

# D. ANNEX: PLUGINS' USER MANUAL

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This set of plugins are developed for the Italian context, but could be adapted to other country/scenario.

Two plugins serve as support the manual editing of cartographic bases:

- *Navigate through features*: easily displays one by one the features in a selected layer;
- *Spatial join max area*: performs a spatial join assigning to the feature the value of the feature on the other layer that cover it more.

A three steps plugin serves to build the Building and Volumes layers of MEM, as follows:

- *Step 1 - Assign ID\_CAD*: assigns the Cadastre ID to the volumetric units;
- *Step 2 - Create energy layers*: creates the Building and Volumes, estimating the external walls and calculating the compactness ratio;
- *Step 3 - Assign EPC and Typology*: finds if there is a corresponding EPC, assigns building's Typology and fills out the energy information on the basis of ID\_EPC or Typology.

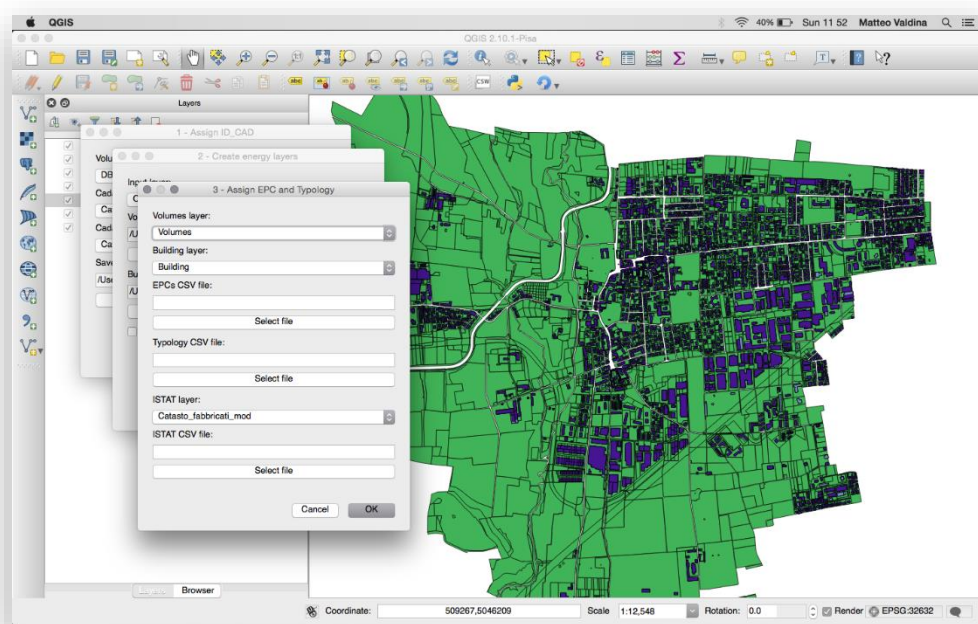
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### D.1 USER GUIDE

This document describes how to use *Municipal Energy Model* plugin and how data must be formatted to be processed by *Municipal Energy Model* plugin.

*Municipal Energy Model* plugin is a QGIS plugin and it need to be installed like any other plugin in QGIS.

The internal name of *Municipal Energy Model* plugin is *Gjiko-plugin* sometime is referred with this name instead of *Municipal Energy Model* in the code.

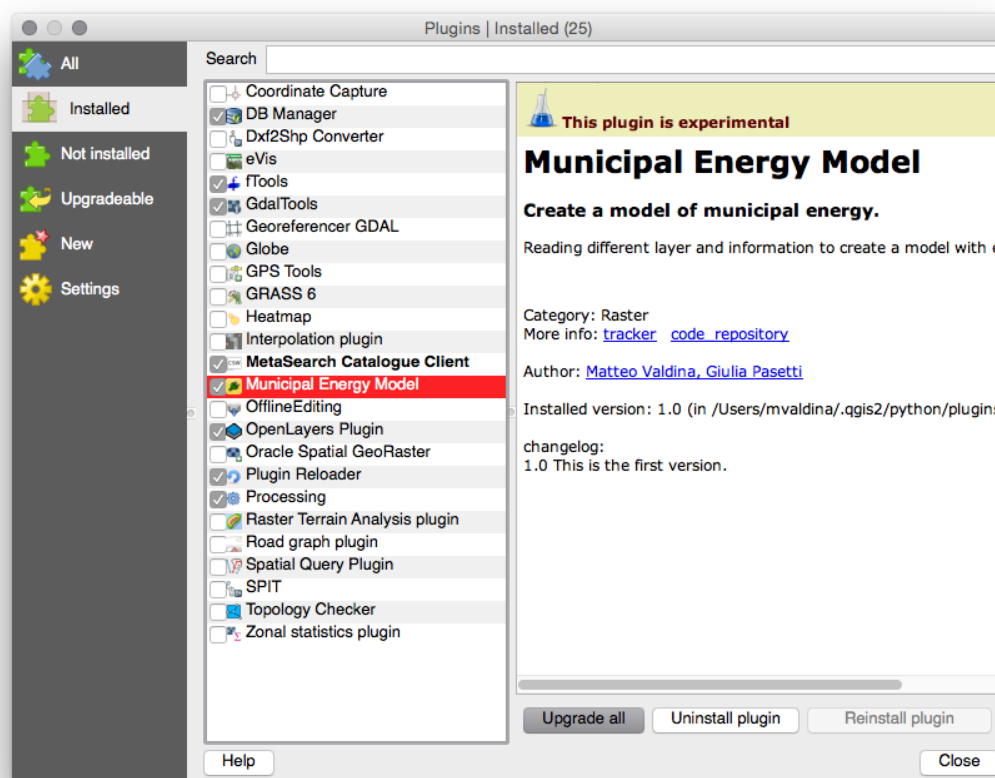


#### D.1.1 Installation

You can get latest version from the [release page](#) of GitHub repository. To install this plugin you need to uncompress the downloaded file in the QGSI plugin folder. See documentation of your QGIS version about plugin installation. The usual location of user plugin is `~/.qgis2/python/plugins`.

After that you must open QGIS and enable *Municipal Energy Model* plugin in Plugins - > Manage and Install Plugins....

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For more information about QGIS plugin  
read [http://docs.qgis.org/1.8/en/docs/user\\_manual/plugins/plugins.html](http://docs.qgis.org/1.8/en/docs/user_manual/plugins/plugins.html).

### D.1.2 Introduction

When you have successfully installed *Municipal Energy Model* plugin, you should see under the menu **Plugins** two additional options: **Municipal Energy Model** and **Municipal Energy Model - tool**. The first menu entry is the plugin itself with the main steps, the second menu entry is a set of tools developed as side utilities.

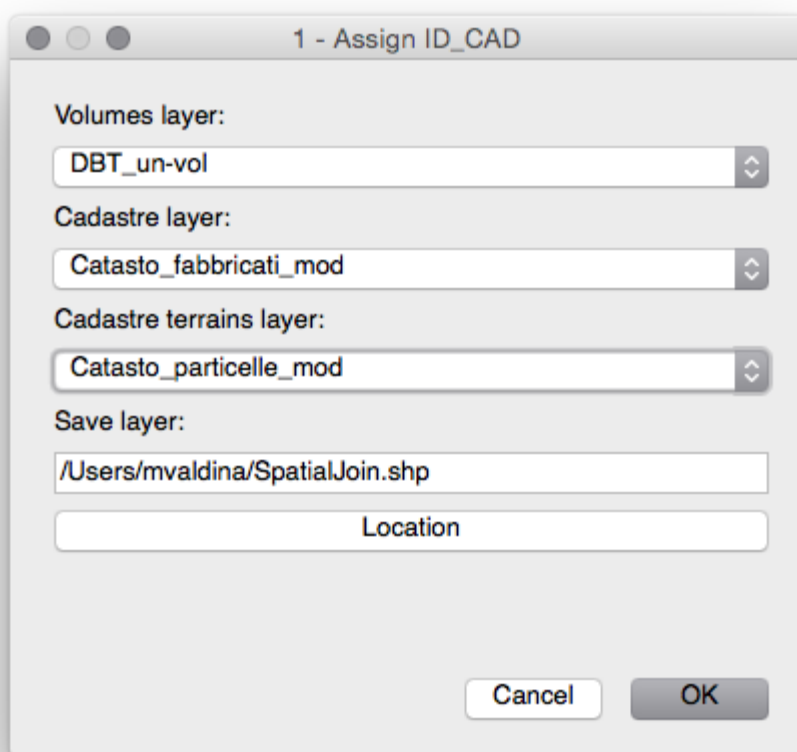
### D.2 MUNICIPAL ENERGY MODEL

The outputs of *Municipal Energy Model* plugin are **Building** and **Volumes** layers.

The user need to go through each step to obtain the final layers. These steps are 1 - Assign ID\_CAD, 2 - Create energy layers and 3 - Assign EPC and Typology.

The first step is to assign the cadastre identification number from layer provided by the DBT (Database Topografico Regionale). In the step 2 the plugin elaborates data from step 1 to identificate building and each volumes of the same building. The plugin also performs the computation of compactness ratio and detect wall surfaces. In the final step 3 the plugin fills each building/volumes with energy efficiency values.

#### D.2.1 Step 1 - Assign ID\_CAD



The first step is open through Plugins -> Municipal Energy Model -> 1 - Assign ID\_CAD. The inputs of this step are three layers: volumes layer, cadastre layer and cadastre terrain layer. The ouptut of this step is a layer called **SpatialJoin** containing the **Volumes layer** plus the cadastre identification code from **Cadastre layer** or **Cadastre terrain layer**.

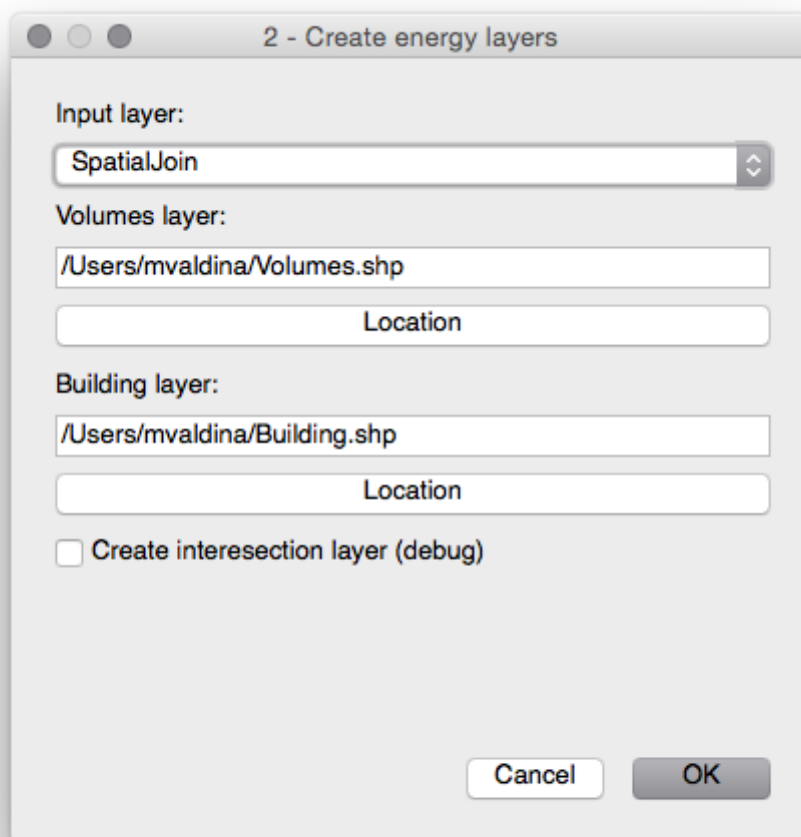
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- **Volumes layer** must contain footprint of each building and each *feature* must have an attribute **UN\_VOL\_AV** that it provide height of each building/feature. This layer should also contain **USE** attribute.
- **Cadastral layer** must contain the **COD\_CATAST** attribute and each geometry must match as much as possible the volumes geometries. This layer will be spatial joined with *volumes layer*.
- **Cadastral terrain layer** must contain the **CHIAVE** attribute. This layer is used in the case that for a *feature* in *volumes layer* doesn't have a cadastral identification code in *cadastral layer* is used the terrain cadastral identification code.

Remark: **UN\_VOL\_AV** contain the height of described building. It is used in the follow step, so, if it is missing you will get an error in the following step.

Note: If a *feature* in *Volumes layer* covers multiple *feature* of *Cadastral layer* or *Cadastral terrain layer* the plugin assigns the value from the *feature* that have the biggest common area.

### D.2.2 Step 2 - Create energy layers



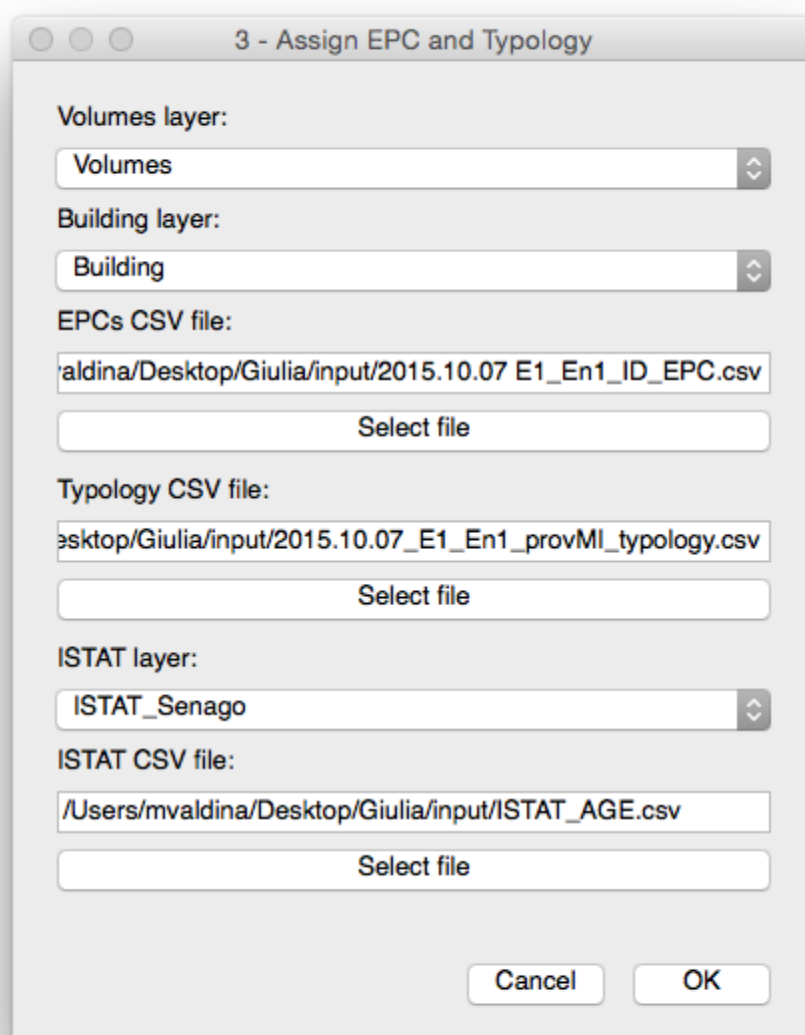
This step creates **Volumes layer** and **Building layer**. **Volumes layer** contains the height information of a building. In fact a building could be composed by two or more volumes with different height. **Building layer** contains the sum of each volumes for the specific building. A volume is considered part of a building when touches another volume with the same cadastre identification code.

After this step you have these two layer that contains unfilled attribute that they will be filled in the next step.

During this step is performed the follow computation: estimating the wall surface, computing compact ratio.

To check if the estimate wall surface is correct you could enable the generation of temporary layer *intersection*. This layer is composed by the segments that are considered common part of the same building. They are the intersection of volumes belonging to the same building.

### D.2.3 Step 3 - Assign EPC and Typology



This step fills **Volumes layer** and **Building layer** with the information provided by EPC and statistic data.

This step needs additional information:

- **ISTAT layer** is a layer containing the section and the ISTAT code **SEZ2011**. This identification code must be the same used in **ISTAT age CSV file**.
- **EPCs CSV file** is a CSV file containing energy efficiency values from the Energy Performance Certificate Database. Each field of CSV file must match the name used in the *Volumes layer* and *Building layer*.

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- **Typology CSV file** is a CSV file containing for each typology the statistic data. This is used if EPC data are not available.
- **ISTAT age CSV file** is a CSV file that provide prevalent **age** of the ISTAT section, to assign it to the buildings without this information.

During this step, it is associated to each building an age from ISTAT data. After that is computed the **ID\_MEM**. When **ID\_MEM** is generated the plugin searches the corresponding EPC certificate and if it is not available uses statistical data.

**ID\_MEM** is an internal identification code formed by **USE-ID\_CAD\_volumeIndex**.

### D.2.4 Notes

#### CSV file format

CSV file are text file where values are separated by comma. In *Municipal Energy Model* plugin the first row of each CSV file have a special meaning. The first row is used as header. In this way the plugin can look for specific field searching for the header name instead of position.

#### ISTAT age CSV file

This file contains the association from ISTAT identification code, called *SEZ2011* to the average age of this ISTAT section, as the following example.

```
SEZ2011,SEZ_AGE
152060000001,1946-1960
152060000002,<=1945
152060000027,>=2006
```

- **SEZ2011** is the ISTAT identification number provided in the **ISTAT layer**.
- **SEZ\_AGE** is a text field containing  $\geq$ [year],  $\leq$ [year] or [year]-[year].

#### Typology CSV file

This file contains for each typology the statistical data needed for the computation, as the following example.

```
TYPOLGY,wind_r,area_r,vol_r,h_level,U_env,U_roof,U_ground,U_wind,Eph,Eth,ETC,EFER,EPW,EPT,E_HEAT,E_DHW,E_H-DHW
E1-A-
1,0.08,0.75,0.49,3.11,1.22,1.12,1.16,3.44,183.35,141.46,16.79,3.89,45.99,229.33,0.80,0.68,0.74
```

- **TYPOLGY** is an attribute computed by the *Municipal Energy Model* plugin that is composed by **USE\_AgeRange\_CompactnessRatioRange**.
- **statistic data** other fields that will be read and imported in the **Building** and **Volumes** layer.



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### ID\_EPC CSV file

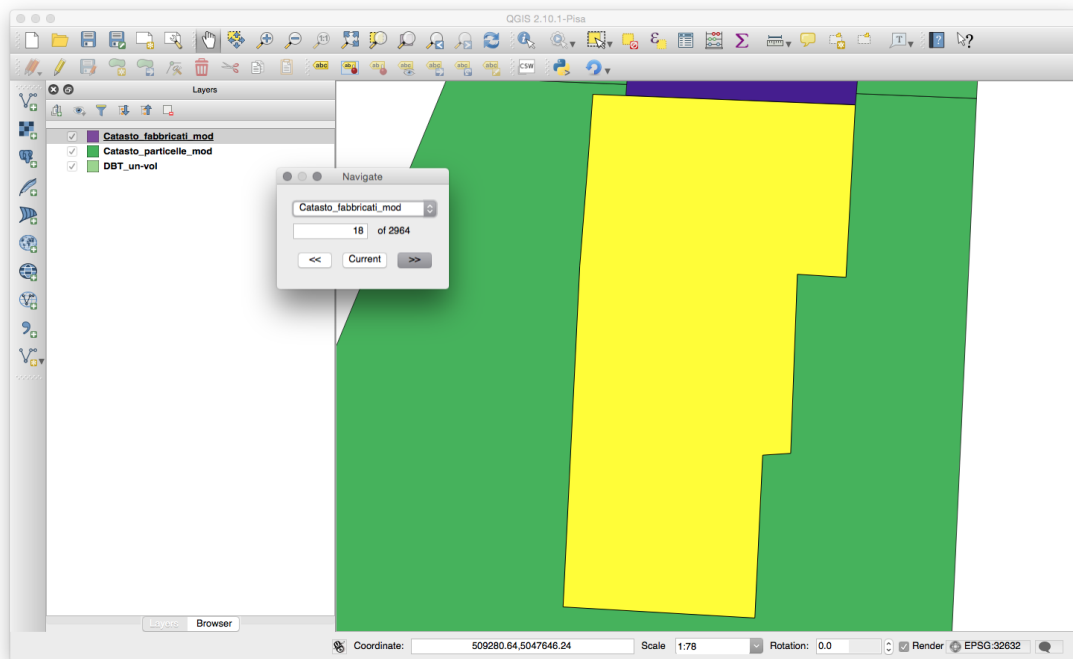
This file contains for each ID\_EPC the energy efficiency data, as the following example.

```
ID_EPC,SUP_NETTA|VOLUME_NETTO,AGE,wind_r,area_r,vol_r,h_level,U_env,U_roof,U
_ground,U_wind,Eph,Eth,ETC,EFER,EPW,EPT,E_HEAT,E_DHW,E_H-
DHW,PV_AREA,ST_AREA
E1-10-1234,515.36,1991-
2005,0.131,0.851,0.747,2.59,0.70,0.74,0.83,3.05,131.34,75.02,18.09,0.00,60.44,191.78,0.58,0.38,0
.52,0.00,0.00
```

- **ID\_EPC** is EPC identification code.
- **statistic data** other fields that will be read and imported in the **Building** and **Volumes** layer.

### D.3 MUNICIPAL ENERGY MODEL - TOOL

#### D.3.1 Navigate through features

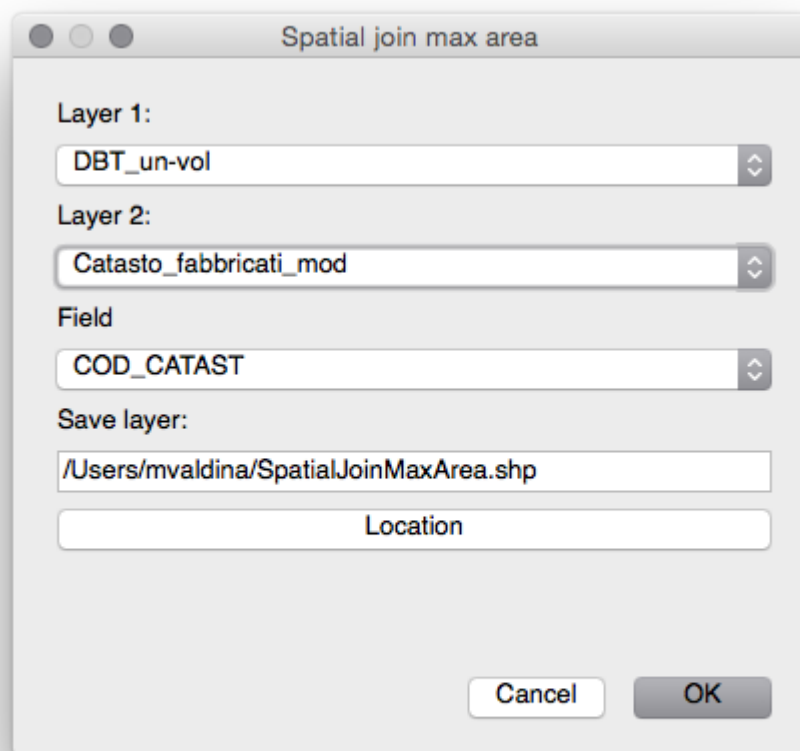


This menu entry opens a dialog that allows you to navigate through features of the selected layer.

In the upper part of the dialog, you can choose the layer that you would like to navigate. In the central part, the number of features and the current index are displayed. You can change the current index to navigate directly to a feature. In the lower part, you can locate the forward button (<<), Current button, and next button (>>). The Current button resets the focus on the current index in the case you moved the view on your layer.

Remark: This dialog is topmost, which means it will stay on top of the QGIS window when it loses focus.

D.3.2 Spatial join max area



This menu entry opens a dialog that allows a spatial join with custom criteria. A field from **layer 2** is added to the **layer 1** and it is saved in the provided location.

The particularity of this spatial join is that in case of a *feature of layer 1* covering two or more *features of layer 2* will be used the *feature from layer 2* that has the biggest common area with *feature of layer 1*.