

# INFLUENCE OF METEOROLOGICAL PARAMETERS ON ENERGY EFFICIENCY OF BUILDINGS

Adrian Roșu<sup>1</sup>, Mirela Voiculescu<sup>1</sup>, Lucian Puiu Georgescu<sup>1</sup> and Daniel Eduard Constantin<sup>1</sup>

<sup>1</sup>"Dunarea de Jos" University of Galati, Faculty of Sciences and Environment, European Centre of Excellence for the Environment, Domneasca Street, no. 111, 800201, Romania; E-mail:daniel.constantin@ugal.ro

**Abstract:** *This paper presents a study of possible effect of meteorological parameters on the energy efficiency of buildings. The particular case of an office building is presented. The influence of the meteorological parameters (temperature and humidity) on temperature of exterior walls temperatures of buildings was analyzed. The building selected for the study has a meteorological station placed on top, thus local meteorological data are available. The temperature of exterior walls was measured using an infrared camera FLIR I7. All data were collected in winter time due to temperature difference that occurs between heated building and atmosphere.*

**Keywords:** *thermography, meteorological parameters, infrared imaging,*

## 1. Introduction

Due to advances of thermography assumptions about the thermal regime of any buildings can be made, based on IR pictures. This is due to development of infrared cameras which evolved from bigger devices like the ones used in scientific laboratory to small devices like hand cameras which become more affordable for anyone all over the world. However IR thermography still has some drawbacks, including the lack of standards and testing time when new camera features are developed [1]. Newest models of the infrared cameras can be used to evaluate the heat loss, humidity, air tightness, electrical faults and some of them can show on site places where facades need to be isolated.

Infrared thermography has been used as a qualitative method for buildings since 1980 and was implemented as an ISO standard which became a European standard, after some modification [2]. Several studies were made to determine air leakages [3][7], thermal bridges [4], moisture and mold accumulations [5] and to analyze old buildings [6]. The potential uses

of IR thermography and the most important parameters and criteria for evaluating thermal images were studied in [7]. Emissivity is an important parameter for building analysis [8] and for studies regarding construction materials [9]. Influence of painted facades and building orientation has been tackled by [10]. The influence of exposed facades on meteorological parameters and the heat exchange on atmosphere and exterior walls was studied by [11].

This paper has as main objective a study of temperatures for some material surfaces on the western facade of a building from the college campus of Dunarea de Jos University of Galati, using thermography imaging and temperature dependence on meteorological parameters influence.

## 2. Methodology and Data

Investigation in terms of energy efficiency in buildings in recent years has focused on the use of non-invasive methods such as thermography method which is basically taking