

DELIVERABLE T2.2.1

D.T2.2.1: Methodology to perform a comprehensive online energy auditing at urban level using 3D city models 03/2019





D.T2.2.1: Methodology to perform a comprehensive online energy auditing at urban level using 3D city models

A.T2.2 Development of an advance 3D Energy Management System (EMS)

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Authors		
	Name (organization)	name, e-mail
WP leader	Valerija Petrinec (EZVD))	valerija@ezavod.si
	Fabio Remondino (FBK)	remondibno@fbk.eu



1. Introduction and aim

The deliverable reports the overall methodology employed to create 3D urban models, enrich them with energy-related information and perform queries to understand their energy performances. In other words, the deliverable includes the contents of the 3DEMS module of the project OnePlace platform, based on outcomes of A.T1.2 “Creation of realistic 3D building models” and A.T1.3 “Estimation of PV potential and heating losses”.

2. Methodology

The overall transnational methodology behind the realization of the 3DEMS module of OnePlace includes:

- Data collection: geospatial data (footprints, LiDAR point clouds, terrain models, orthoimages, etc.) need to be collected in order to create 3D building models. Moreover other energy-related data (e.g. energy consumption, CO2 emissions, heating consumption, etc.) should be collected, harmonized, stored in databases and linked to the buildings, e.g. using building IDs, geolocations, etc. (D.T1.1.1-2-3).
- 3D model generation: depending on the available geodata, different procedures can be applied to produce 3D geometries, i.e. 3D envelopes, at different geometric resolution and with different levels of detail - LOD (D.T1.2.1-2-3).
- Further data generation and collection: 3D building geometries, coupled with terrain information, occlusions and geolocations, can be used to estimate the photovoltaic (PV) potential of building roofs and produce 3D solar maps (D.T1.3.1-2). Heating losses from building facades can be measured using thermal cameras (D.T1.3.3)
- Data and geometry linking: the created geospatial databases allow to connect heterogeneous information with geometric/3D information, retrieving such info on demand and with specific tools.
- Data visualization on the web: using OGC web platforms (e.g. Cesium) all collected / generated information can be visualized online. Queries can be performed producing new visualization scenarios in order to better understand energy flows, requests, etc.

3. Examples

The following figures report some examples of possible consultation performed within the 3DEMS module of the OnePlace platform. It can be noticed that any type of information, linked to a specific building, can be queried, analysed and visualized within the 3D environment of the city. Reconstructed 3D urban environments bring various advantages in visualizing such energy-related information as they allow to better interpret and understand the condition of the considered building.

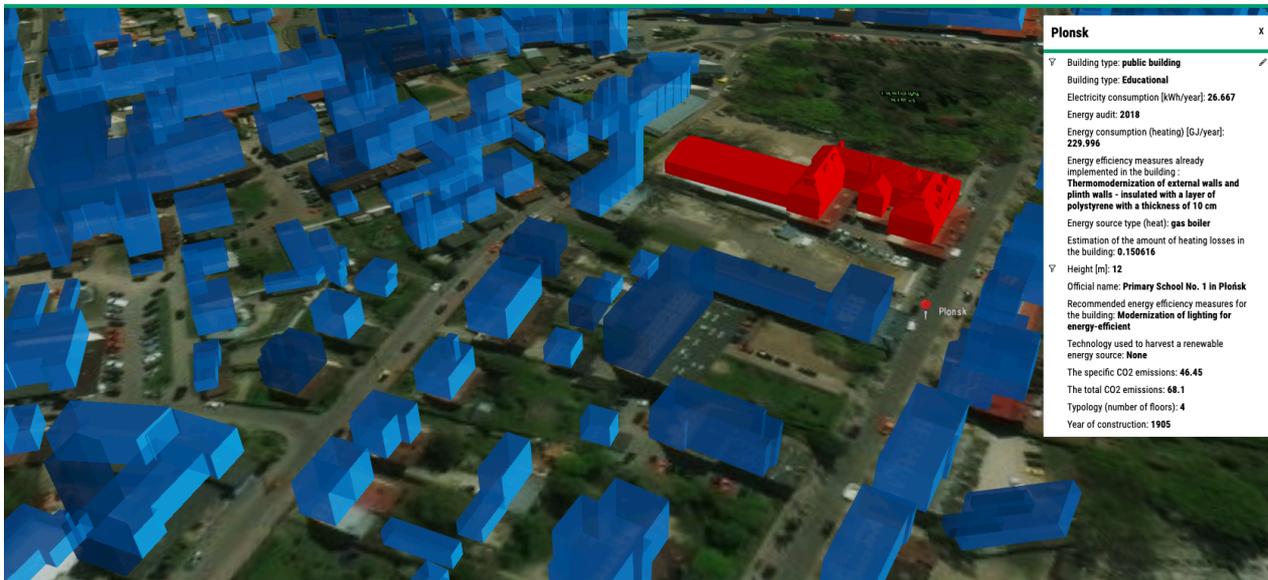


Figure 1: 3D digital city with a query performed to visualize the available heterogeneous information of the building.



Figure 2: Photovoltaic (PV) potential of building roofs displayed per month and as a yearly sum.

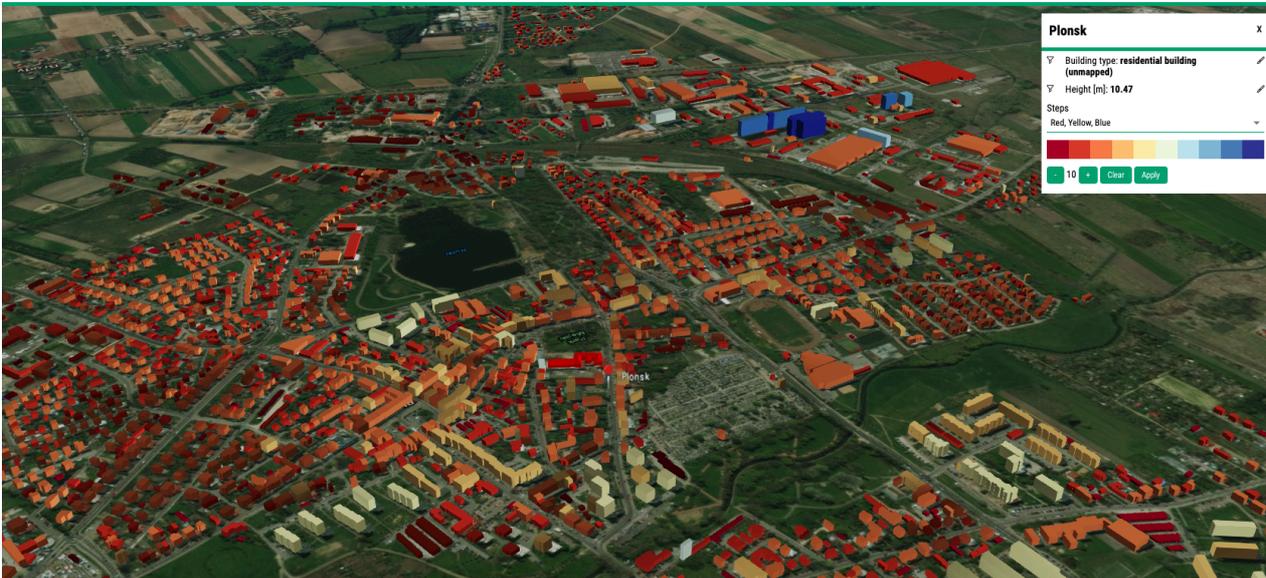


Figure 3: 3D buildings grouped and visualized based on their height (above) or heating needs (below).