

Output description

General description of the output files

The simulation outputs multiple files, that are described below. Folders are marked in **bold**.

File name and level	Description
expansion-matrix-abs-values.csv	Expansion matrix filled with absolute numbers
expansion-per-cu.csv	List the expansion that happens per control unit
no param vari	Output directory if no param variation is selected
metrics-per-cu.csv	Computed metrics per control unit (like SSR, SCR, NPV, total grid demand, ...) including the concrete parameters for the simulated PV, battery and the charging station component
XXXX-substation-time-series.csv	Time series of the load, wind/o.s. PV feedin, etc. aggregated on substation level
substation-detailed-time-series.csv	Time series of the additional details on substation level, like residential load (includes feed-in) and demand (only residential grid demand, no surplus feed-in accumulated)
parameter-settings.csv	Parameter settings for the concrete simulation run (very useful for parameter variations)
sim-added-roof-sections-per-cu.csv	A list of all sim. added roof sections per control unit
substation-detailed-time-series.csv	Addition information, aggregated on substation level, that is not contained in the first file
build_and_run_info.txt	Information on the simulation run and the used program
<i>optional output:</i>	Output of all power flows inside the control units ...
<i>case single file:</i>	<i>See command line parameter --cu-output for details</i>
XXXX-CU-time-series.csv	... in one file
<i>case seperated files:</i>	
ts-per-cu	

File name and level	Description
YYYY-AllCUs-ts.csv	... in one file per substation YYYY
param vari XXXX	Output directory if a parameter variation is selected
build_and_run_info.txt	Information on the simulation run and the used program
variation index XXXX	There is one subfolder for every variation combination, the concrete parameters can be found in parameter-settings.csv
<i>rest of the content</i>	see folder no param vari

Detailed description per file

metrics-per-cu.csv

Column name	Description
UnitID	The control unit ID of the current record
SCR	The self-consumption rate over the complete simulated time span
SSR	The self-sufficiency rate over the complete simulated time span
NPV	The net-present value (including installation costs) over the complete simulated time span
Sum of demand [kWh]	The demand sum of electricity demand of the real smart meters and all simulated consumers (heat pump and charging station) in kWh
Sum of MU demand [kWh]	The demand sum of the measurement units, i.e., the real smart meters in kWh
Sum of self-consumed e. [kWh]	The sum of locally produced and self-consumed electricity in kWh
Sum of PV-generated e. [kWh]	The sum of locally produced PV energy in kWh
Sum of grid feed-in [kWh]	The sum of electricity that was fed into the grid in kWh
Sum of grid demand [kWh]	The sum of electricity that was demanded from the grid in kWh
BS EFC	The battery equivalent full cycles (if not battery is simulated, this value defaults to 0.0)
BS n_ts_empty	The number of time steps where the battery was empty (if not battery is simulated, this value defaults to 0.0)
BS n_ts_full	The number of time steps where the battery was full (if not battery is simulated, this value defaults to 0.0)
BS total E withdrawn [kWh]	The sum of electricity that was withdrawn from the battery in kWh (if not battery is simulated, this value defaults to 0.0) - Attention: The battery might not be empty at the end of the simulation procedure

Column name	Description
Sum of HP demand [kWh]	The sum of demanded electricity of the heat pump in kWh (if no heat pump is simulated, this value defaults to 0.0)
Sum of CS demand [kWh]	The sum of demanded electricity of the EV charging station in kWh (if no EV charging station is simulated, this value defaults to 0.0)
Peak grid demand [kW]	The peak grid demand in kW over the complete simulated time span
Emissions cbgd [kg CO2eq]	The CO2e emissions caused by grid demand including upstream emissions (but no installation emissions for PV panels, battery storage or heat pumps)
Avoided emissions [kg CO2eq]	The avoided CO2e emissions caused by local production (and possibly storing) of renewable energy
Sim. PV max P [kWp]	The installed power in kW (resp. kWp) of the simulated PV installation, or 0.0 if none is present
Sim. BS P [kW]	The installed power in kW of the simulated battery storage system, or 0.0 if none is present
Sim. BS E [kWh]	The installed capacity in kWh of the simulated battery storage system, or 0.0 if none is present
n EVs	The number of EVs with their home at this given unit
Sim. CS max P [kW]	The installed power in kW of the simulated EV charging station, or 0.0 if none is present

XXXX-substation-time-series.csv

Column name	Description
Timestep	The time step ID of the current record
<i>Per substation YYYY</i> YYYY	Active power in kW at substation YYYY
open_space_pv_feedin	Total feed-in of open-space PV installations in kW
wind_feedin	Total wind feed-in at grid level in kW
OverallBatterySOC	Mean SOC over all simulated battery storage systems on control unit level
total_load	Total active power in kW in the grid

substation-detailed-time-series.csv

The columns of this output follows the following nomenclature:

- **load:** Sum of all current virtual smart meter measurements per time step
- **demand:** Sum of the positive current virtual smart meter measurements per time step

Column name	Description
Timestep	The time step ID of the current record
<i>Per substation YYYY</i>	
YYYY_resident_load_kW	Sum of residential load in kW of all residential buildings connected to substation YYYY
YYYY_resident_demand_kW	Sum of residential demand in kW of all residential buildings connected to substation YYYY
total_residential_load	Total residential load in kW
total_residential_demand	Total residential demand in kW

XXXX-CU-time-series.csv or YYYY-AllCUs-ts.csv

Column name	Description
Timestep	The time step ID of the current record
ControlUnitID	The control unit ID of the current record
Load_vSmartMeter_kW	The power at the virtual smart meter in kW (positive values denote a demand, negative values denote a feed-in)
Load_rSmartMeters_kW	The power summed over all real smart meters in kW (positive values denote a demand, negative values denote a feed-in)
Load_self_produced_kW	The self-produced power that is consumed in the current time step in kW at the given unit - Please note: If excess power was fed into the battery in the previous steps, this will only be taken into account at the moment of discharge
PVFeedin_simulated_kW	The current PV production in kW (if present, else 0.0)
BS_SOC	The state of charge of the connected battery (if present, else 0.0)
BS_load_kW	The current power of the battery storage in kW (if present, else 0.0; positive values denote battery charging, negative values denote discharging)
HP_load_kW	The current power of the heat pump in kW (if present, else 0.0)
CS_load_kW	The current power of the EV charging station in kW (if present, else 0.0)
CS_n_EVs_conn	The number of home-parking vehicles that are currently connected to the charging station
CS_n_EVs_not_conn	The number of home-parking vehicles that are currently not connected to the charging station