Input description

General overview of the input data

- The simulation requires a sqlite3-database with the structure of the system that should be simulated (default filename is SystemStructure.db).
- The existing smart meter data of the individual measurement units must be stored in a subfolder called ‘SeparatedSmartMeterData’ as individual comma-seperated values (csv) files.
- The file name of the CSV files must equal the measurement unit ID (key: `list_of_measurement_units.MeUID`) as they are defined in the system structure database.

The general structure of the system structure database

The system structure database requires the following tables:

Table name	Description
time_indices	List of time indices
list_of_substations	List of substations
list_of_control_units	List of control units
list_of_measurement_units	List of measurement units
global_profiles_pv	Global PV feedin (normalized)
global_profiles_pv_info	Information about how many global PV feedin time series exist per orientation
global_profile_wind	Global wind farm feedin (normalized)
global_profiles_heatpumps	Global heap pump demand profiles (normalized)
address_data	List of all known addresses with yearly energy demand in case of heat pump heating
heat_demand_per_location	Information about the heat demand that is converted using gas consumption data (if available)
address_roof_data	List of all roof sections of all buildings (with orientation and size)
residual_grid_load	Time series of the residual grid load, that is not measured by any smart meter, but still present

Table name	Description
electricity_emissions	Time series of the CO2 emissions (optional table, is used, if present, otherwise ignored)
electricity_prices	Time series of the hourly electricity prices (optional table, is used, if present)

Structure of the smart meter data / csv files

Each smart meter csv file must have the following columns in this order:

Column name	Description
TimestepID	The id of the time step (key: `time_indices.TimestepID`)
Value_Demand	Reading of the demand in kWh at the given time step
Status_Demand	*ignored*
Value_Feedin	Reading of the feed-in in kWh at the given time step
Status_Feedin	*ignored*

Details on the database tables

Documentation of the configuration database in detail

Table time_indices

Column name	Type	Description
TimestepID	INTEGER	ID of the timestep, must start with 1 and must be numbered consecutively
UTC_time	TIMESTAMP	UTC time stamp of the beginning of the time step in the format YYYY-MM-DD HH:MM:SS
local_time	TIMESTAMP	Local time stamp of the beginning of the time step in the format YYYY-MM-DD HH:MM:SS
local_time_zone	TEXT/VARCHAR(4)	Time zone name of the local time as text (might change e.g. through daylight saving time)

Table list_of_substations

Column name	Type	Description
substation_id	INTEGER	ID of the substation, may start with 1 and may be numbered consecutively (not mandatory anymore)
substation_name	TEXT	Name of the substation

Table list_of_control_units

Column name	Type	Description
UnitID	INTEGER	ID of the control unit, may start with 1 and may be numbered consecutively (not mandatory anymore)
substation_id	INTEGER	ID of the substation to which this control unit is connected to [Foreign key]
LocID	INTEGER	ID of the location where the control unit is located at [Foreign key]
has_wbx	INTEGER	Holds the value 1, iff there is a wallbox connected to this control unit

Table list_of_measurement_units

Column name	Type	Description
MeUID	INTEGER	ID of the measurement unit, may start with 1 and may be numbered consecutively (not mandatory anymore)
UnitID	INTEGER	ID of the control unit to which this measruement unit is assigned [Foreign key]
UnitID	INTEGER	ID of the control unit to which this measruement unit is assigned [Foreign key]
MeterPointID	TEXT	Name of the meter point, i.e. MPRN (Meter Point Reference Number in UK) or MELO (Meter Location Number in Germany)
has_demand	INTEGER	Holds the value 1, iff this measurement unit shows a demand at least at one point in the simulation time
has_feedin	INTEGER	Holds the value 1, iff this measurement unit shows a feedin at least at one point in the simulation time

Column name	Type	Description
has_pv_residential	INTEGER	Holds the value 1, iff a residential PV installation is connected (exclusivley and not exclusivley) to the measuremt unit
has_pv_open_space	INTEGER	Holds the value 1, iff an open-space PV installation is connected (exclusivley and not exclusivley) to the measuremt unit
has_bess	INTEGER	Holds the value 1, iff a battery is connected (exclusivley and not exclusivley) to the measuremt unit
has_hp	INTEGER	Holds the value 1, iff a heat pump is connected (exclusivley and not exclusivley) to the measuremt unit
has_chp	INTEGER	Holds the value 1, iff a CHP is connected (exclusivley and not exclusivley) to the measuremt unit
LocID	INTEGER	ID of the location where the measurement unit is located at [Foreign key]
has_wind	INTEGER	Holds the value 1, iff a wind farm is connected (exclusivley and not exclusivley) to the measuremt unit
has_biomass	INTEGER	Holds the value 1, iff a bio mass power plant is connected (exclusivley and not exclusivley) to the measuremt unit
has_evcs	INTEGER	Holds the value 1, iff a residential EV charging station is connected (exclusivley and not exclusivley) to the measuremt unit
has_public_evcs	INTEGER	Holds the value 1, iff a public EV charging station is connected (exclusivley and not exclusivley) to the measuremt unit

Table global_profiles_pv

Column name	Type	Description
TimestepID	INTEGER	The time step for which the dataset is valid [Foreign key]
Value_Feedin	REAL	The normalized feed-in value at the given timestep
Orientation	TEXT / VARCHAR(2)	The orientation of the given feedin value
SameOrientationTimeSeriesIndex	INTEGER	If there are more time series for one orientation, this number gives the id (starting with 0) of the time series with the same direction

Table global_profiles_pv_info

Column name	Type	Description
orientation	TEXT / VARCHAR(2)	The orientation
number_of_ts	INTEGER	Number of time series for the given orientation

Table global_profile_wind

Column name	Type	Description
TimestepID	INTEGER	The time step for which the dataset is valid [Foreign key]
wind_profile_value	REAL	The normalized feed-in value at the given timestep

Table global_profiles_heatpumps

Column name	Type	Description
TimestepID	INTEGER	The time step for which the dataset is valid [Foreign key]
Value_Demand	REAL	The normalized demand value of the heat pump time series; normalization takes place on a yearly level to a demand sum of 1000 kWh / a
TimeSeriesIndex	INTEGER	The index of the heat pump time series (important, if there is more than one time series)

Table address_data

Column name	Type	Description
LocID	INTEGER	ID of the location (starting with 0)
n_buildings	INTEGER	Number of buildings (for which geodata is available)
has_residential_buildings	INTEGER	Holds the value 1, iff the location holds a residential building, and can thus be regarded as residential location
max_volume	REAL	The volume of the (biggest) building on the given location - used for aproximating the heat demand if no heat demand is given in table heat_demand_per_location

Table heat_demand_per_location

Column name	Type	Description
LocID	INTEGER	ID of the location
MeanHeatEnergy_kWh	REAL	Mean heat demand of the location in kWh per year / mean over all regarded years

Table address_roof_data

Column name	Type	Description
LocID	INTEGER	ID of the referenced location [Foreign key]
Area_in_m2	REAL	Area of the roof section in square meter
Orientation	TEXT / VARCHAR(2)	The orientation of the given roof section; for every orientation there has to exist a correspoding time series in the tabel `global_profiles_pv`

Table residual_grid_load

Column name	Type	Description
TimestepID	INTEGER	ID of the timestep, must start with 1 and must be numbered consecutively
P_residual_gridload	REAL	Residual grid load in kW during time step TimestepID

Table electricity_emissions

Column name	Type	Description
TimestepID	INTEGER	ID of the timestep, must have the same alignment as time_indices.TimestepID
emissions_g_kWh	REAL	CO2eq. emissions of one kWh of electiricty that is taken from the transmission grid

Table electricity_prices

Column name	Type	Description
TimestepID	INTEGER	ID of the timestep, must have the same alignment as time_indices.TimestepID
local_price	REAL	The local (dynamic) price for residential households for a dynamic tariff in ct/kWh
spotmarket_price	REAL	The (dynamic) price at the spot market (without vat or taxes) in ct/kWh