.

#### Never planned for EV charging

Older buildings without sufficient electrical infrastructure and grid supply may need to be upgraded to accommodate EV charging. Determine your budget, who is responsible for these costs and how they will be covered.

# Determine the charging preferences of residents to select the type of EV chargers you need

At this stage of the project, you can investigate to define the most suitable EV infrastructure with a professional installer.

How many charger are going to be installed?



- Less than 10
- 10 to 30
- More than 30

What is the expected capacity?



- **Night charging:** AC from 7.4 to 22 kW
- **Fast charging:** DC 60 kW
- **Ultra-fast charging:** DC 120-180 kW

What is the configuration of the carparks?



- Indoor or outdoor carparks
- Number of EV spaces and zones
- Individual or shared spaces
- Is there any plan to extend the EV infrastructure in the future?

How is the consumption measured?



- Is there a meter per EV space or a meter for all the parking area?
- Is there a need to manage electrical capacity and loads, or to prioritize charging sessions?

Is there any specific EV charging use-case to consider?



- Is there a need to provide visitor's or staff charge points?





# Determine the charging preferences of residents to select the type of EV chargers you need

Some calculation tools

To estimate charging level and speed:

Type of charging stations regarding the average charging speed (for an EV with a 60 kWh battery):

The power of the source determines the charging speed\*\*

Source used	Domestic power socket	Dedicated AC power socket		Dedicated DC power socket	
Power	Single-phase: 2.3 kW	Single-phase: 7.4 kW	Three-phase: 22 kW	60 kW	180 kW
Suggested time	26 h	8 h	2h45 min	70 min	25 min
% of charge reached in 30 min	2%	6%	18%	30%	80%

(\*\*) Subject to the use of a suitable cable.



## Tips



What is the maximum demand?

Maximum demand is the expected peak load in an electrical system.

It is determined at the time of design or modification of the electrical installation, in order to inform the required capacity of upstream electrical equipment.

To estimate p

Minimum  
For EVS

$$P_{ev} = A * N * P_{evse} * C_{fn}$$

$P_{evse}$ : power of EVSE to consider as a reference for the location

$C_{fn}$ : demand factor

N: total number of parking spaces at the location

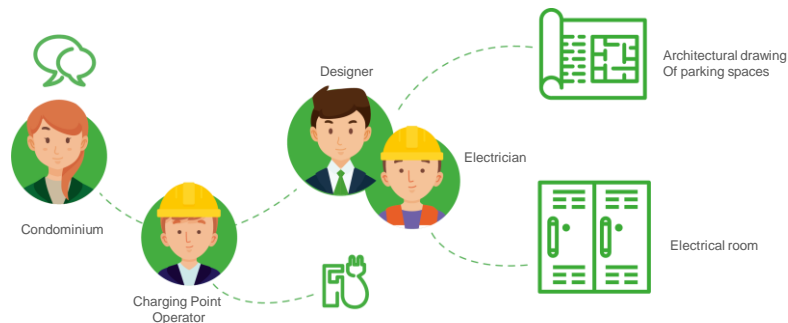
A: percentage of parking spaces to be equipped with EVSE

$P_{ev}$ : minimum power to be reserved for EV infrastructure at the location



## Existing electrical network

There are several parts of the electrical infrastructure that need to be assessed, including:



### The building's existing grid supply (external)

- Peak electrical demand helps inform when and how users can charge their vehicles, in a sustainable and fair way.
- Transformer size determines how much power can be supplied to the EV charger(s).
- Maximum electrical capacity helps know how much spare capacity is available and the potential number and size of EV chargers without capacity upgrades.

### The building's existing electrical infrastructure

The number of electrical distribution boards and their availability in parking spaces will affect the size and number of EV chargers and help determine whether additional space for electrical infrastructure in the building is required.

To determine the best option, the **owner's corporations** should talk with their contractor.

They may need authorization from the building manager to provide the electrician sufficient access to all areas, including the electrical room, and to share electrical and architectural drawings of parking spaces.

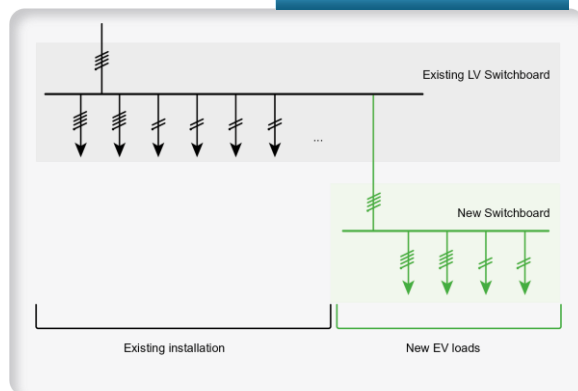


## How to integrate new loads

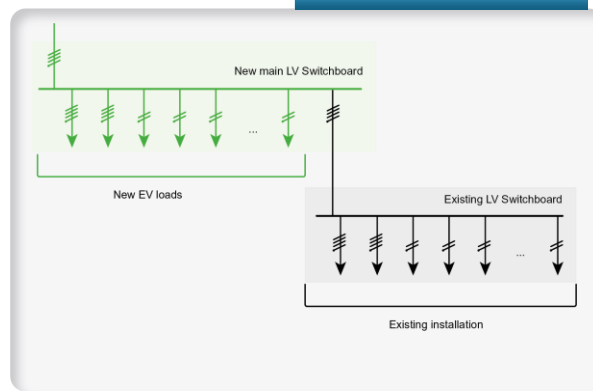
Integration of several high-power loads and adaptation to an existing electrical infrastructure must consider how the new EV power loads will impact the power demand and if local energy supplies can compensate for the increased demand.

Here are some basic principles of EV infrastructure integrations to be discussed with electrical engineer.

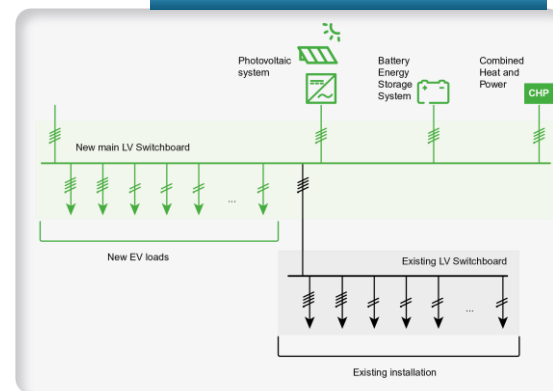
EV loads integrated into the existing electrical infrastructure



EV loads integrated into a new main low voltage switchboard



EV loads and local power supplies integrated into a new main low voltage switchboard



## IEC standards for EV supply equipment (EVSE)

Charging an electric vehicle means connection to a powerful electricity supply.  
All electrical installations shall be properly designed, constructed, and treated according to the IEC standards for EV installations.

The user or integrator shall always perform an appropriate complete risk analysis and test the system with respect to the relevant specific application or use thereof.

**IEC 61851 standard for EV supply equipment** defines the fundamental aspects of EV charging and contains all the requirements covering the EVSE, as equipment. Therefore, the EVSE must comply with the IEC 61851 series and shall be supplied according to IEC 60364-7-722 Requirements.

**IEC 60364 - part 7-722 for Low Voltage installations** contains a new part dedicated to supplies for EV that require electrical protective measures:

- Protection against short-circuits and overloads with circuit breakers
- Protection against electric shocks and risks of electrocution with a 30 mA RCD.
- Protection against overvoltage with a surge protection device (SPD).

The International Electrotechnical Committee (IEC) has defined a set of standards, covering devices, protection and electrical installation,



In addition, please refer to local standards



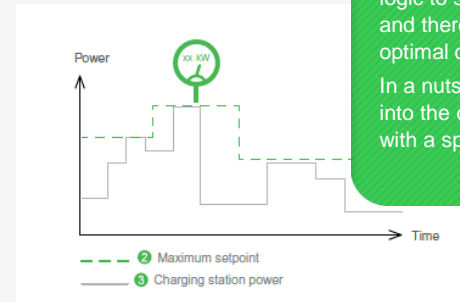
# Load Management Systems

Managing your energy more efficiently across the building could help you avoid major upgrades to the building's electrical infrastructure and/or help you reduce your energy bills.

Installing load management systems enable to adjust automatically the charge rates across the EV chargers, in the limit of the available power supply, and can prioritize building loads such as air-conditioning when there is a spare capacity.

To reduce the building's overall energy demand, condominiums can also consider undertaking energy efficiency projects, such as switching to LED lighting (with occupancy sensors) throughout the building common areas, installing solar photovoltaic (PV) panels and on-site battery.

## Dynamic load management



With dynamic load management system, the remaining energy at the building is allocated to the EV infrastructure in real time based on the energy demand and the system settings.



### Tips

What is the difference between smart charging and traditional load management?

Smart Charging goes further than a standard load management setup. It is an intelligent system with proactive logic to schedule and forecast, and therefore provides an optimal charging solution.

In a nutshell, each EV plugged into the charging station charges with a specific charging profile.

## Expected Services

Owners-corporation should anticipate the operational needs to select the solution and keep the budget of their project under control.

Is it planned for private or shared EV charging?



How are going to be managed the service?



- With/without authentication badges
- With/without EV driver App

For operation and maintenance use, should the EV infrastructure be connected?



- To a remote supervision from Charging Point Operator
- To one or multiple Charging Station Management System
- To local Charging Station Management System
- To Energy or Building Management Systems
- To domestic networks

How are going to be managed the charging costs?



- Via centralized energy management system
- Fixed fee
- Implementing sub-metering for individual energy use



+

### Tips

Who will manage the operation?

For residential buildings, most of owners-corporation delegate the EV infrastructure operation to EV operators' companies that provide EV charging services, including installation, maintenance and billing.

## Efficient and cyber-secured communication network

The digital networks is deployed for the communication of EV charging infrastructures. It uses the Ethernet communication network, and can be wired for the LAN (Local Area Network) or wireless for the WAN (Wide Area Network).

The choice of ethernet topology and addressing policy is driven by:

- Interconnexion with existing IT infrastructure or isolated EV system
- Existing local edge controller in the EV infrastructure
- Maintainability - scalability of the communication network
- Level of openness of the EV LAN to third party system
- Cloud connectivity WAN and targeted level

The choice of the wireless communication architecture depends on charging stations number and cost targets. Wireless communication (4G, Wi-Fi) can be provided through external or embedded modem.

There are different network topologies: star and daisy chain are the most familiar. To decrease dependency between a group of chargers it is recommended to prefer star topology than daisy chain.

Learn more on digital topologies and cybersecurity



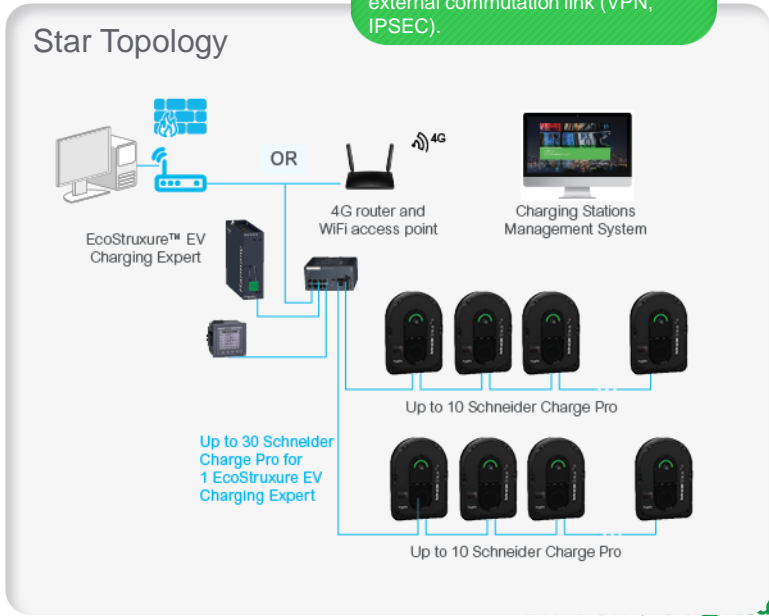


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### Tips

What about cybersecurity?

The communication network shall consider the cybersecurity requirement and the network communication constraints e.g. Network IP addressing, segmentation (VLAN), firewall, external commutation link (VPN, IPSEC).



# Key steps of a project

For an EV infrastructure implementation

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Learn more



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## Step 1



Investigate building and residents' readiness to define the approach

Evaluate existing policies and constraints such as deed restrictions, common area usage policies and design issues. Define the services, including billing and authorizations of use. Elaborate the strategy for budget and return on investment. Establish approval process for tenants and unit owners and cost recovery procedure.

## Step 2



Regarding the complexity, design the most suitable EVSE with the help of experts and partners: EV Operators, Electrical engineers, System integrators.

## Step 3



## Step 4



Select your park of charging stations, electrical devices, energy metering, load management and supervision solution, and services fitting your needs, local regulations and subsidiaries..

## Step 5



Schedule and manage the installation of the EV infrastructure

Support adoption and usage of the EV infrastructure by the residents. Manage or delegate operations and maintenance to EV operators

## Step 6



# eMobility solutions for a residential building

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Discover Schneider Electric solutions



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### Residents' Usages

- Residential building: 4 floors, 60 flats, 20 EV owners
- Shared spaces – Outdoor
- Mainly night charging: AC 22kW
- Authentication via RFID required for residents and visitors
- Individual billing



### Utility supply and electrical distribution

- Dedicated EV switchboard
- Canalis distribution trunking system with breakers installed in Canalis busbar
- Box with electrical protections upstairs each charging station
- Individual metering in each charging station



### Energy management strategy

- Load Management System to optimize the EV charging and manage key building loads (elevators)
- Dynamic energy management



### Operation and maintenance needs

- EV infrastructure managed by CPO
- Wireless network
- Authentication of users and operators
- Integration with CPO management system for operation and maintenance needs
- EV driver application for booking provided by CPO

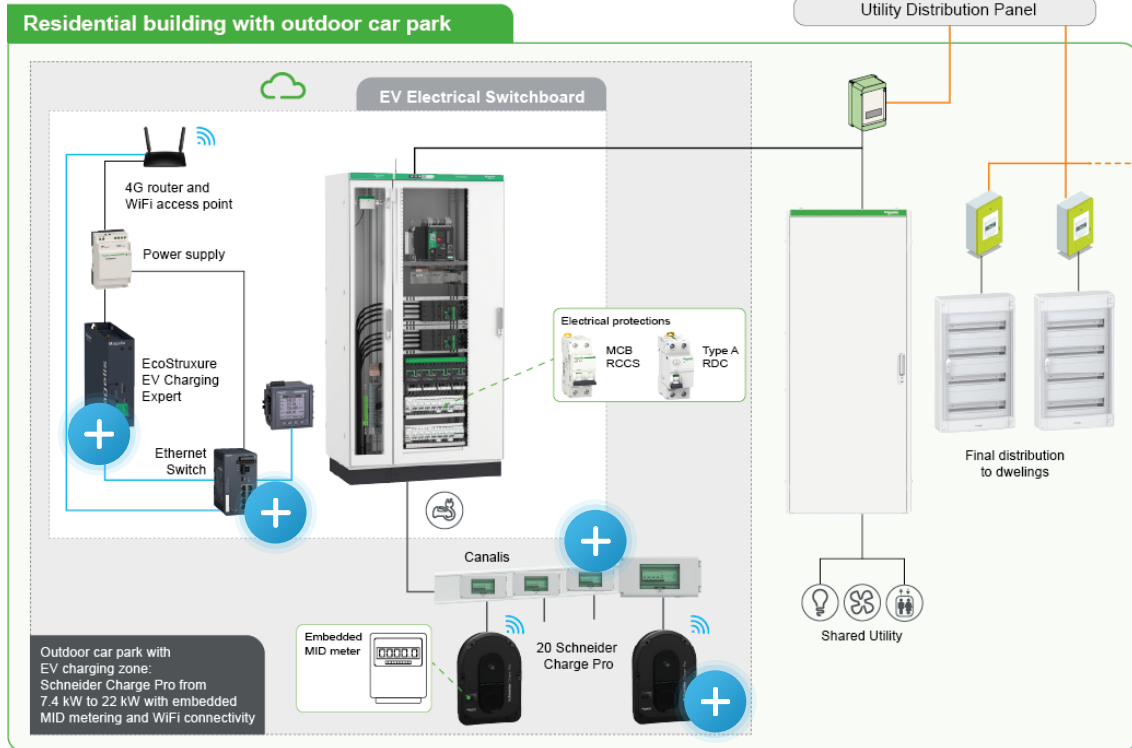




Integration of EV charger's data in the CPO Charging Station Management System



EV driver application provided by the CPO



\* In countries where the installation standard IEC/HD 60364-7-722 or equivalent local regulations are applied, a RCD type B must be used instead of RCD type A-SI.

— Ethernet network  
— Power network

— Utility supply network

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# Schneider Charge Pro



[Learn more on eMobility solutions from Schneider Electric](#)



[Watch the video](#)

## AC charging station with MID meter and native connectivity



### Easy installation and wiring:

- Three cabling options: back, top, bottom
- Connectors for fast wiring

### Easy commissioning:

- On-site configuration with eSetup mobile app
- Automatic firmware upgrade alert with eSetup
- Wi-Fi direct connectivity

### Characteristics:

- Combine 1P-3P from 7.4 kW up to 22 kW
- T2S socket or 7 m attached cable with T2 connector OCPP 1.6J
- 4G, Wi-Fi, Ethernet embedded connectivity
- Double Ethernet Port
- Authentication through RFID reader
- Embedded MID meter
- Possible connection to external meter via MODBUS RTU and to smart utility meter with DSO and TIC interfaces (specific commercial references)



# EcoStruxure EV Charging Expert

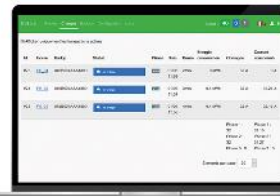
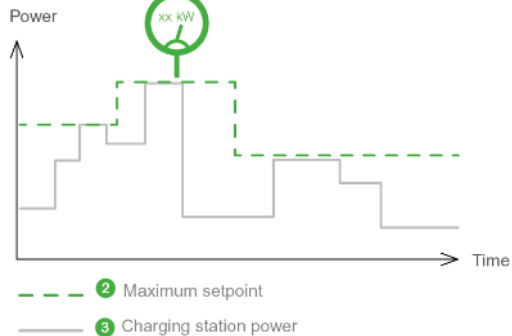


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[Watch the video](#)

## Load Management System



### Characteristics:

- Dedicated for Schneider Charge Pro
- Up to 30 charging stations expendable
- 5 zones and 3 sub-zones
- Dynamic distribution of available power among charging stations
- Peak/off hours EV Charging management
- Monitoring and control of EV charging stations based on an open protocol (OCPP 1.6-J)

+ Option for specific projects



# EcoStruxure EV Advisor

## Designed to meet your needs



### Interoperable



with certified OCPP1.6J charging stations and access to our extensive API library



### Cybersecurity



following General Data Protection Regulation and cybersecurity recommendations



### Convenient



excellent uptime and access to a large range of services



### Flexible



with white-labeling options and add-ons to adapt to your use case



Remote control



Detailed reports



Performance dashboard





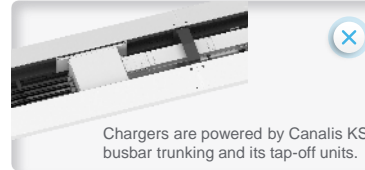
# Electrical distribution solutions



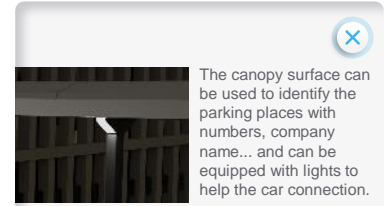
## Canalis, a modular solution to bring a maximum of possibilities



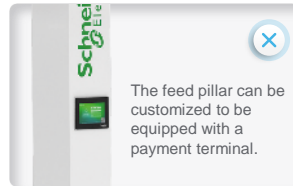
Canalis is fed by cables coming through the feed pillar or from the top when the canopy is next to a building.



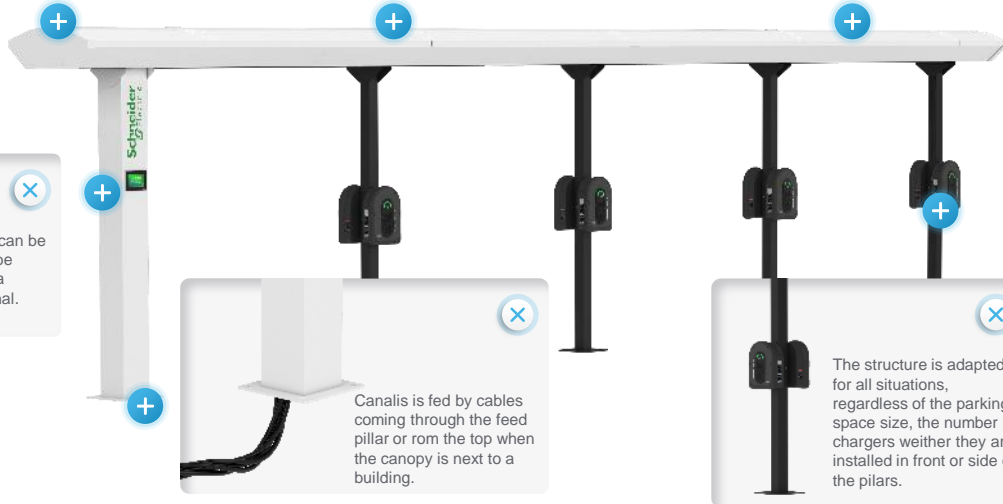
Chargers are powered by Canalis KS busbar trunking and its tap-off units.



The canopy surface can be used to identify the parking places with numbers, company name... and can be equipped with lights to help the car connection.



The feed pillar can be customized to be equipped with a payment terminal.



Canalis is fed by cables coming through the feed pillar or from the top when the canopy is next to a building.



The structure is adapted for all situations, regardless of the parking space size, the number of chargers whether they are installed in front or side of the pillars.





# Electrical distribution



## EV Supply Equipment electrical protection



- MCB 1P+N



- MCB 3P+N



- MNx



- Type Asi RCD monophasé



- Type Asi RCD triphasé



- Type B RCD triphasé

The EV READY Mark is a certification mark that provides an answer to the questions of **Interoperability and Performance for Electrical and Hybrid Rechargeable Vehicle (EV) Charging Stations.**



Launched on the initiative of automobile manufacturers Renault-Nissan, the EV READY mark is the result of technical quality work undertaken at numerous workshops with representatives of all the players in this industry (vehicle manufacturers, AC charging station manufacturers, installers, operators, utilities, networks, standardization organizations, third party laboratories, etc.).



# Digital networks

## WAN solution: 4G embedded modem



Charging Stations Management System

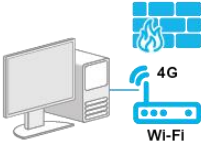


Schneider Charge Pro

## Wi-Fi connectivity

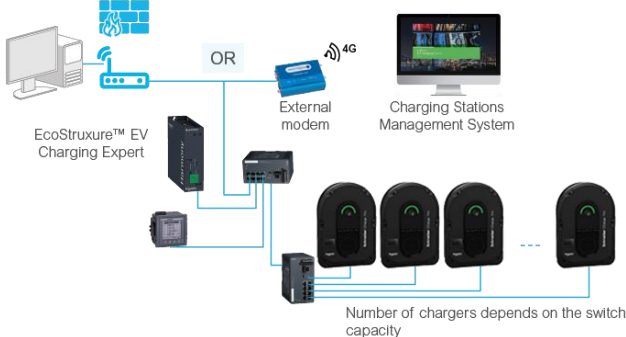


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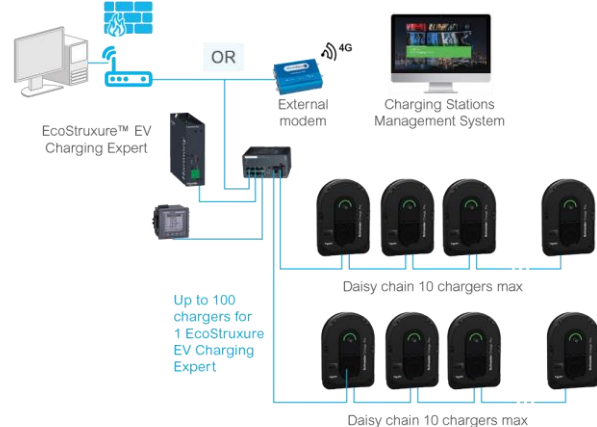


Managed IT services

## LAN solution: Star network



## Daisy chain





# Digital networks



Complete range of  
Modicon Switches

## Modicon Managed and Unmanaged Switches

The Modicon Networking range offers you a smart and flexible way to integrate Ethernet solutions into your operation, from the device level to the control network and to your corporate network

### Unmanaged switch for star topology



4 ports for copper  
MCSESU053FN0



8 ports for copper  
MCSESU083FN0

### Managed switch for daisy chain topologies



4 ports for copper  
MCSESM043F23N0



8 ports for copper  
MCSESM083F23N0

These managed switches come with the Ethernet TCP/IP protocol. They come with 4 or 8 copper cable transmission ports. They provide simple and complex connectivity for multiple Ethernet devices, network management, enhanced cybersecurity and more advanced switching features.





### Residents' Usages

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### Utility supply and electrical distribution

- Dedicated EV switchboard
- Individual metering for each charging station
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### Energy management strategy

- Load Management System to optimize the EV charging and monitor key building loads (i.e. elevators, gates, pumps)
- Dynamic energy management



### Operation and maintenance needs

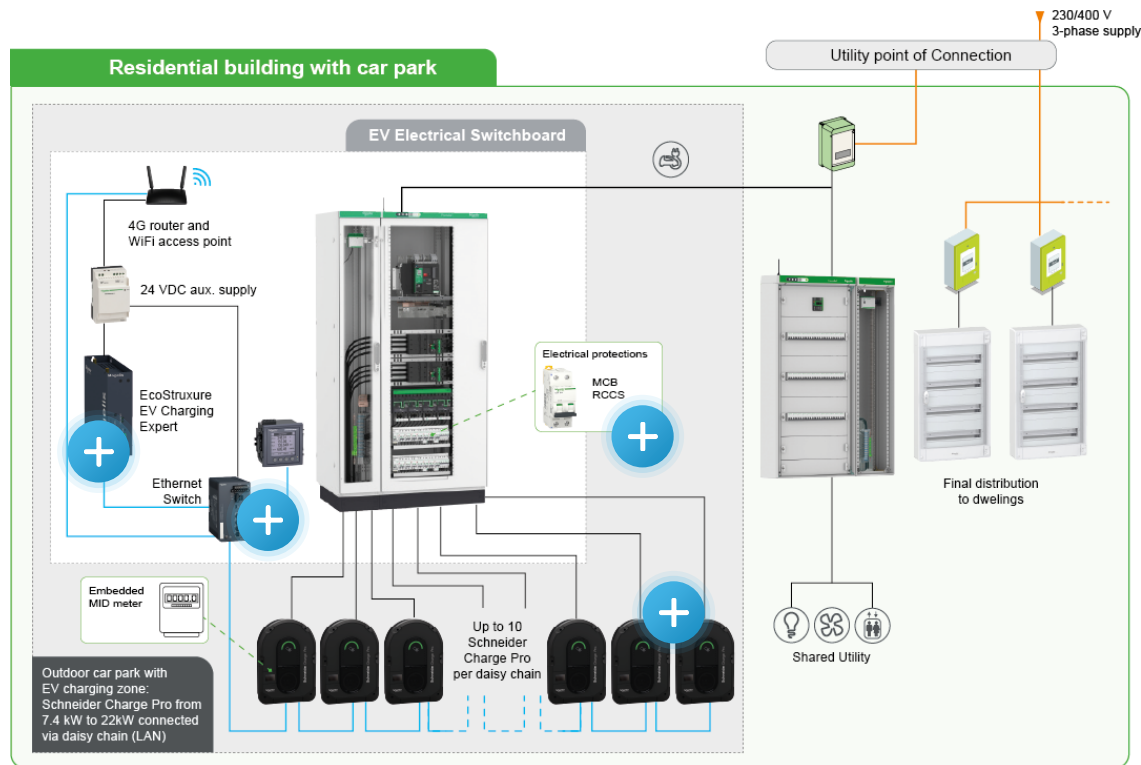
- EV infrastructure managed by CPO
- EV chargers connected via Daisy chain (LAN)
- Authentication of users and operators
- Integration with CPO management system for operation and maintenance needs
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# EcoStruxure EV Charging Expert

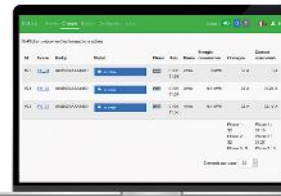
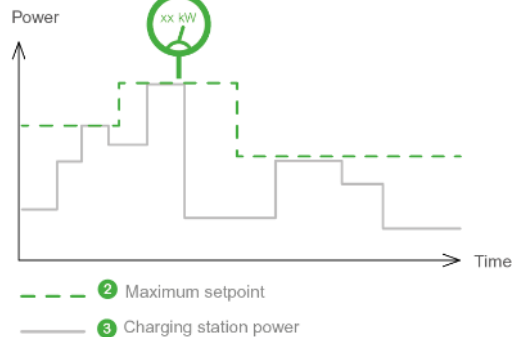


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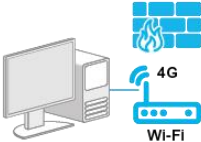


Schneider Charge Pro

## Wi-Fi connectivity

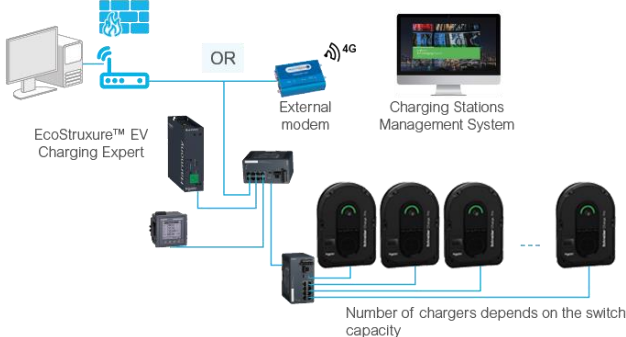


Charging Stations Management System

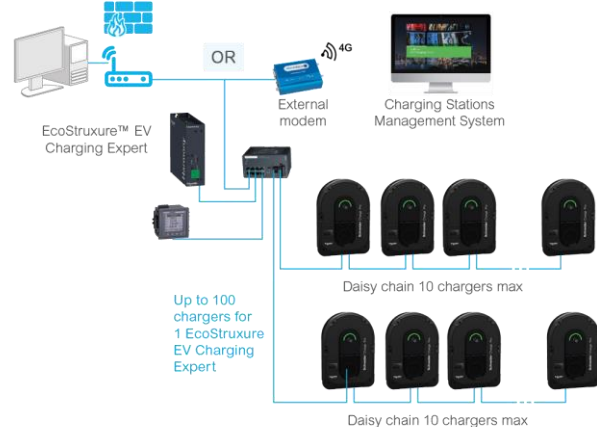


Managed IT services

## LAN solution: Star network



## Daisy chain





# Digital networks



Complete range of  
Modicon Switches

## Modicon Managed and Unmanaged Switches

The Modicon Networking range offers you a smart and flexible way to integrate Ethernet solutions into your operation, from the device level to the control network and to your corporate network

### Unmanaged switch for star topology



4 ports for copper  
MCSESU053FN0



8 ports for copper  
MCSESU083FN0

### Managed switch for daisy chain topologies



4 ports for copper  
MCSESM043F23N0



8 ports for copper  
MCSESM083F23N0

These managed switches come with the Ethernet TCP/IP protocol. They come with 4 or 8 copper cable transmission ports. They provide simple and complex connectivity for multiple Ethernet devices, network management, enhanced cybersecurity and more advanced switching features.





### Residents' Usages

- Residential building: 4 floors, 60 flats, 20 EV owners
- Shared spaces – Outdoor or Indoor
- Mainly night charging: AC 22kW
- Authentication via RFID required for residents and visitors
- Individual billing



### Utility supply and electrical distribution

- Box with electrical protections upstairs each charging station
- TIC metering for each charging station



### Energy management strategy

- No load Management System to optimize the EV charging, only TIC interface for load shedding capability and consumption measurement



### Operation and maintenance needs

- EV infrastructure managed by CPO
- Wireless network
- Authentication of users and operators
- Integration with CPO management system for operation and maintenance needs
- EV driver application for booking provided by CPO



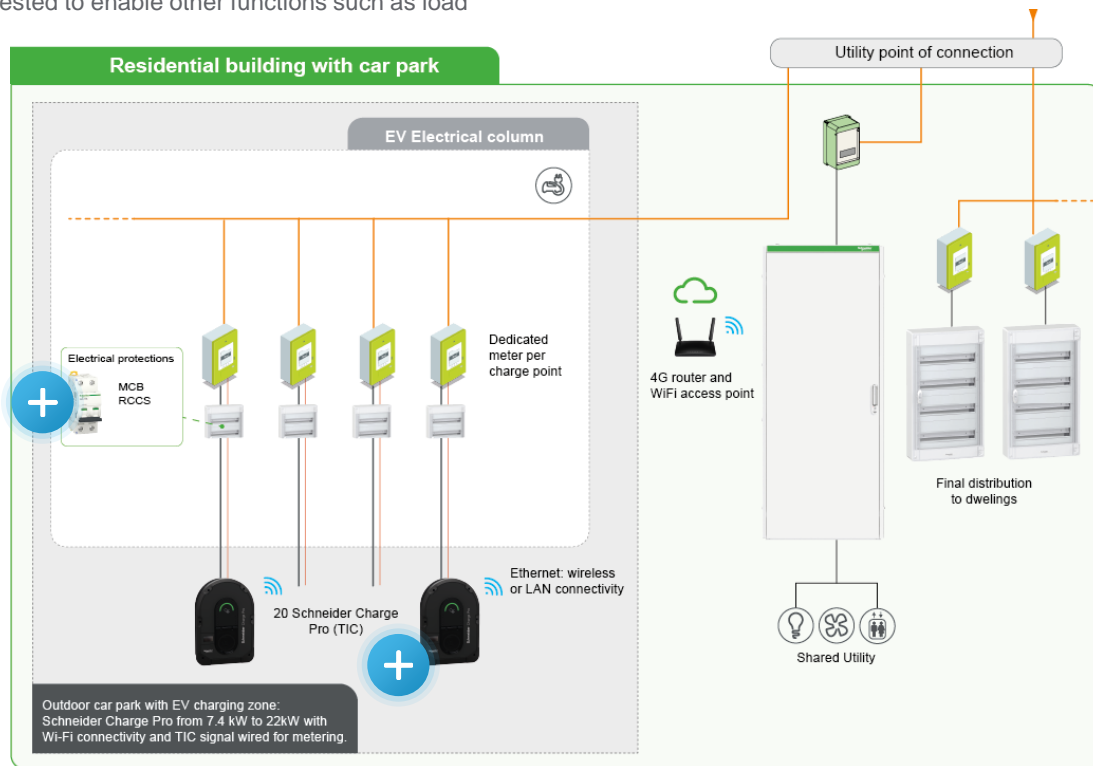
When EV loads are not shared with the other loads, the solution doesn't require to implement load management. However, a TIC interface could be requested to enable other functions such as load shedding or billing.

In that case an electrical column can be created to connect each charging station to an independent delivery point.

## Integration of EV charger's data in the CPO Charging Station Management System



EV driver application provided by the CPO



\* In countries where the installation standard IEC/HD 60364-7-722 or equivalent local regulations are applied, a RCD type B must be used instead of RCD type A-Si.



# Schneider Charge Pro



[Learn more on eMobility solutions from Schneider Electric](#)



[Watch the video](#)

## AC charging station with MID meter and native connectivity



### Easy installation and wiring:

- Three cabling options: back, top, bottom
- Connectors for fast wiring

### Easy commissioning:

- On-site configuration with eSetup mobile app
- Automatic firmware upgrade alert with eSetup
- Wi-Fi direct connectivity

### Characteristics:

- Combine 1P-3P from 7.4 kW up to 22 kW
- T2S socket or 7 m attached cable with T2 connector OCPP 1.6J
- 4G, Wi-Fi, Ethernet embedded connectivity
- Double Ethernet Port
- Authentication through RFID reader
- Embedded MID meter
- Possible connection to external meter via MODBUS RTU and to smart utility meter with DSO and TIC interfaces (specific commercial references)



# EcoStruxure EV Advisor

## Designed to meet your needs



### Interoperable



with certified OCPP1.6J charging stations and access to our extensive API library



### Cybersecurity



following General Data Protection Regulation and cybersecurity recommendations



### Convenient



excellent uptime and access to a large range of services



### Flexible



with white-labeling options and add-ons to adapt to your use case



Remote control



Detailed reports



Performance dashboard





# Electrical distribution



## EV Supply Equipment electrical protection



- MCB 1P+N



- MCB 3P+N



- MNx



- Type Asi RCD monophasé



- Type Asi RCD triphasé



- Type B RCD triphasé

The EV READY Mark is a certification mark that provides an answer to the questions of **Interoperabilityband Performance for Electrical and Hybrid Rechargeable Vehicle (EV) Charging Stations.**



Launched on the initiative of automobile manufacturers Renault-Nissan, the EV READY mark is the result of technical quality work undertaken at numerous workshops with representatives of all the players in this industry (vehicle manufacturers, AC charging station manufacturers, installers, operators, utilities, networks, standardization organizations, third party laboratories, etc.).



### Residents' Usages

- Residential building: 15 flats, 15 EV owners
- Private spaces – Outdoor or Indoor
- Mainly night charging: AC 22kW
- Authentication via RFID required for residents and visitors
- Individual billing



### Utility supply and electrical distribution

- Single utility point of connection
- Centralized EV switchboard with dedicated utility meter and external EV meter for each tenant
- Box with electrical protections upstairs each charging station



### Energy management strategy

- No Load Management System to optimize the EV charging, only metering to keep the electrical consumption below the contract limit



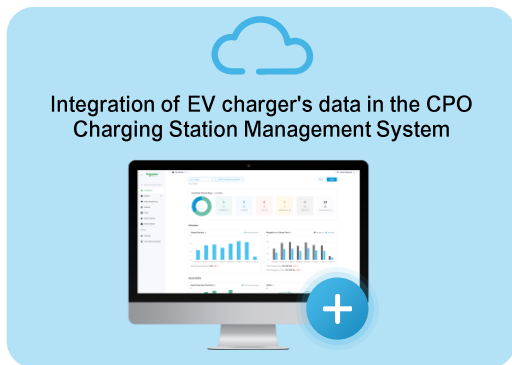
### Operation and maintenance needs

- EV infrastructure managed by CPO
- Wireless network
- Authentication of users and operators
- Integration with CPO management system for operation and maintenance needs
- EV driver application for booking provided by CPO

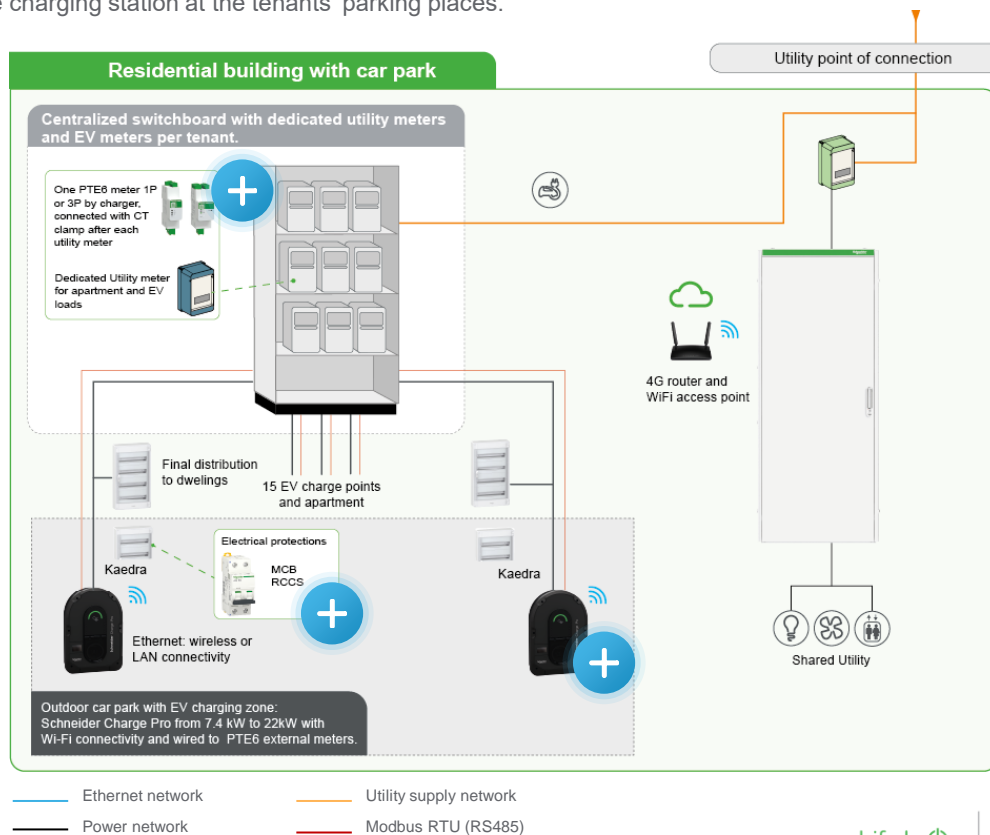


In brown-field applications in Spain or Italy, each appartement may already be supplied with the installation of a utility meter and sharing the utility supply point with the charging station at the tenants' parking places.

In that case, a solution using external meters such as PTE6 connected via Modbus RTU to the charging stations can be implemented to keep the overall loads below the contract limits.



EV driver application provided by the CPO





# Schneider Charge Pro



[Learn more on eMobility solutions from Schneider Electric](#)



[Watch the video](#)

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# EcoStruxure EV Charging Expert

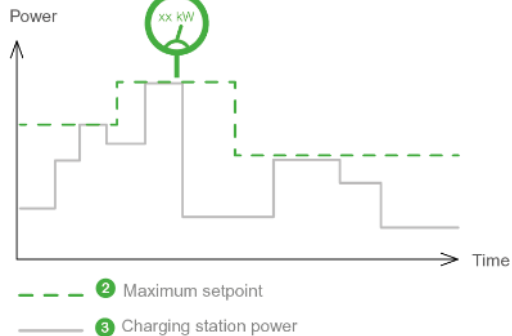


[Learn more on eMobility solutions from Schneider Electric](#)



[Watch the video](#)

## Load Management System



### Characteristics:

- Dedicated for Schneider Charge Pro
- Up to 30 charging stations expendable
- 5 zones and 3 sub-zones
- Dynamic distribution of available power among charging stations
- Peak/off hours EV Charging management
- Monitoring and control of EV charging stations based on an open protocol (OCPP 1.6-J)

+ Option for specific projects



# EcoStruxure EV Advisor

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with certified OCPP1.6J charging stations and access to our extensive API library



### Cybersecurity



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# Electrical distribution



## EV loads metering

Energy sensor PowerTag Resi9 1 or 3 phases



- 1 phase: R9MUX6M



- 3 phases: R9M80X6M





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