

SUNSHINE

“Smart Urban Services for
Higher eNergy Efficiency”



Hybrid approach for large-scale Energy Performance estimation based on
3D city model data and typological classification

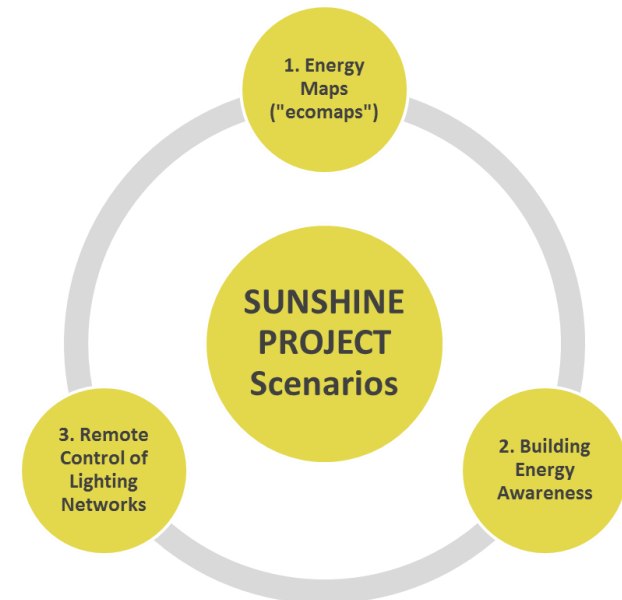
Presentation

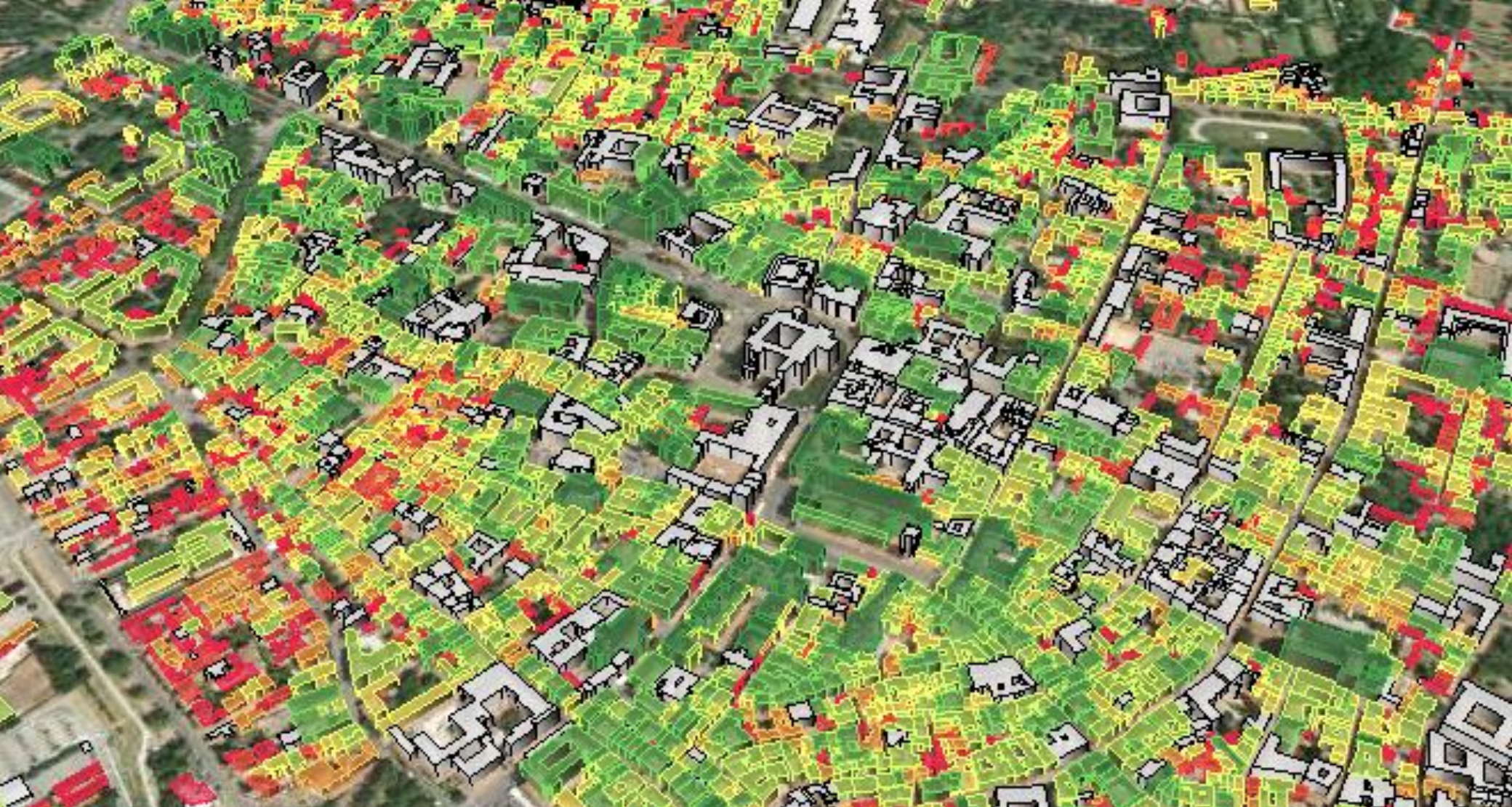
- Project scope and objectives
- SUNSHINE Scenarios
- Scenario 1: Building Energy Performances Assessment – **EnergyMaps**
 - **Conceptual idea:** Hybrid approach for large-scale Energy Performance estimation based on 3D city model data and typological classification
 - **Generation Workflow**
 - **Outputs**
 - **Validation Procedure**
 - **Energy Map Visualization (/Demo)**

Smart Urban Services for Higher eNergy Efficiency"

- Innovative digital services, interoperable with existing spatial data infrastructures, supporting improved energy efficiency at the urban and building level.
- **Smart service platform** accessible from both a web-based client and an App for smartphones and tablets, for:

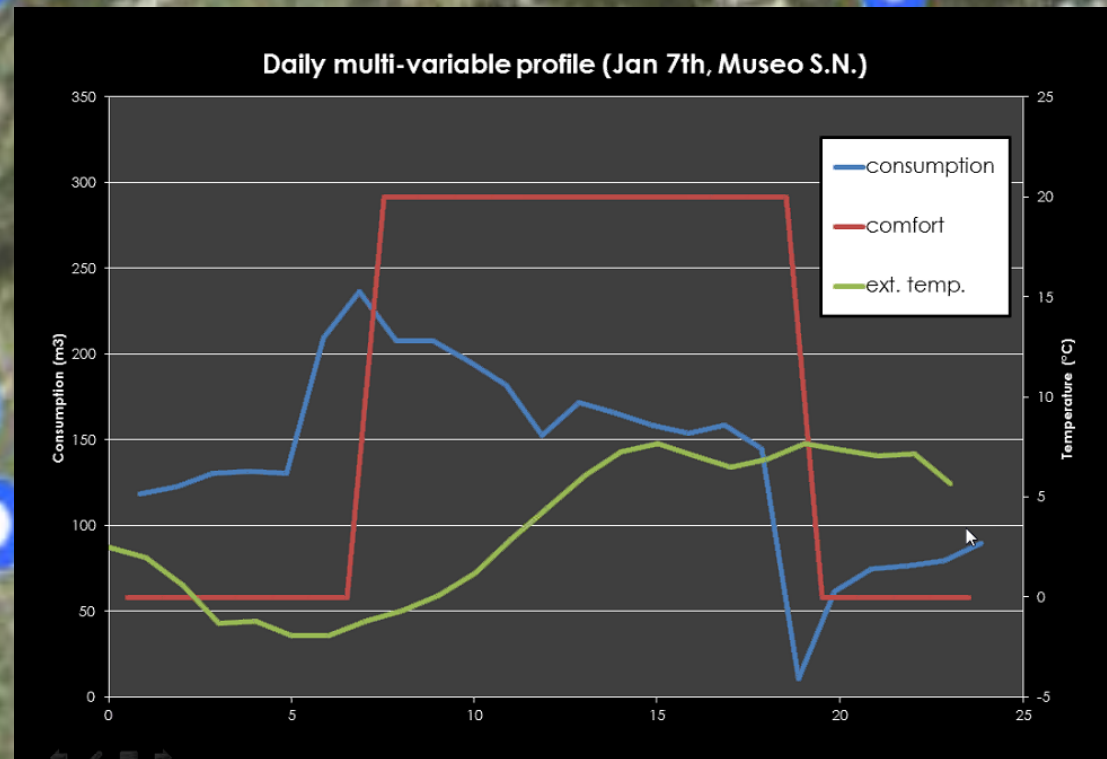
1. Automatic large scale assessment of building energy behavior,
2. Optimization of energy consumption of building level heating/cooling systems
3. Interoperable control of public illumination systems based on AMR.



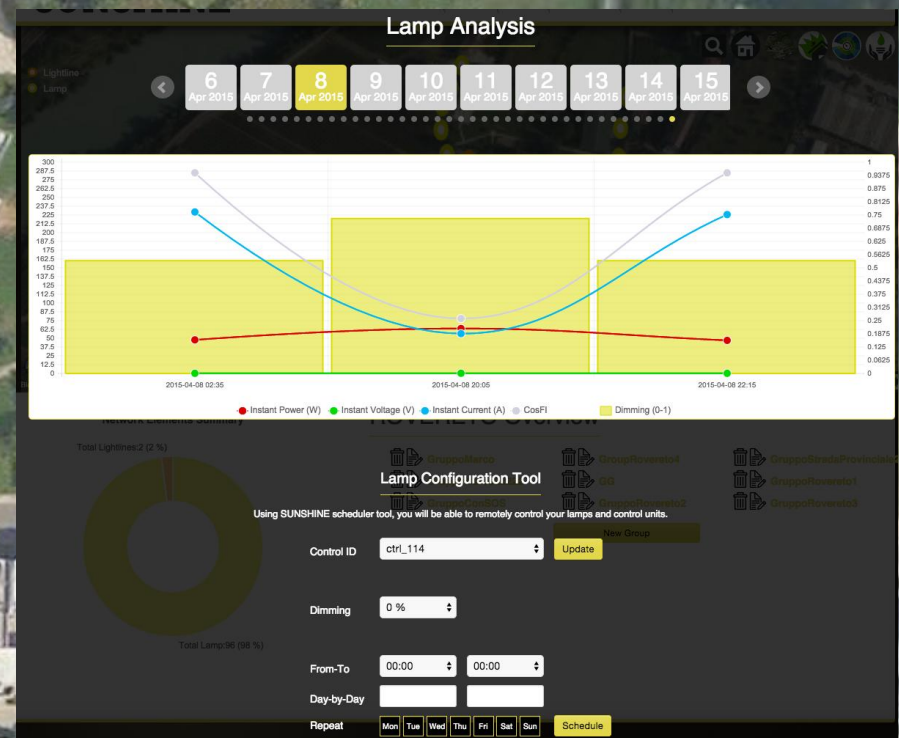
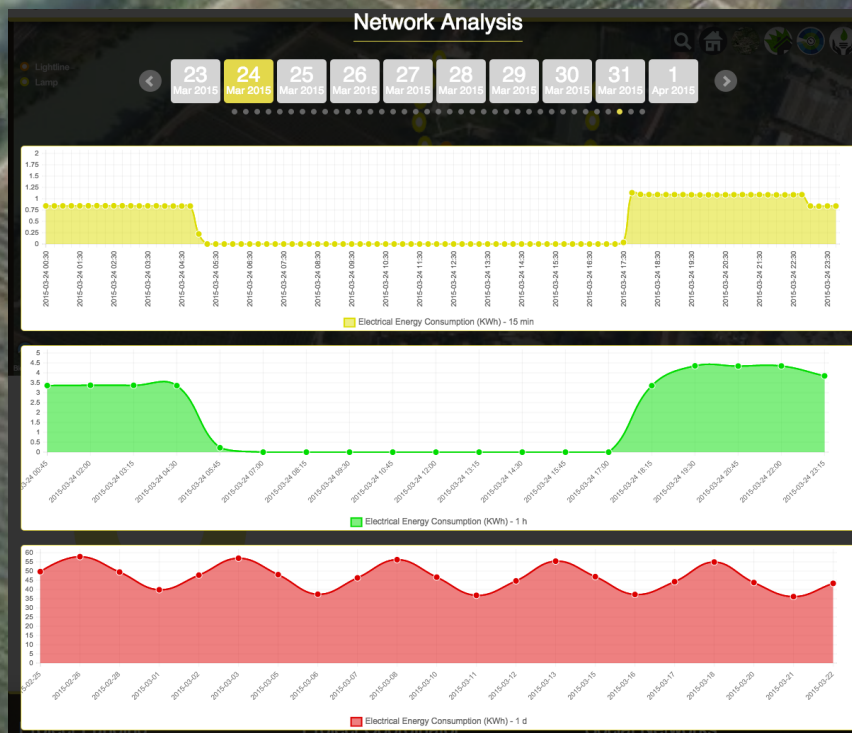


Example Energy Map for Ferrara pilot city
<http://sunshine.graphitech-projects.com/>





Energy awareness readings – Ferrara pilot
<http://sunshine.graphitech-projects.com/>



Remote control of lighting network– Rovereto pilot
<http://sunshine.graphitech-projects.com/>

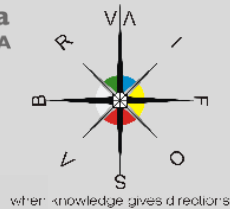
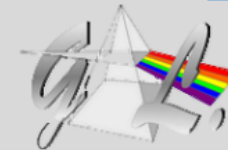
Scenario 1: Building Energy Performances Assessment – Energy maps

- Assesses energy behaviors of buildings from integration of existing geographic information (e.g. cadastral data and topographic data) in order to perform large-scale energy assessments, creating **energy maps** ("ecomaps") and **energy pre-certification** of buildings.
- Energy maps ("eco-maps", "energy density maps") are an innovative and particularly useful tool for a large array of specialists, public workers, researchers and industry, who can use them for example in:
 - Analyzing the possibilities for large scale urban renewal**, especially in what concerns the development or extension of district heating networks and the creation of energy strategies for hard-to-tackle or deprived urban areas;
 - Prioritizing city-wide investments and assisting decisions** on development area locations based on provided information on the state of the art energy-wise as well as nearby energy opportunities for developers.

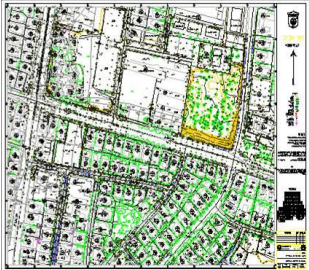
Consortium



GraphiTech



Cadaster data

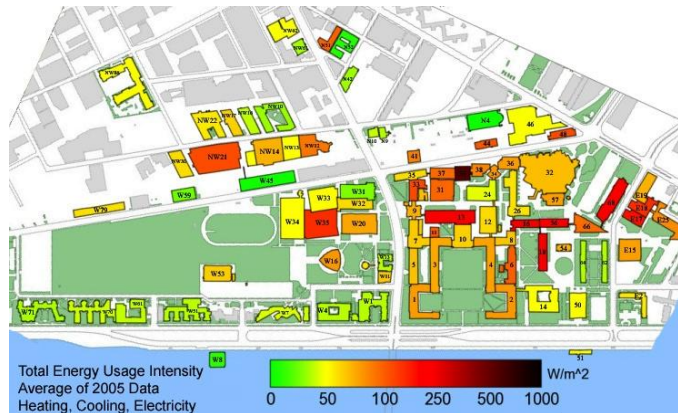
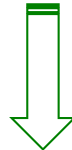


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Building Data

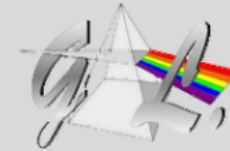


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GIST



ESADE
Business School

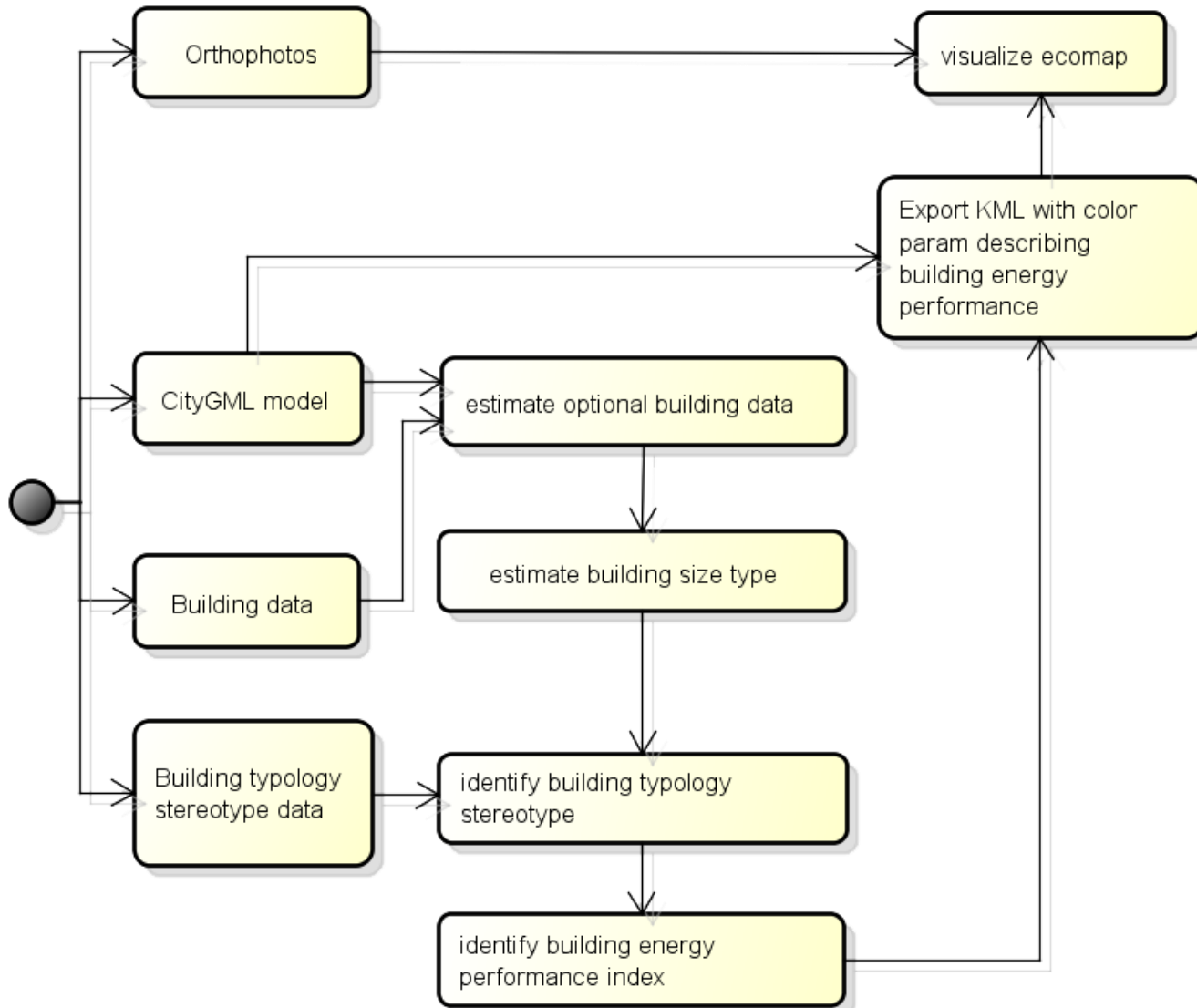
meteogrid

HEP ESCO d.o.o.



GEOSYS

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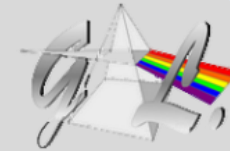


Energy map output data model

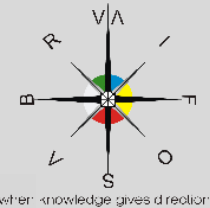
Attribute Name	Type
Identifier	string
Geometry	geometry
Begin	integer
End	integer
Height	float
Floors	float
Average floor height	float
Refurbishment	{no/standard/adv}
Area	float
Perimeter	float
Shared perimeter wall	float



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 meteo**grid**


Energy map output data model

Attribute Name	Type
Exposed perimeter wall	float
U_roof	float
U_floor	float
P_win	float
U_wall	float
U_win	float
EPI	float
EPGL	float
Delta_U	float
Building_typology	string
Heating_days	int
Irradiation	int
Climatic_zone_id	int

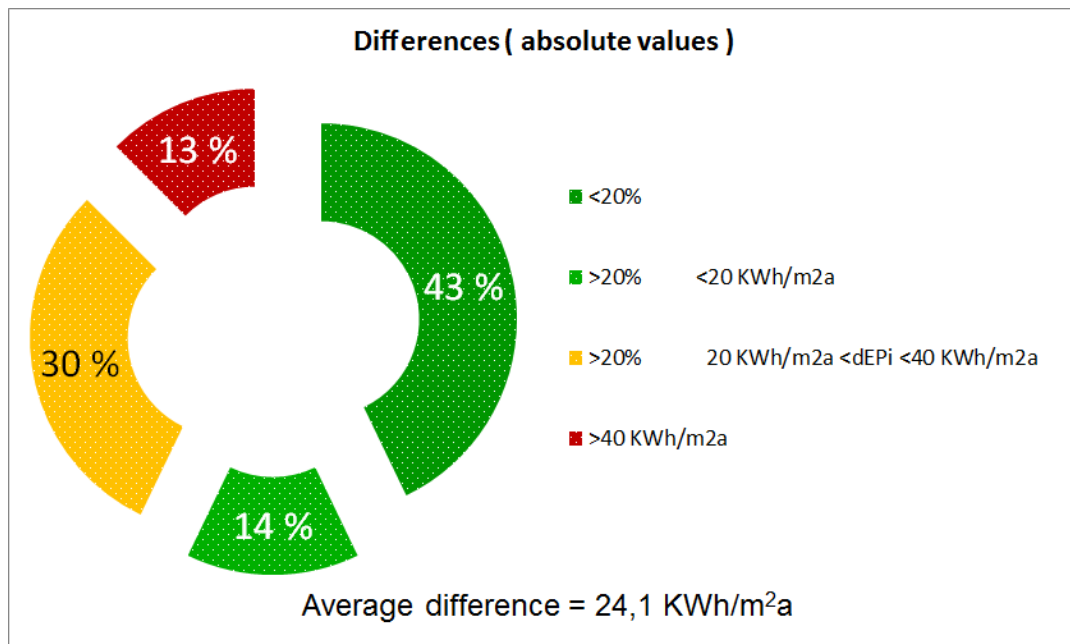
Validation procedure

Preliminary considerations:

- Real Energy certificate are usually apartment-level based (the sunshine estimation is building-based);
- Errors in cadastral data;
- Difficult to obtain real information about the refurbishment level.

Validation procedure

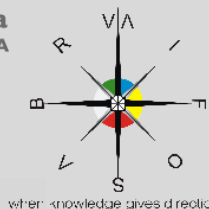
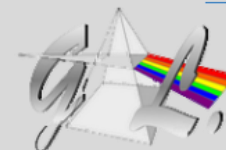
Difference between Epi – building with S
(exposed surface) / V (volume) less than 0.1



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Energy map visualization



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DEMO: <http://sunshine.graphitech-projects.com>
VIDEO SCENARIO 1: <https://youtu.be/WzBieL4UeLY>
VIDEO SCENARIO 2: <https://youtu.be/gDriKfqBvyQ>