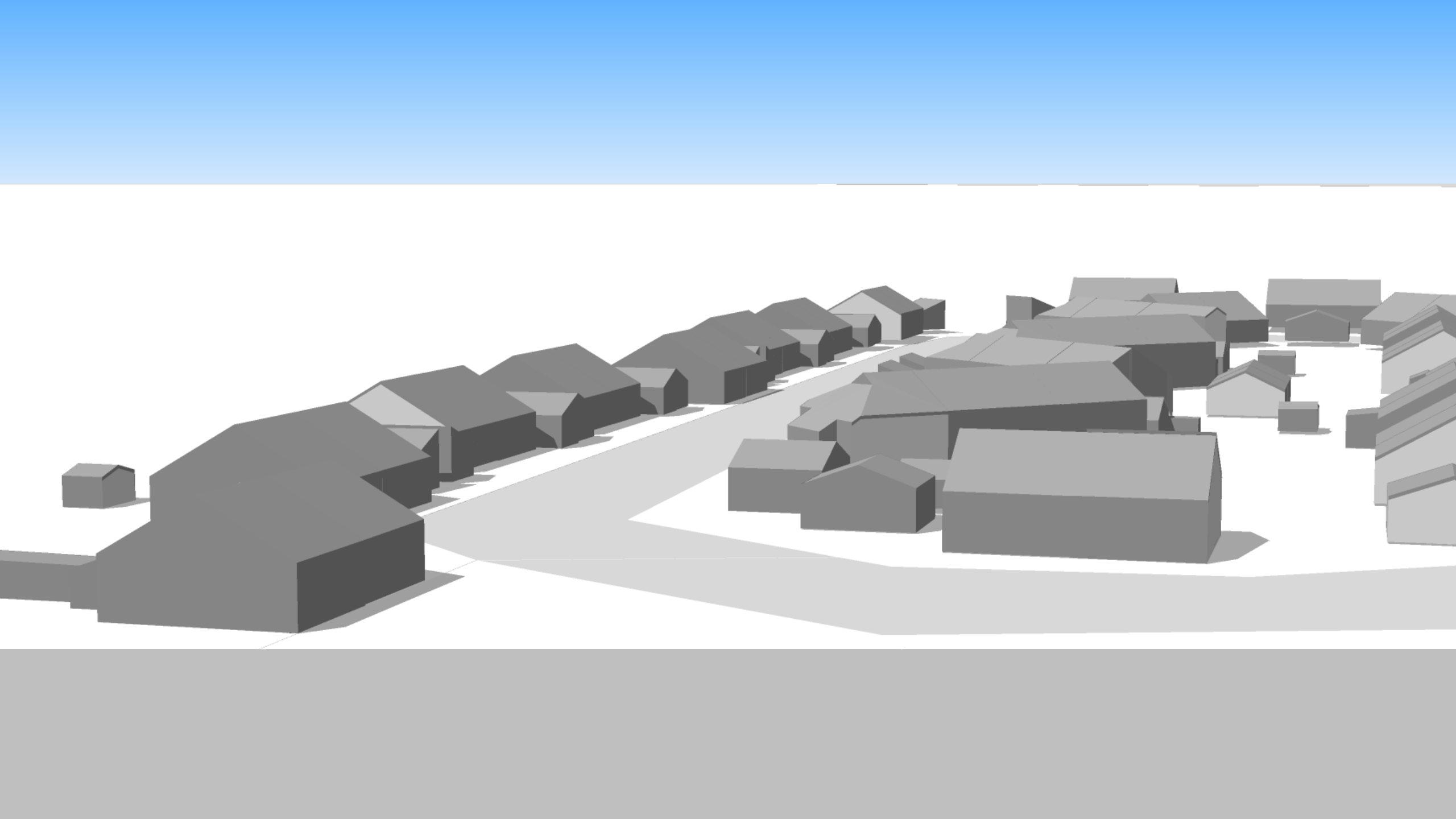
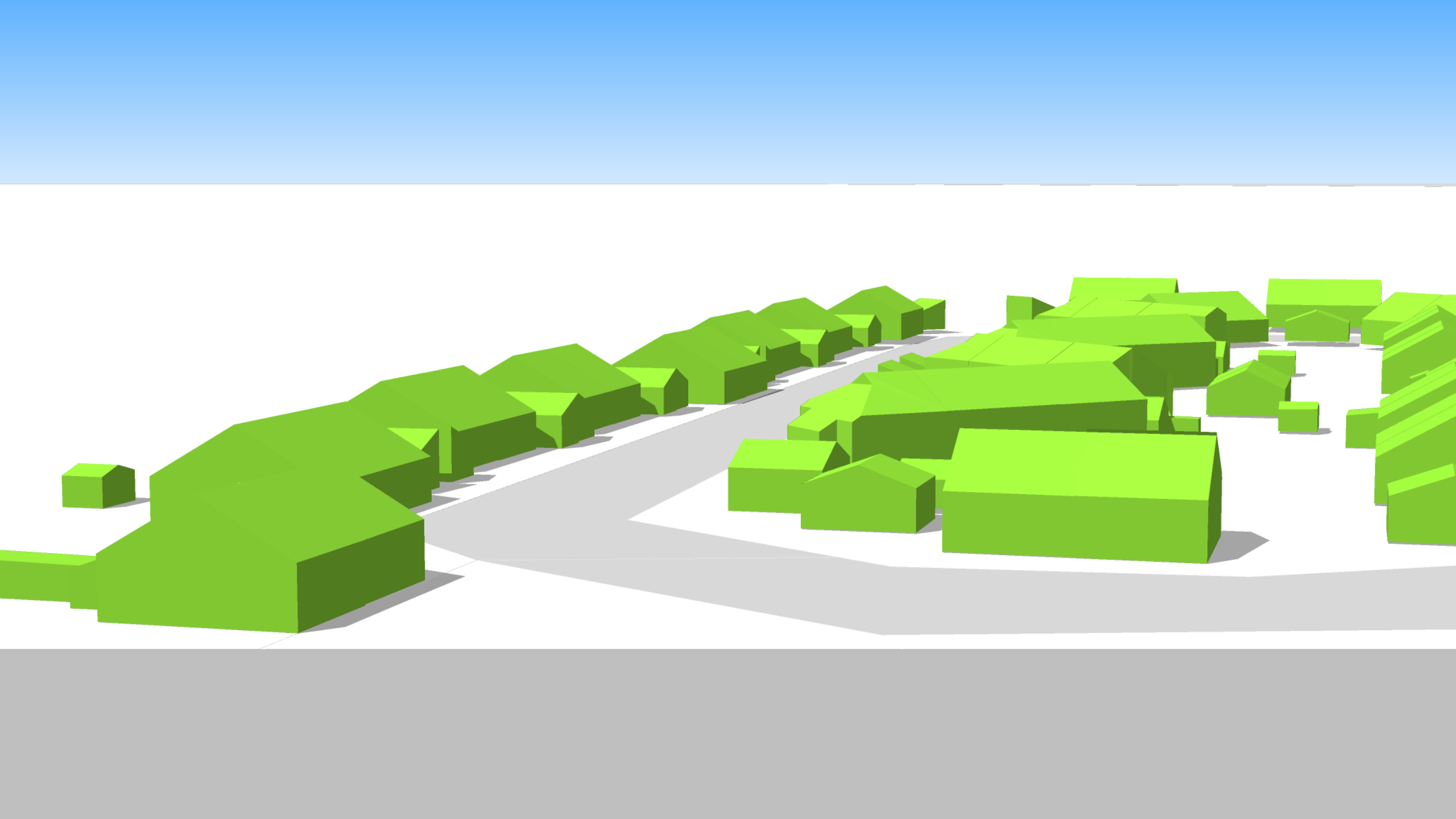
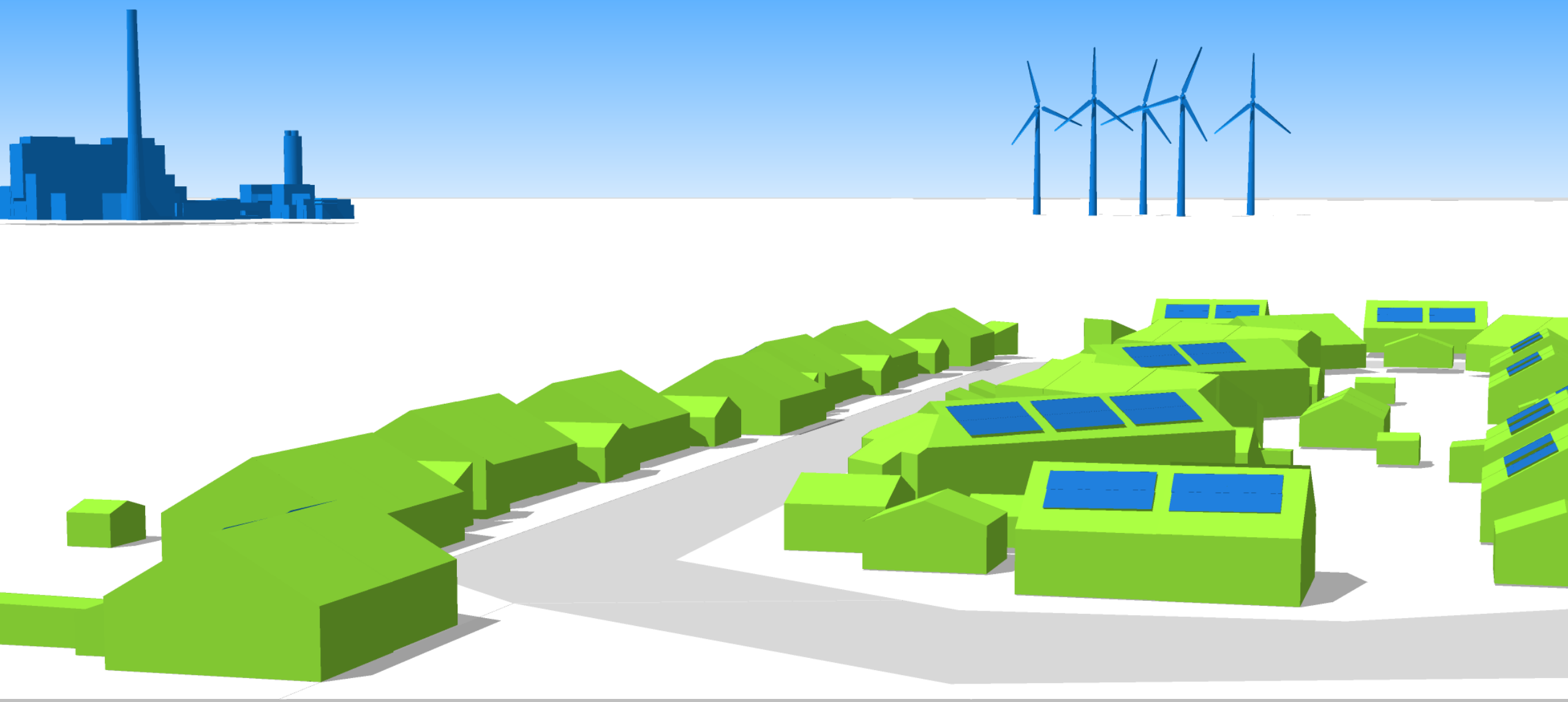
The impact of input data uncertainty on the reliability of district energy simulations

Ina De Jaeger






(geothermal)
(wind)
(solar)


P_{heat}
Time
P_{el}
Time
P_{heat}
Time
P_{el}
Time

BUILDING DESCRIPTION:
input data for building energy simulation

general
location
construction year
…

renewable energy system
presence
characteristics (production, …)
…

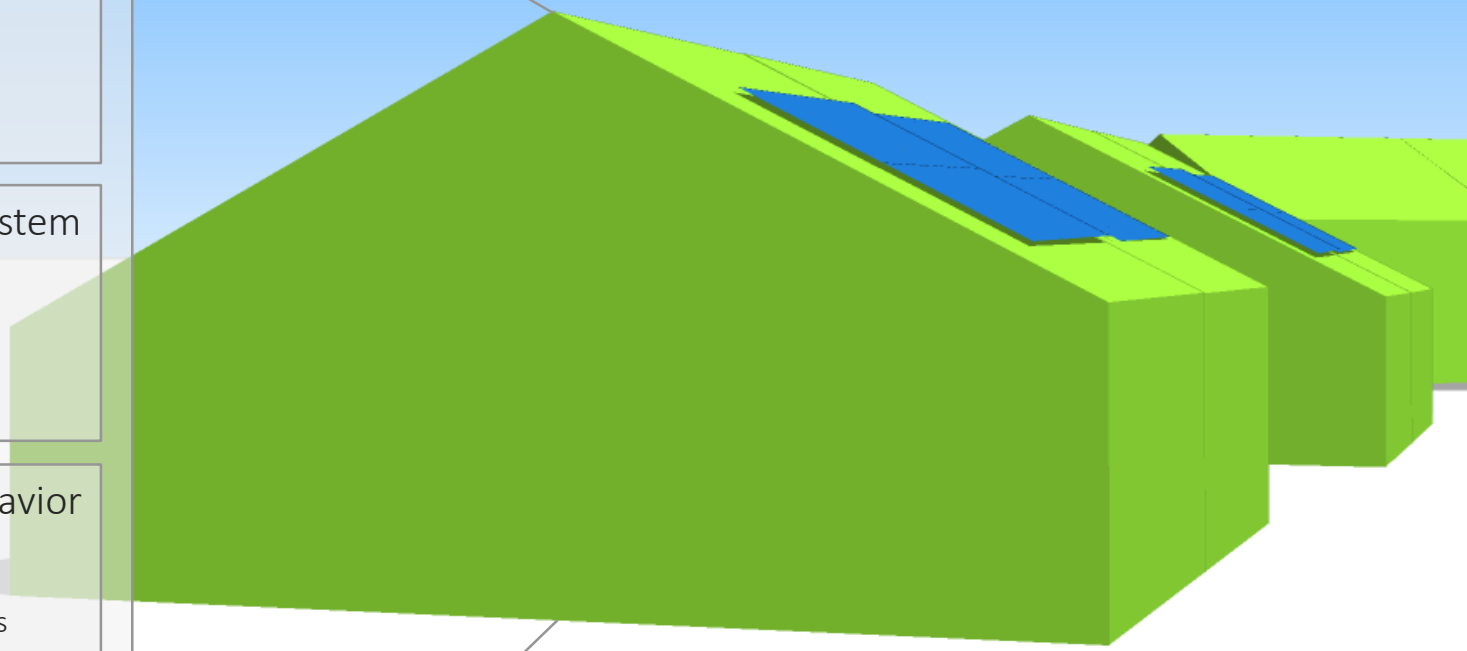
building geometry
heated volume
compactness
glazing (orientation, slope, …)

HVAC system
presence
efficiency (production, distribution, supply, …)
…

building envelope
insulation quality
air tightness
thermal mass
glazing (area, size, …)

user behavior
occupancy
activities
heating preferences
ventilation preferences

building appliances / cooking / lighting
presence
characteristics

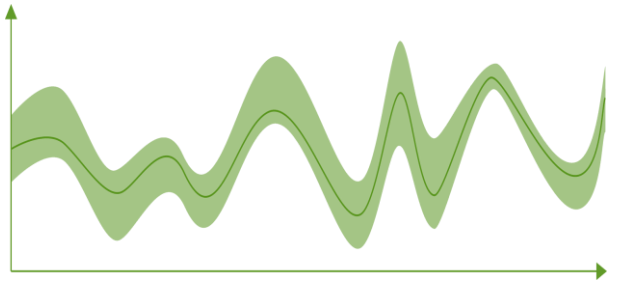


How to *quantify the uncertainty on the district energy demand as a result of the uncertainty and intrinsic variability of input data?*

e.g. occupant behaviour

e.g. thermal performance of the building envelope

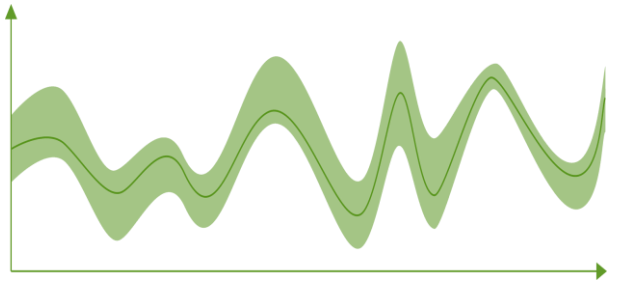
(~ archetype ~ construction year and building geometry)



DISTRICT ENERGY DEMAND
+ UNCERTAINTY

How to *quantify the uncertainty on the district energy demand as a result of the uncertainty and intrinsic variability of input data?*

(For existing residential neighborhoods)



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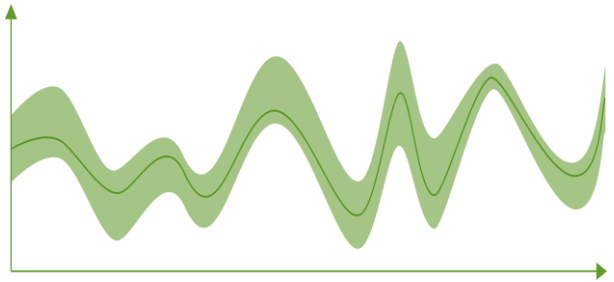
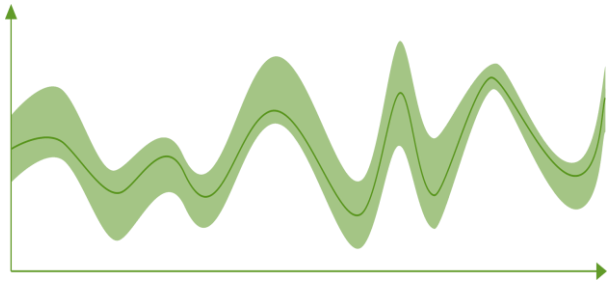


DISTRICT ENERGY DEMAND
+ UNCERTAINTY

(Through Monte Carlo simulations)

How to *quantify the uncertainty on the district energy demand as a result of the uncertainty and intrinsic variability of input data?*

(For existing residential neighborhoods)



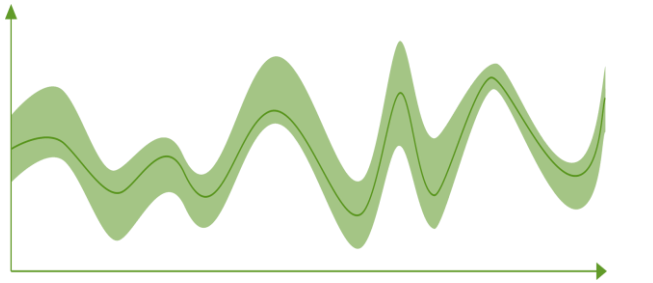
DISTRICT ENERGY DEMAND
+ UNCERTAINTY

(Through Monte Carlo simulations)

How to *quantify the uncertainty on the district energy demand as a result of the uncertainty and intrinsic variability of input data?*

(For existing residential neighborhoods)

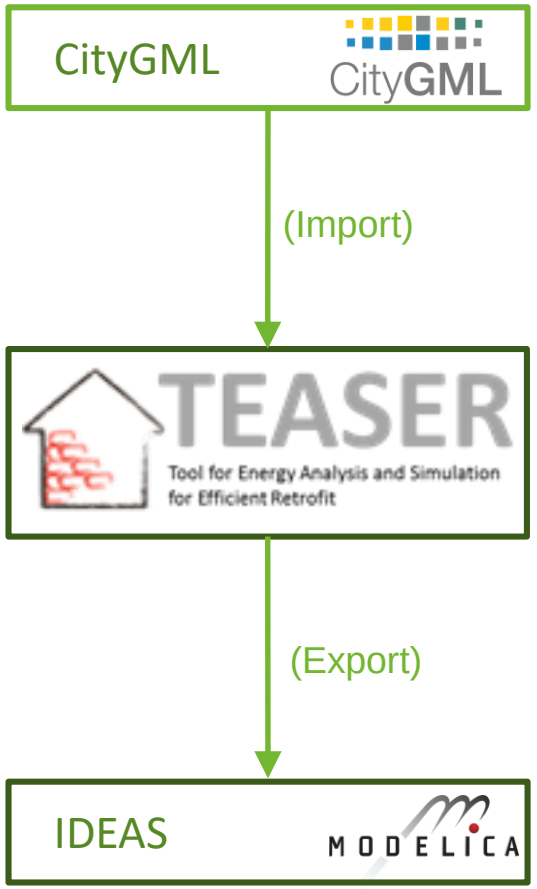
+ DATA



DISTRICT ENERGY DEMAND
+ UNCERTAINTY

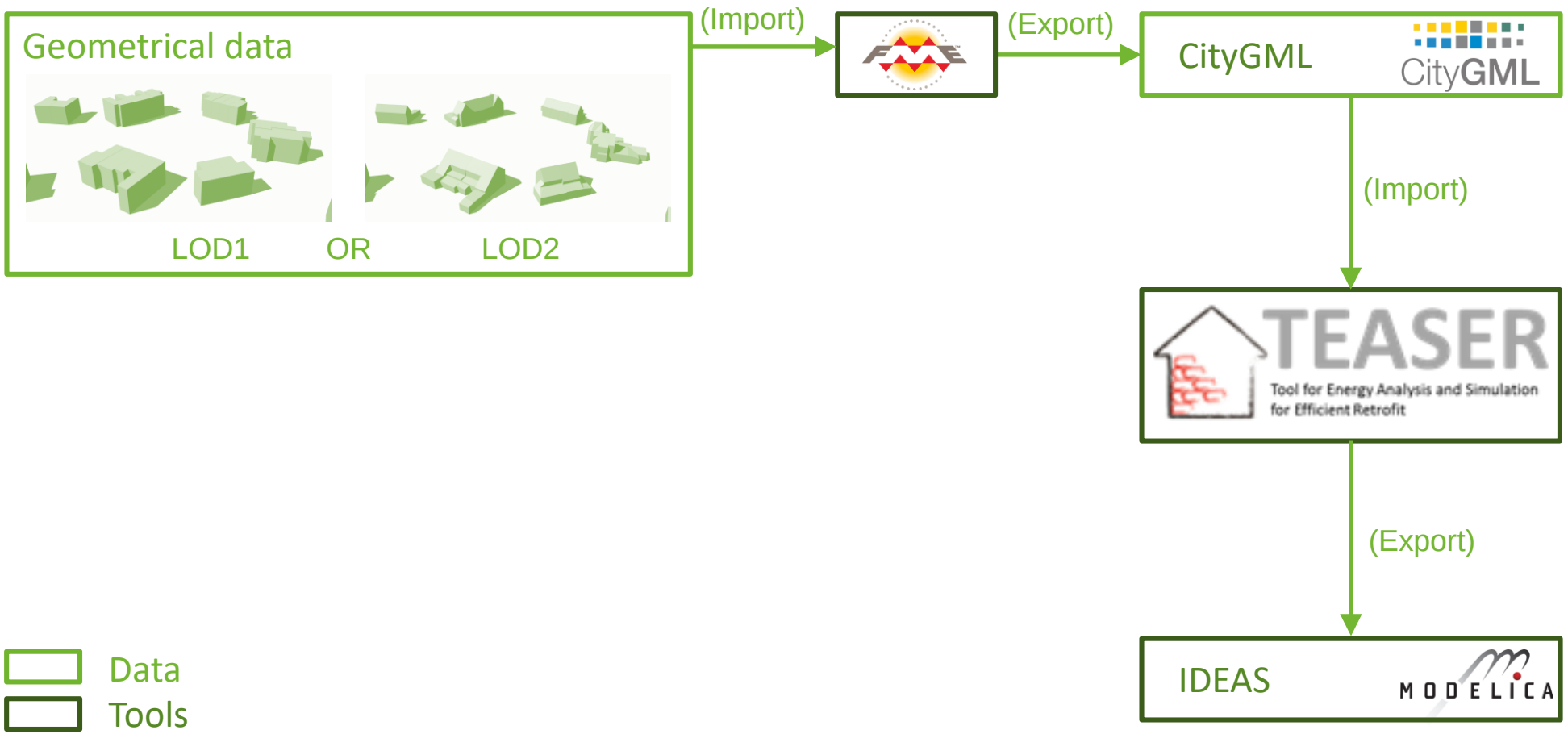
(Through Monte Carlo simulations)

Methodology

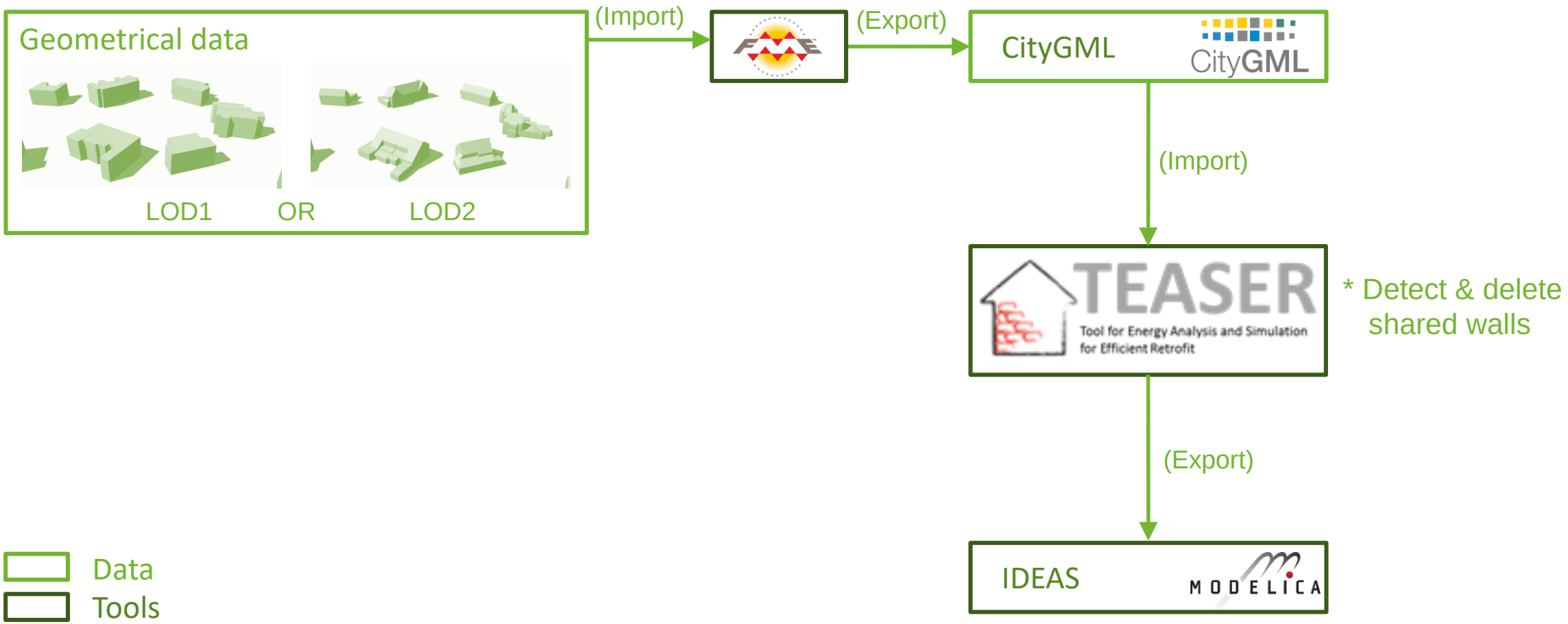


Data
Tools

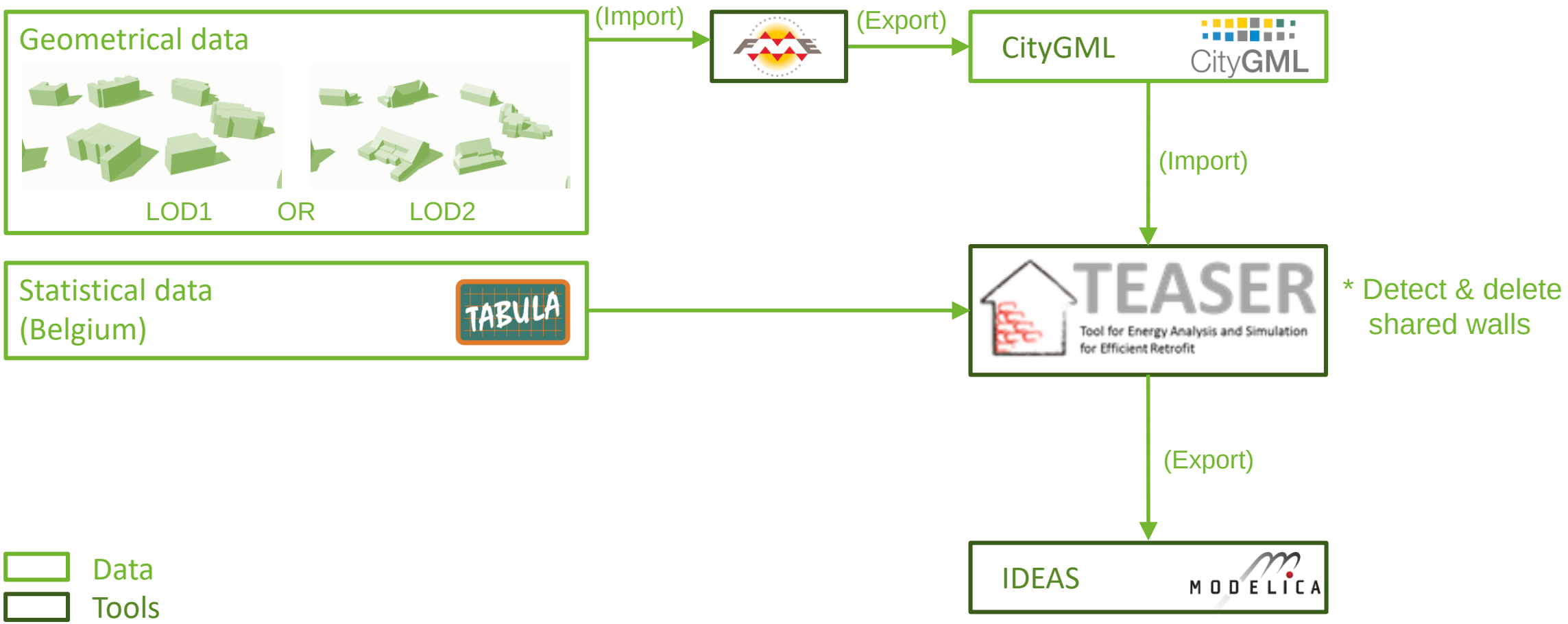
Methodology



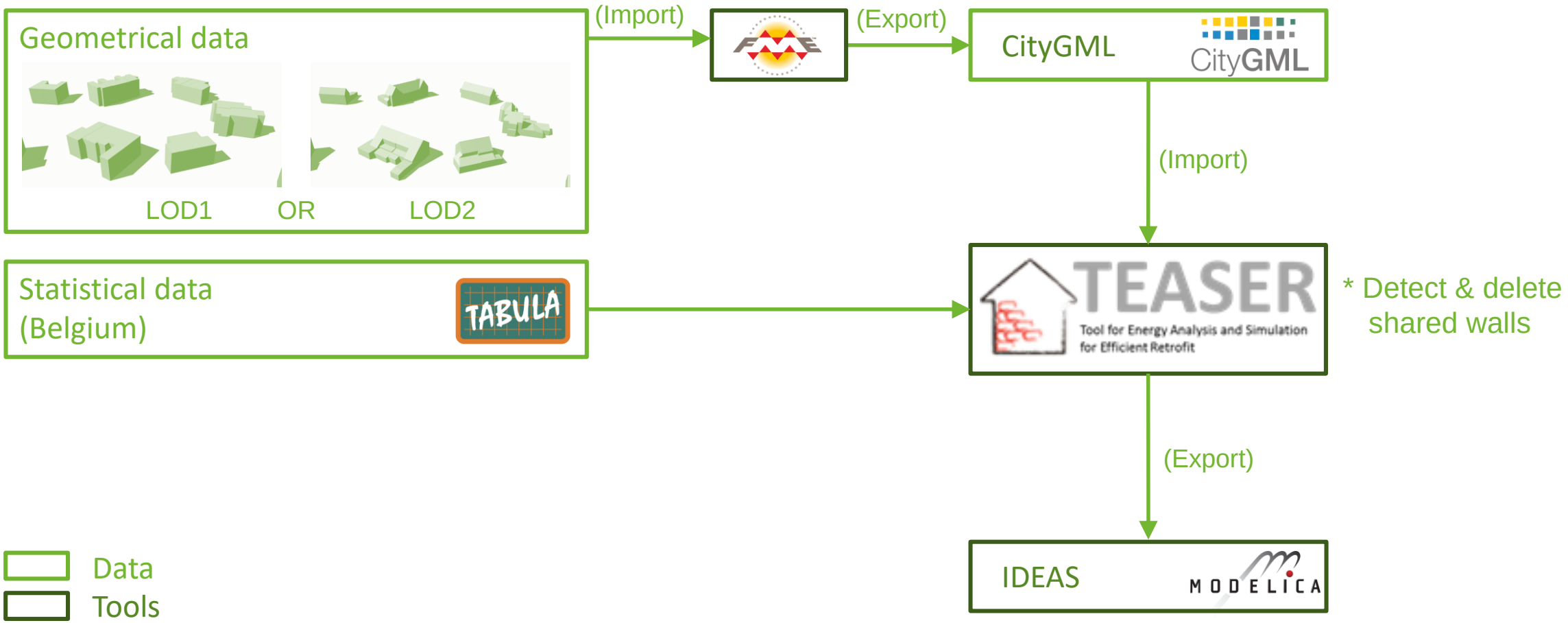
Methodology



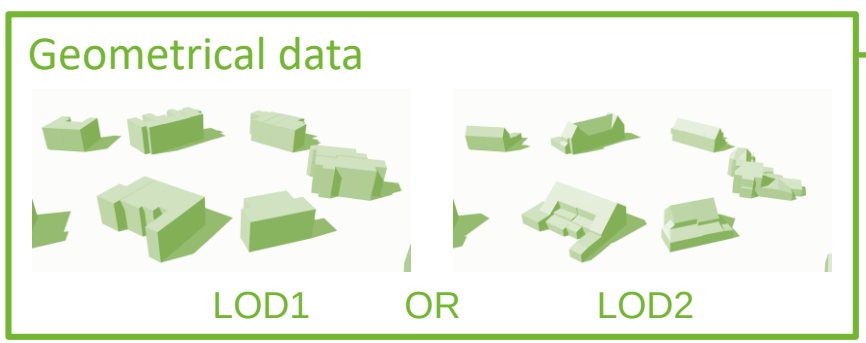
Methodology



Methodology



Methodology



(Import)

(Export)

CityGML

(Import)

Statistical data (Belgium)

TABULA

PROBABILISTIC DATA

TEASER

Tool for Energy Analysis and Simulation for Efficient Retrofit

* Detect & delete shared walls

(Export)

IDEAS

MODELICA

* One-zone vs two-zone
  Ideal heating vs realistic heating with radiators
  Standard occupant vs StROBe occupant

Data
Tools

Thank you!

Questions?

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ina.dejaeger@energyville.be