

# Genesis of the CityGML Energy ADE

Authors: International CityGML Energy ADE development group



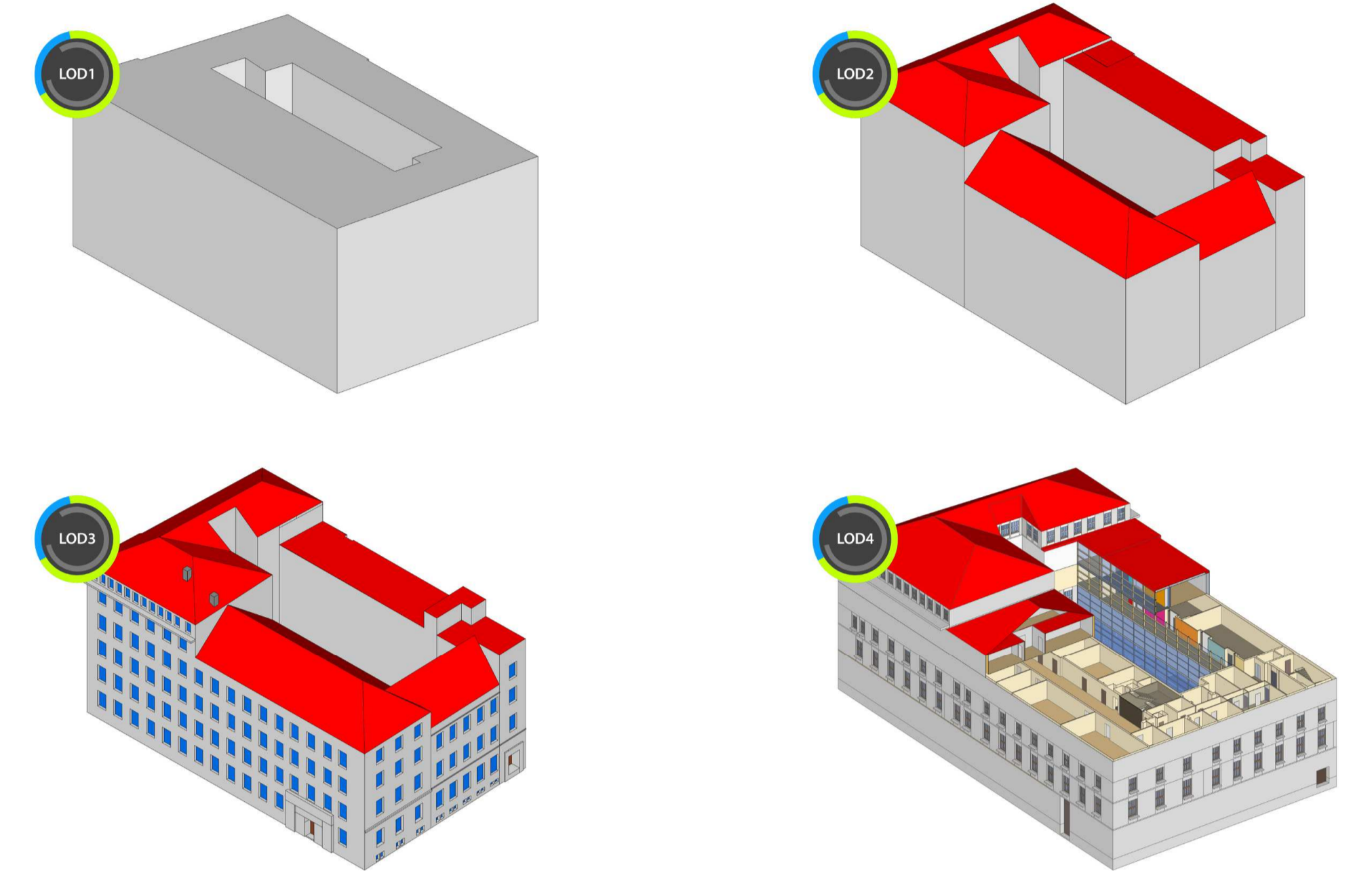
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## CityGML? ADE ??

CityGML is an international open standard of virtual 3D city model, developed by the Open Geospatial Consortium (OGC), and used for modelling an ever growing number of cities (e.g. London, Helsinki), regions and even countries (Germany).

It models the 3D topographic objects of entire cities (e.g. buildings, transportation infrastructures, etc.) regarding their geometry, topology, semantics, and appearance. CityGML city models have shown huge possibilities in the fields urban planning, Environment and Energy, enabling diverse studies by combining expert urban simulation algorithms with the richness of the Big Geo Data.

CityGML includes a standard schema which can be extended for domain-specific entities (e.g. energy attributes) through Application Domain Extensions (ADE).



Its flexible object modelling in 4 different Levels of Details enables the virtual city model to adapt to local building parameter availability and application requirements

## Why a CityGML Energy ADE?

- To store relevant energy-related data in a common open city data model, used for urban energy simulations.
- To offer data exchange and interoperability possibilities between urban energy stakeholders (e.g. municipalities, energy supply companies, ESCOs) and tools...
- ...as well as with other expert fields (acoustics, statics), in order to combine the data collection efforts!

## Main features

- Flexibility: Following the philosophy of CityGML and its Levels of Detail (LODs)
- Compatibility: Allowing to be used in different urban energy platforms for different analysis methods, using data from different data specification standards (e.g. INSPIRE, BEDES).
- Modularity: connection with other CityGML ADEs, use and extension of ADE Energy in other fields

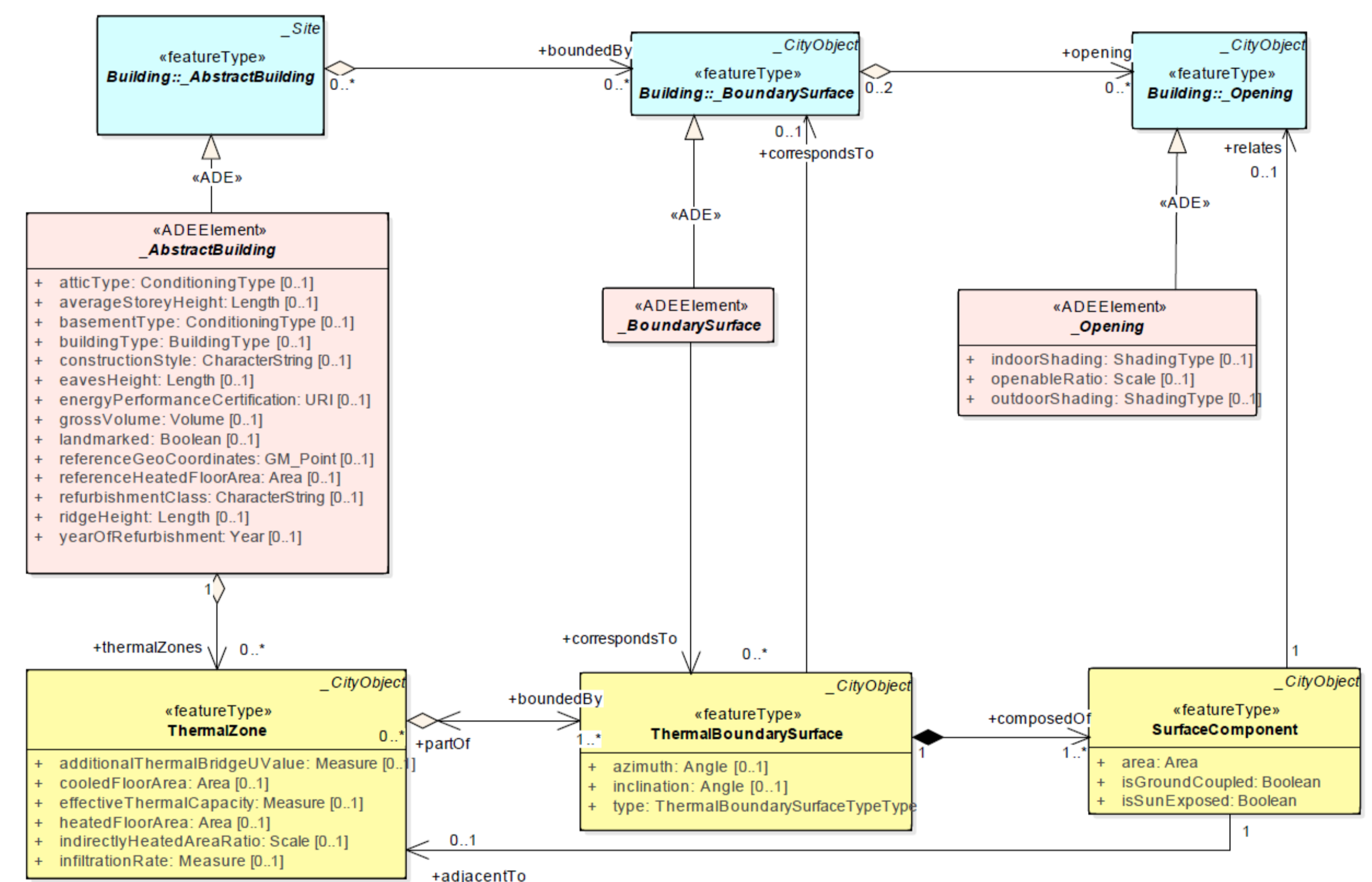
## Energy ADE Schema

The Energy ADE Schema is structured around an Energy core and three modules potentially usable/extendable in other fields :

- Constructions and Materials
- Occupancy
- Energy and Systems

The actual version 0.5 is freely available online:

[www.sig3d.org/citygml/2.0/energy/](http://www.sig3d.org/citygml/2.0/energy/)



Class diagram extract of the Energy core, which relates thermal building objects to CityGML standard objects

## Use cases

Six urban energy modelling and simulation tools are represented in the International CityGML Energy ADE development group, providing diverse applications and case studies such as:

- Heating demand diagnostics
- (Pre-)certification of energy performance
- CO2 emission and primary energy maps
- Energy saving potentials and refurbishment scenarios

- Solar and renewable potentials
- District heating network layout and sizing
- Heat density maps
- and many others...

