Modus operandi to link GUSTO to the Open Platform

The superior objective of this document is: (i) to give an explanation how to use available information from the open platform in the modeling exercise, and (ii) to introduce the required steps to write modeling results to the open platform, and therefore, make them available for other modeling teams.

Ad (i): exemplarily, the process is shown for the solar radiation variable (*LoadFactor|Electricity|Solar|Profile)*

Ad (ii): exemplarily, the process is shown for the modified electricity profile

In the following, a description is given how to get information from the open platform (Scenario Explorer) into GUSTO's modeling framework. In addition, functionalities of the framework are presented concerning the upload of modeling results to the platform. The code, data and further information are available at GitHub: https://github.com/sebastianzwickl/GUSTO

Figure 1 shows an overview of the individual steps, which enable a linkage among the models. In the following, each step is described in detail. Note that the following description refers to the folder structure in the corresponding GitHub repository.

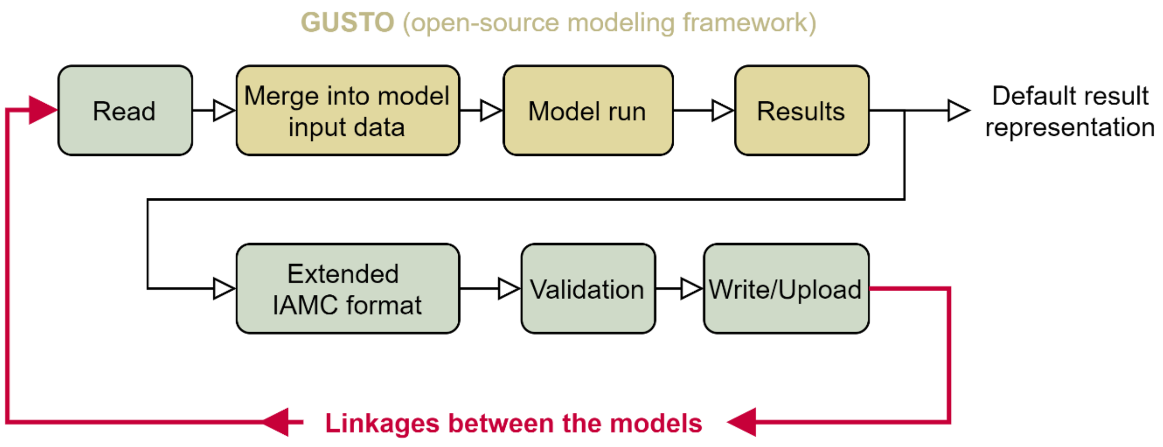
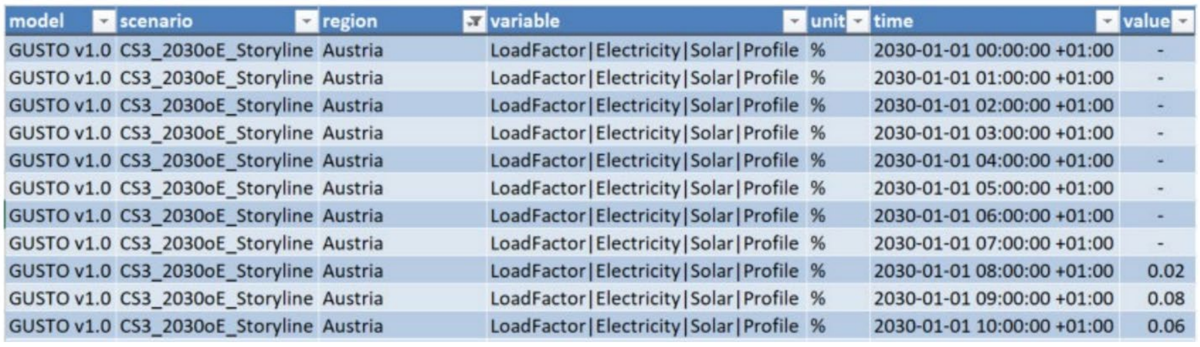

GUSTO (open-source modeling framework)
Read
Merge into model input data
Model run
Results
Default result representation
Extended IAMC format
Validation
Write/Upload
Linkages between the models

Figure 1 Overview of the modus operandi to link the models

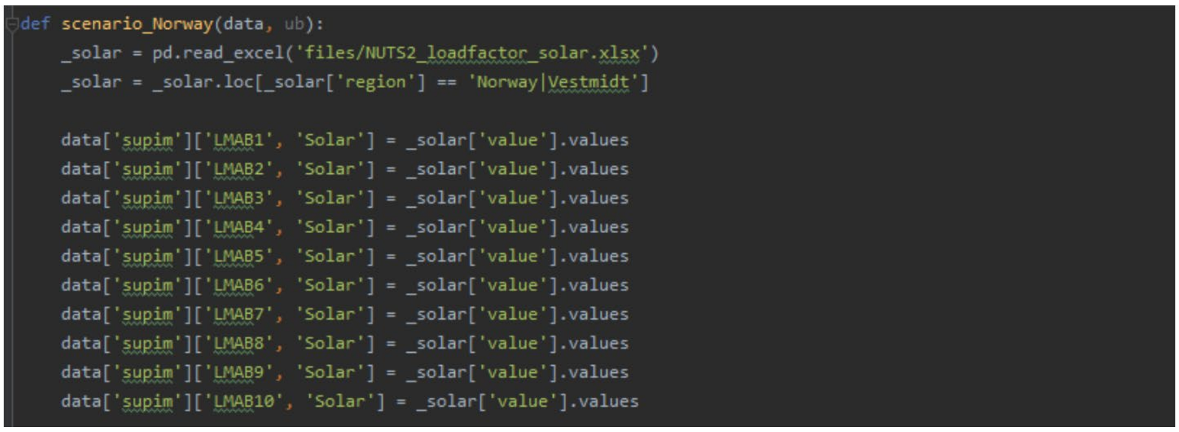
1. **Read (download information from the open platform):**
   Download the data from the open platform into the subfolder *files.* It contains all information from the open platform. Note that the default input file of the model is located under *Input*. However, the information in *files* enable a modification of the values in *Input*. In order to download data from the open platform, run the script *_Read_from_Open_Platform.py.* Note that the script is included in the subfolder *files* to write directly into the corresponding folder. Exemplarily Figure 2 shows the variable *LoadFactor|Electricity|Solar|Profile* downloaded from the open platform.
2. **Merge into model input data:**
   As already mentioned, the information from the open platform is saved in *files* and modify the input data (see *Input* subfolder). The script *scenarios.py* (see directory *urbs/scenarios.py*) contains the assumptions, especially those that differ by the different scenarios (or storylines) and merges the information from the open platform into the modeling framework (see Figure 3). Thereby, the downloaded solar radiation is merged as an input.

3. Model run (generate modeling results):
   Please see detailed description in the corresponding repository how to run the model and generate results. Note that the corresponding scenario or input modifications still have to be declared (or "activated") in the *run_model.py* script (e.g., by the command *scenarios = [urbs.scenario_Norway, 'cost'])*
4. Results (Default result representation):
5. Extended IAMC format:
   The process enabling to write the results into the extended IAMC format is executed by the command *Elec_profile_to_ext_IAMC.write_to_iamc_format()* implicitly within the *run_model.py* script*.*
6. Validation:
   The results can be validated by using the command: *nomenclature.validate(to_validate)*[1].
7. Write/Upload



model	scenario	region	variable	unit	time	value
GUSTO v1.0	CS3_2030oE_Storyline	Austria	LoadFactor|Electricity|Solar|Profile	%	2030-01-01 00:00:00 +01:00	-
GUSTO v1.0	CS3_2030oE_Storyline	Austria	LoadFactor|Electricity|Solar|Profile	%	2030-01-01 01:00:00 +01:00	-
GUSTO v1.0	CS3_2030oE_Storyline	Austria	LoadFactor|Electricity|Solar|Profile	%	2030-01-01 02:00:00 +01:00	-
GUSTO v1.0	CS3_2030oE_Storyline	Austria	LoadFactor|Electricity|Solar|Profile	%	2030-01-01 03:00:00 +01:00	-
GUSTO v1.0	CS3_2030oE_Storyline	Austria	LoadFactor|Electricity|Solar|Profile	%	2030-01-01 04:00:00 +01:00	-
GUSTO v1.0	CS3_2030oE_Storyline	Austria	LoadFactor|Electricity|Solar|Profile	%	2030-01-01 05:00:00 +01:00	-
GUSTO v1.0	CS3_2030oE_Storyline	Austria	LoadFactor|Electricity|Solar|Profile	%	2030-01-01 06:00:00 +01:00	-
GUSTO v1.0	CS3_2030oE_Storyline	Austria	LoadFactor|Electricity|Solar|Profile	%	2030-01-01 07:00:00 +01:00	-
GUSTO v1.0	CS3_2030oE_Storyline	Austria	LoadFactor|Electricity|Solar|Profile	%	2030-01-01 08:00:00 +01:00	0.02
GUSTO v1.0	CS3_2030oE_Storyline	Austria	LoadFactor|Electricity|Solar|Profile	%	2030-01-01 09:00:00 +01:00	0.08
GUSTO v1.0	CS3_2030oE_Storyline	Austria	LoadFactor|Electricity|Solar|Profile	%	2030-01-01 10:00:00 +01:00	0.06

Figure 2 LoadFactor|Electricity|Solar|Profile information (and structure) downloaded from the open platform



```
def scenario_Norway(data, ub):
    _solar = pd.read_excel('files/NUTS2_loadfactor_solar.xlsx')
    _solar = _solar.loc[_solar['region'] == 'Norway|Vestmidt']

    data['supim']['LMAB1', 'Solar'] = _solar['value'].values
    data['supim']['LMAB2', 'Solar'] = _solar['value'].values
    data['supim']['LMAB3', 'Solar'] = _solar['value'].values
    data['supim']['LMAB4', 'Solar'] = _solar['value'].values
    data['supim']['LMAB5', 'Solar'] = _solar['value'].values
    data['supim']['LMAB6', 'Solar'] = _solar['value'].values
    data['supim']['LMAB7', 'Solar'] = _solar['value'].values
    data['supim']['LMAB8', 'Solar'] = _solar['value'].values
    data['supim']['LMAB9', 'Solar'] = _solar['value'].values
    data['supim']['LMAB10', 'Solar'] = _solar['value'].values
```

Figure 3 Python script scenarios.py enabling to merge information from the open platform into the modeling framework

Therefore, the required steps can be summarized as follows:

- Download information from the open platform in the subfolder (*_Read_from_Open_Platform.py)*
- Merge the information into the modeling framework (*scenario.py*)
- Select the merged information by enabling the corresponding scenario (*run_model.py*)
- Run the model and validate the results (*nomenclature.validate(to_validate)*)
- Upload the validated data manually to the open platform

[1] For further information is referred to https://github.com/openENTRANCE/nomenclature.