

POLITECNICO DI TORINO
SECOND SCHOOL OF ARCHITECTURE
Master of Science in Sustainable Architecture
Honors theses

Energetic evaluation of public buildings of Rivalta's municipality

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This work has been created in order to answer to the requests of a town, Rivalta di Torino: on one hand, we would like to have an energetic analysis of the buildings existing in Rivalta, because we want to analyse the current situation of consumptions, we want to verify the losses and create a plan of improvement; on the other hand, our aim is to satisfy the goals of the European directive 2012/27/UE, that, every year, enforces the reclassification of the 3% of the whole area covered by public buildings.

The implements used in order to achieve this purpose are diagnostic and energetic signature (the last one is the real picture of the thermal behaviour of the building).

The survey has involved 14 schools (nursery schools, primary and secondary school), the Town Hall and the library; these buildings have been divided into three categories based on the year of construction and subsequent restructuring.

The data have been catalogued in file-cards that include the geometric features (surface, volume, s/v), the technical characteristics of the elements of opaque and transparent envelope and the sub-systems features of the thermal wiring, the analysis of the hours when the thermal wiring is turned on and the effective use of the rooms (by which we can see that the ignition timetables are also programmed beyond the hours of use of the premises).

Thanks to the elaboration of consume data of the last 3 seasons of heating, we could obtain the actual energy performance index, then we compared the data of all buildings and we selected three buildings, representing each category.

In order to analyse the thermal behaviour of the three buildings we used a software called Termolog. Taking as input the technical data relating to the building envelope and the wiring, and climate data of the three heating seasons, the program returns a model of the building that reproduces the thermal behaviour. At this point, we verified the correspondence of primary energy needs for heating, calculated by the program and actually measured consumption, we could accept the thermal model and we used it in order to proceed with the hypothesis of energetic retrofit.

In order to calculate the costs of these hypothesis we have considered the costs of labour and material referred to the "Conto Energia Termico" which provides an incentive on the cost of 40% if they respect the values imposed by the Decree 12/28/12. The limits were respected.

For each case the energy savings and cost and payback of the interventions of requalification have been calculated.

Each building has been considered representative of its category, and the study has been extended to the other buildings belonging to the same category, estimating a savings percentage and applying it to the measured consumption of other schools. At a cost of about € 1,600,000 the Administration could plan the redevelopment of the 16 public buildings into 10 years and to have the payback on about 6, considering about € 250,000 annual saving on heating costs. The line of action suggests a possible distribution of the interventions, remembering that each investment yields annual savings.



All these aspects could lead to an increasing energetic and economic sustainability of Rivalta's public park. The hypothesis of intervention meets the requirements of the Directive 27/EU 2012/ fulfilling the objective. This work could be utilized as model for other municipalities.

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