Integrate battery dynamics into ETM

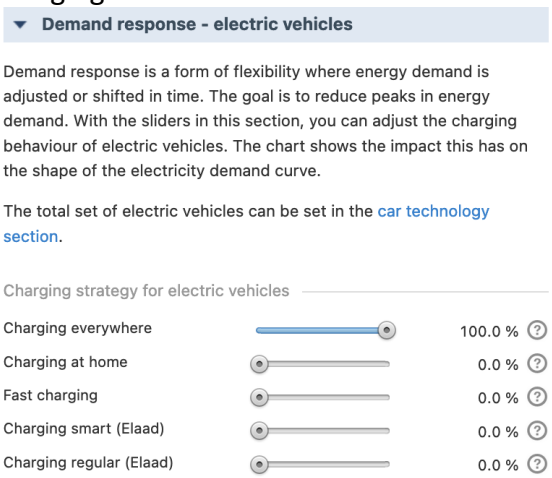
Problem:
The Energy Transition Model (ETM) models the hourly demand of electric vehicles (EV) as time curve. At the same time, the batteries of EV can be (partially) used as a storage device for electricity. The time curves and the storage behaviour are currently not consistent.

Proposed solution:
Using ABM, produce (hourly) time curves for one year for all combinations of the following four 'variables':

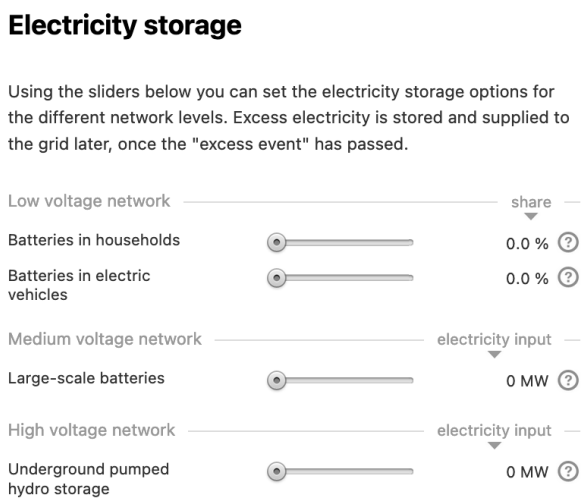
1. The charging location:
    a. Charging at home only
    b. Charging at the office only
    c. Charging both at the office and at home
    d. Using fast chargers in a combination with a, b and c?
2. The traveling behaviour:
    a. Commute to work on workdays
    b. Trips to shops etc. on work and weekend days
    c. Trips on weekend days
3. The charging behaviour:
    a. Charging when arriving
    b. Charging when there is expected capacity on the network
    c. Smart charging to optimize profit?
4. The storage (vehicle-to-grid) behaviour:
    a. Allowing 5% of the battery volume to be used for V2G
    b. Allowing 10% of the battery volume to be used for V2G
    c. …
    d. Allowing 95% of the battery volume to be used for V2G
    e. Allowing 100% of the battery volume to be used for V2G

This yields a library of hourly profiles that can be used in the ETM to describe the hourly demand of EV depending on the choice of users for

- Charging behaviour:



- Storage (V2G) behaviour:



Further suggestions:
Using the API of the ETM, the ABM vehicles can interact with the rest of the energy system to get information about electricity price and expected network impact.

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