How to charge several electric cars in a common parking area

It is easy for a traditional detached homeowner to install a private charging device for a new electric car, but the challenge for the 50 percent of people globally who live in shared spaces, including apartments and condominiums[1], is much greater.

These types of houses usually have a common parking area or a parking basement and this makes the installation of chargers more complicated, especially when it comes to the question of minimum amperage per charger and the total limit of the grid connection available.

It is a common misunderstanding of how a charger works in everyday life that causes this stumbling block.
There is no need for each charger to be able to use for example 22kW at 32 A simultaneously.

Average driving distances

Several studies reveal that the daily driving distance of a car is far less than many assume. Depending on the country and area, on an average day a car drives between 30 and 50 kilometers[2]. This number is far from what a modern electric car can drive on a full charge. So, when returning home from a day of driving, the car's battery is not empty. A standard electric car consumes about 190 Wh per kilometer, which means after an average day on the road only between 5.7 and 9.5 kWh of energy out of the battery is used. This is the amount that needs to be recharged with the home charger overnight.

We also know that the average overnight parking duration is around 10 hours[3]. Combining these two statistics gives an overview of the realistic charging requirements for shared residential spaces. Recharging 10kWh on a regular single phase 230V socket outlet with 16 amp would only take about three hours. This means that, in theory, you can charge three cars on a 3.7 kW charger within 10 hours.

However, the challenge still exists when lots of cars need to be charged at the same time. They can't start and stop their charging session at the same time, and this means that a form of load management is required.

Static or dynamic load control
The optimal solution is to make a load control that either statically or dynamically adjusts the charging effect according to the current need.

With solutions like ABB's Terra AC chargers, you can prioritize after "first in - first out", which gives full charging effect to the first car. When this is charged or there is capacity left, the next electric car will charge and so on. You can also set up for an equal division, where all electric cars that charge each get their share of the pie. For example, if only one electric car charges, it will have 100 percent capacity. If another is charged, each gets 50 percent, and with three electric cars they get 33 percent, and so on. These two solutions are called static load control.

But what if this capacity changes during the day? Let us assume that a building has 63 A into the entire space. The consumption of these 63 A will fluctuate during the day, all depending on how the building is used. There will be periods when one has more amps available and why not utilize it?

Great benefits of combining ABB's Terra AC charger with smart energy meter
If you combine solutions like ABB's Terra AC chargers with smart energy meters at the entrance to the building, chargers will be able to adapt dynamically to the amps available here and now. For example, if the building has solar panels installed, this will allow users to harness this extra energy to charge the electric cars with a higher power. Or if consumption elsewhere in the building increases, the chargers will automatically lower the charging power so that they never use more than the available power.

In conclusion, setting up more chargers is only a part of the solution for multi-dwelling sites. It is rather about using a combination of the number of chargers and the right power chargers with load management, giving the flexibility to charge effectively withing the given grid capacity at the site at any time and satisfy the needs of residents throughout the day and night. ABB's Terra AC is one solution that can help to achieve this goal.

Source 1: https://ec.europa.eu/eurostat/statistics-explained/index.php?title=File:Distribution_of_population_by_dwelling_type,_2018_(%25)_SILC20.png

Source 2: https://www.sciencedirect.com/science/article/pii/S0191261516309067#tbl0001

Source 3:

https://setis.ec.europa.eu/system/files/Driving_and_parking_patterns_of_European_car_drivers-a_mobility_survey.pdf