It can be expected that there will be a widespread adoption of Electric Vehicles (EVs) during the next decade which results in sharp increase of the electricity consumption. The electricity grid is not built for such high additional load that might occur when all EV owners plug in their vehicle after getting back from work. To avoid huge investments, we have to develop a solution that A. predicts grid overload and B. carries out smart charging. Here, smart charging means changing the default charging behavior such that the total electricity consumption stays within grid limits.

The goal of the project is to develop a prototype of the Grid congestion manager that predicts the overload and carries out smart charging.

# Tasks and starting points

As a starting point, you’ll receive the following datasets:

* Grid topology that reflects the capabilities of the grid at given location (the capabilities of the substations, electric lines, etc.)
* Simulated data of 100 electric vehicles that includes information about each EV and the prediction of their charging pattern.

<https://drive.google.com/drive/folders/1ESu5cZdLdLp9eYT_Zugud6fg0opOXeoq?usp=sharing>

Tasks:

1. Prepare the datasets for analysis;
2. Develop a prediction model that forecasts the grid load in specific location based on EV charging statistics.
3. Develop a model for smart charging – a model that divides the electricity consumption of EVs such that the limits of the grid won’t be exceeded and all of the EV owners receive the similar experience.
4. Develop a graphical user interface (GUI) with following functionality:
   1. enables to select a time of day (hour) and location as an input and shows grid load forecast.
   2. shows the optimized charging schedule if there is a threat of grid congestion.