

THE BIDIRECTIONAL FOTOLINERA OF MOLINS DE REI

Context. Metropolitan Network of Fotolineras

The Metropolitan Council of the AMB (its main governing body), approved on September 25th, 2018 the Climate and Energy Plan 2030, which establishes the axes, bases and actions necessary to achieve the objectives of energy transition and fight against climate change in the metropolitan area of Barcelona. The ENER 5-1 action includes the creation of a Metropolitan Network of Fotolineras.

There are currently 9 Fotolineras in operation, by the end of May it is planned to have a total of 13 charging stations in operation and in 2022 it is expected to reach 35. One of these 9 existing systems, the one of Molins de Rei, has a bidirectional loading equipment or V2G (vehicle-to-grid). Based on the results of the operation of the bidirectional V2G installation in Molins de Rei, it will be decided how to continue working with this type of loading equipment in the future development of the metropolitan network of Fotolineras. This new generation of V2G power stations is aligned with the energy revolution of the next decade: **the integration of batteries that store renewable energy within an intelligent distribution network that puts citizens in the center**

The fotolineras of the Metropolitan Network of Fotolineras consist of a photovoltaic pergola (10kWp in the majority of cases), associated to two different consumptions. On the one hand, to supply renewable energy with electric vehicles (3 Type 2 equipment at 7.4kW and 1 Schuko at 3.6kW), and, when there are no parked vehicles or those have been fully charged, the energy coming from the photovoltaic pergola supplies the adjacent public building. Additionally, most facilities are placed in park & ride locations, in other words, parking areas close to large interchange of public transport in order to promote the intermodality with public transport to access the center of Barcelona.

In this way, the project addresses three key issues in metropolitan territory:

1. **Energy transition**, increasing the self-sufficiency of the municipalities, thanks to the photovoltaic installation.
2. **Public health**, improving air quality thanks to promoting mobility more sustainable (electric vehicles, collective transport, etc.)
3. **Climate change**, reducing GHG emissions in all aspects of the draft.

The bidirectional V2G Fotolinera of Molins de Rei

The energy transition requires new methods of energy storage. The V2G (vehicle-to-grid) charging stations are undoubtedly a great tool to achieve this goal. The bidirectionality of the energy flow allows vehicle batteries to serve as a source of energy at specific times in which the building needs it. This new scenario has many advantages. For example, car batteries can be used at moments as a source of energy to contribute to the energy demand of the building where they are connected when the photovoltaic generation is lower than the demand, causing a decrease in the power peaks. It can also be useful to reduce energy consumption during peak hours and thus generate a saving in the electricity bill. In addition, photovoltaic generation has always been linked to a variability in production, since it depends on solar radiation, and this variation does not always adapt to the consumption profile of the building. In this situation, the V2G systems, can consider the electric car as a battery connected to the network to adapt the excesses or shortage of solar generation through the charging or discharging of batteries. Finally, the use of V2G technology can maintain the quality of the energy supply required by the loads through continuity in the supply or compensation of reactive power.

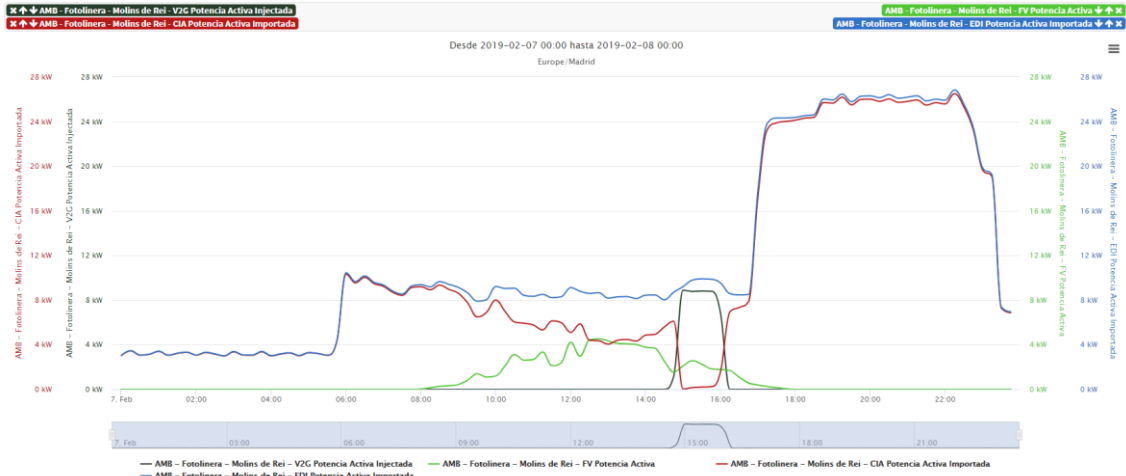
Operation

So far, the vehicles that have access to the V2G equipment, are two municipal fleet vehicles of the City Council (Nissan Leaf and eNV-200). For the operation of the equipment there is an intelligent remote management system developed by NUVVE, which has two fundamental elements:

- I A mobile app that allows users of the V2G recharge point to interact with the team and schedule their availability to transfer energy to the network.
- I A remote management system, a virtual platform, that decides the optimal operating profiles of the installation at a global level (photovoltaic, load, discharge, optimal tariff periods, power peaks, etc.)

Monitoring

Attached there is a screenshot of a day of operation in which can be observed that the injection of the vehicle into the building during 1h, allowed the building not to import energy from the network, as adding V2G and photovoltaic covered the energy demand:

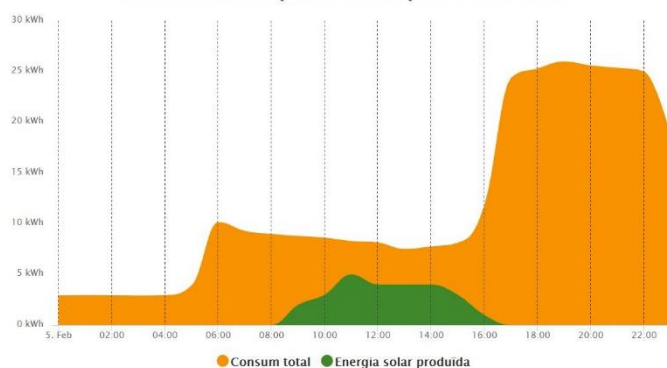


Citizen awareness

The photovoltaic pergola with electric vehicle recharging is creating in the AMB a new urban landscape called to replace the traditional gas stations, transmitting in a simple way to the citizens the new energy paradigm: distributed local renewable and sustainable mobility.

In addition, at the reception of the sports center, a TV screen with three rotating charts that give information about the installation in the current day, the past and a summary of the previous month:

Fotolinera Poliesportiu Municipal Molins de Rei



RESUM D'AHIR 05/02/2019

Consum de la xarxa	259,21 kWh
Energia solar autoconsumida	26,00 kWh
Consum total	286,42 kWh
Energia solar produïda	26,00 kWh
Energia exportada a la xarxa	0,00 kWh

ESTALVI GENERAT

CO ₂	7,02 Kg
€	1,83 €
%	9,08 %

Data sheet

Generation: 8.4kWp photovoltaic pergola (7.2kW Fronius inverter)

Charging equipments:

- 1 Bidirectional equipment of 10kW (Magnum Cap)
- 1 Typo 2 equipment of 6,9kW (Wallbox Circutor)
- 1 Schucko Shucko of 2,3kW (Wallbox Circutor)

Interconnected building: Molins de Rei municipal sports center. Very stable consumption profile throughout the week (mostly afternoon)

Images

