Validating energy simulation results for district models based on GIS data: first experiences on the case of the city of Enschede (NL)

Franken, Martinus [1]; Coors, Volker [2]; Fitsky, Matthias [2]; **Struck, Christian [3]**; Rovers, Twan [3]; Hernandez Moral, Gema [4]; Vinci, Fabio [5], Martirano, Giacomo [5], Pignatelli, Francesco [5]

[1] Kadaster BV (NL), [2] Hochschule für Technik Stuttgart (D), [3] Saxion Hogeschool (NL), [4] Fundacion CARTIF (ES), [5] Joint Research Centre of the European Commission (IT),

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Aim

1. Within the Energy & Location Applications project, executed under the ELISE action of the ISA2 Program, a task is carried out with the aim of evaluating the validity of simulation results for simulation models at district scale based on GIS data (CityGML).

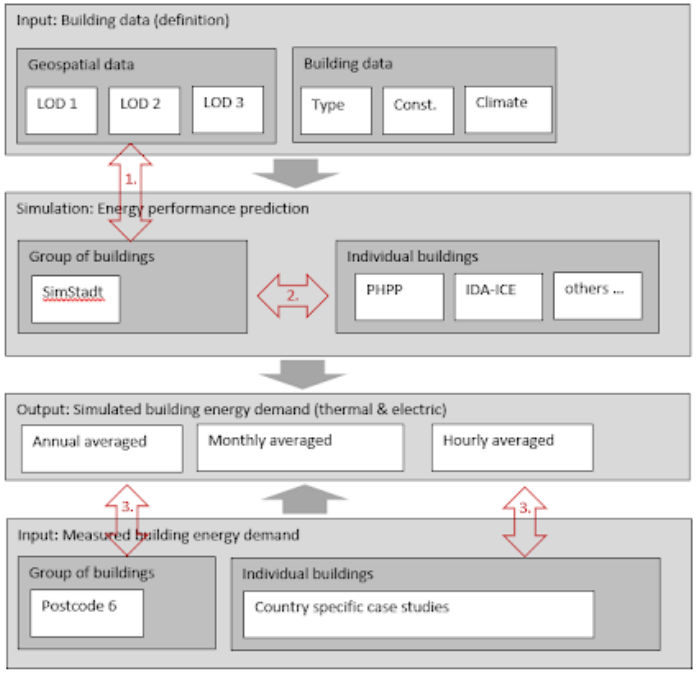
2. This contribution documents the first experiences for conducting one of the three parts of the evaluation framework for the City of Enschede, The Netherlands. The study compares results from a simulation made with SIMSTADT software, for a model made up of 327 dwellings, with averaged data on annual consumption data for heating for LOD 1.

Validation approach

The model accuracy and simulation results can be assessed on (at least) three levels:

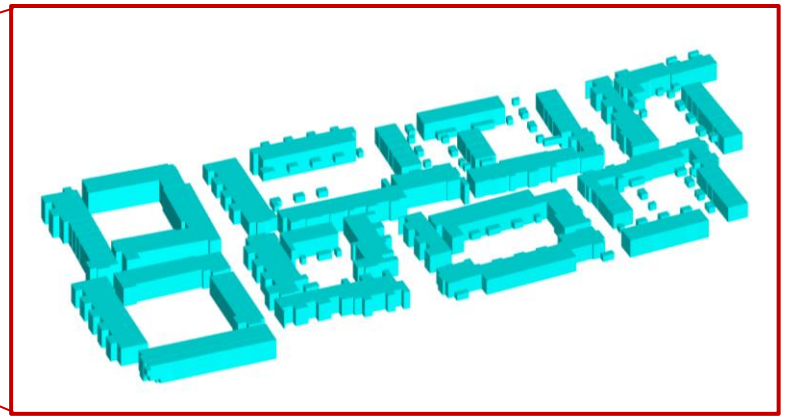
1. Level of detail geometrical data: impact of LOD on prediction accuracy
2. Intermodel comparison: accuracy assessment between simulation models on city and building scale (monthly and hourly averages)
3. Absolute performance prediction: comparison of predicted and measured data (multi- and single building scale)

Validation framework



Modelling & simulation
workflow, validation steps 1-3

Case study, Enschede (NL) – LOD 1



113 building blocks

327 addresses = dwellings

6518 building blocks

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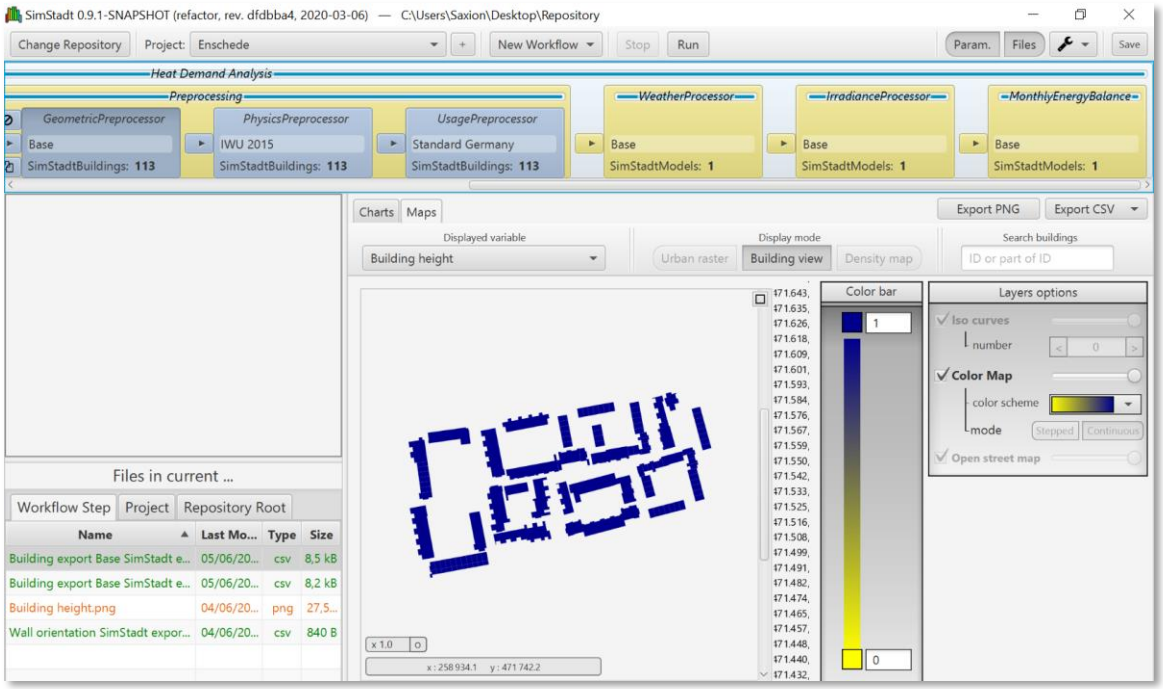
Energy demand for heating, prediction with SimStadt



Application of German building physics and occupancy libraries for Dutch case study.

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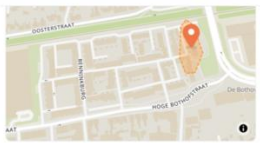
Energy demand for heating, prediction with SimStadt

	Average energy use for heating per dwelling [kWh/a]
SimStadt, prediction	11500
Zensus, 2017 [NL]	12400 (1)
Difference (%)	7 %

(1) https://www.clo.nl/indicatoren/nl0035-energieverbruik-door-de-huishoudens

Next step: Preparing comparison of predictions with absolute measurements, postcode 6 level

Pos.	Postcode 7511	Map	Street & Adres	Number of dwellings
1	LM		Tijhofburg 2 - 26	25
2	LL		Stinsburg 19 - 37	19
3	LC		Kremersmaten 84 - 132	49
4	LB		Kremersmaten 40 - 82	43

- Publically available data from energy suppliers.
- Aggregated on postcode 6 level for protection of privacy.
- Modelled area comprises of 18 postcodes at postcode 6 level.

Preliminary conclusions

1. CityGML geometry data are suitable to parametrize simulation models for the prediction of the energy demand on district scale.

2. There is a need to develop localized (county specific) building material and occupancy libraries to enrich simulation models.

3. Indicative simulation results show a surprisingly good fit between predicted and averaged energy use data, even for LOD 1 models.

Questions?

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