



Climamed 2017 – Mediterranean Conference of HVAC; Historical buildings retrofit in the Mediterranean area, 12-13 May 2017, Matera, Italy

Energy and technological refurbishment of the School of Architecture Valle Giulia, Rome

Livio de Santoli^a, Francesco Mancini^{b,*}, Carola Clemente^b, Stefano Lucci^b

^a Department of Astronautics, Electrical and Energy Engineering (DIAEE), Sapienza University of Rome, Via Eudossiana 18, 00184 Rome, Italy

^b Department of Planning, Design and Technology of Architecture, Sapienza University of Rome, Via Flaminia 72, 00196 Rome, Italy

Abstract

Modern architecture built in historical urban contexts represents a demanding issue when its energy efficiency should be improved. Indeed, the strongest efforts have to be made to maintain the architectural identity and its harmony with the surrounding cultural heritage. This study deals with the main building of the School of Architecture Valle Giulia in Rome, designed by Enrico Del Debbio in the 30's. Further constraints are related to several interventions of airspace expansion starting from 1958 which involved the building starting from 1958. So, preservation would mean highlighting its historic change but, adapting the built environment to the contemporary users' needs. As above-mentioned, the building belongs to the Valle delle Accademie, within the historic park of Villa Borghese, so that to acquire landscaping values. Those latter ones call for ulterior requirements when any new design process is conceived. The study provides a global renewal of the building accounting for the current low Indoor Environmental Quality in both summer and winter seasons and the lack of suitability to the contemporary University student's needs. The interaction between building performance and HVAC systems was studied by collecting data and architectural surveys conducted by all the architects who modified the building. This procedure was chosen since thermo-physical investigations are considered destructive due to required perforations to identify the actual wall layers. Moreover, thermographic surveys were carried out to validate the modelled building response. The result of the study is the identification of viable interventions to improve the accessibility and fruition of the building as well as its energy performance. A specific cost-benefit analysis was done to prioritize the design options along with considering the measures needed to preserve all the architectural features and values.

© 2017 The Authors. Published by Elsevier Ltd.

Peer-review under responsibility of the scientific committee of the Climamed 2017 – Mediterranean Conference of HVAC; Historical buildings retrofit in the Mediterranean area

* Corresponding author. Tel.: +39 339 7072595
E-mail address: francesco.mancini@uniroma1.it

Keywords: energy refurbishment; energy efficiency; cultural heritage.

1. Introduction

Construction sector is one of the most responsible GHG emitter and cause of poor air quality [1]. In Italy, after the implementation of European Directive 2009/29/EC, the so-called EU 20-20-20, specific incentive schemes aimed at building energy refurbishment were promoted [2]. In this framework, the energy retrofiting of Valle Giulia, School of Architecture of Rome have been designed to get funding from Conto Termico, i.e. DM 12/28/2012, which is an incentive scheme to promote renewable integration and efficient thermal management of public buildings [3]. Since it is included in the listed buildings group, any design proposal should be based on minimum intervention and reversibility [4] to preserve its architectural values. Materials types and their physical properties play a key role in the interaction with the surroundings in terms of microclimate [5] and energy performance [6,7]. Indeed, the first step to unlock a more economically viable and rational use of energy is the on-site survey and the investigation of original design as well as accounting for modifications made during the building lifespan [8]. This is the method to verify the feasibility for installing cutting-edge technologies in the building [9] or where renewables are available in the surroundings [10], even when the building is located in protected areas [11]. Furthermore, Italian building stock involves large public housing districts where it is possible to design general energy efficiency measures to be always applied since their homogeneity [12,13] as well as cultural heritage calling for specific interventions case by case [14]. This latter is the case of Valle Giulia, School of Architecture which is analyzed in this study.

2. Building history

Italian big cities have replied to the Covenant of Mayors call for implementing renewables by a planned strategy towards the aforementioned EU 20-20-20 targets. Nevertheless, protected areas and UNESCO sites were excluded from this step and city like Rome, with a large cultural heritage, shows high potential in its rural-urban continuum [15,16] but, low renewable energy potential in its center [17].

Valle Giulia, School of Architecture of Sapienza University, is located in the center of Rome, specifically in the Valle delle Accademie. Current layout is mainly due to the works done for the Universal Exhibition of 1911. The main street is Viale delle Belle Arti which leads to the Renaissance villa of Pope Giulio II, who gives the name to the Valley. Nearby, there are buildings of great architectural and cultural values as the Academies and the Culture Centre, the National Gallery of Modern Art and, the case study, i.e. the School of Architecture of Rome [18].

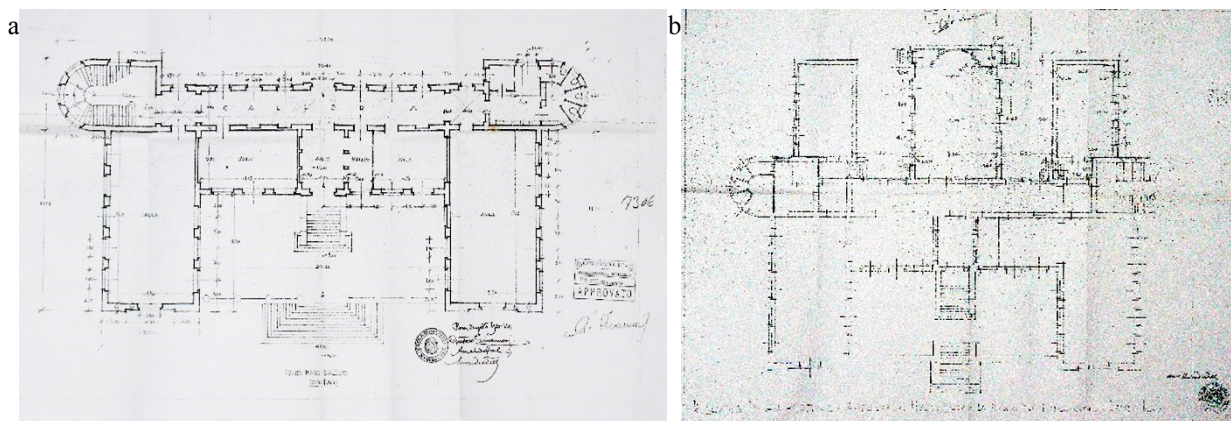


Fig. 1. (a) original plan; (b) plan with the first volumetric addition.

In 1930, Enrico Del Debbio ended the project for the so-called Royal School of Architecture, as shown in Figure

Download English Version:

<https://daneshyari.com/en/article/7919048>

Download Persian Version:

<https://daneshyari.com/article/7919048>

[Daneshyari.com](https://daneshyari.com)