

**Report on training in innovative technologies in energy efficiency in buildings within TEMPUS - Energy Efficiency, Renewable Energy Sources and Environmental Impacts - master study "ENERESE"**

*Period: 23.02.2015. – 23.03.2015.*

*Place: Aristotle University of Thessaloniki, Greece*

*Supervisor: Prof. Agis M. Papadopoulos*

**Timeline of activities**

<b>Period of time</b>	<b>Activity</b>
23.02.2015	Arrival in Thessaloniki;
24.02.2015	Meeting with Professor Papadopoulos at Aristotle University of Thessaloniki, discussion about the purpose and aim of work; meeting with researchers from the host University;
24.02.2015 – 06.03.2015	Working on the topics of indoor thermal conditions, weather data for Thessaloniki, the impact of building thermal envelope quality on indoor thermal conditions and energy consumption.
09.03.2015 – 20.03.2015	Working on the practical measurements of indoor thermal conditions in four representative offices and one classroom; The measurements of CO2 concentration, indoor air temperature and humidity, U-value coefficients and the temperatures of the surfaces of external walls are done in order to predict necessary number of air changes and energy consumption in office buildings, together with potential energy savings. Also the snapshots with infrared thermal camera are done for both Mechanical and Civil engineering buildings.
20.03.2015	Final meeting with Professor Papadopoulos, discussion about the achieved results and future mutual collaboration.
23.03.2015	Departure from Thessaloniki.

### Narrative report

The main focus of this training was to predict and measure indoor air conditions in office buildings.

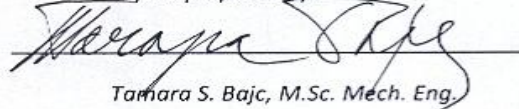
The first two weeks were dedicated to a theoretical training on topics concerning indoor air temperature, velocities, relative humidity and CO<sub>2</sub> concentrations, together with the innovative technologies to improve energy efficiency in buildings. Also, the existing residential building sector, together with public buildings in Thessaloniki is studied in order to define the most common constructions, and their characteristics. The main idea was to measure indoor air parameters in real conditions, during the working hours, and in correlation with occupants' behavior. It is well known that the occupant behavior can mainly increase the energy consumption, in some cases even more than 50%. Also it is always important to emphasize that the energy savings measures could not be observed without the optimal indoor air conditions, neither could be implemented prejudicing the occupants comfort. With these ideas in mind, a lot of standards are implemented in order to prescribe the minimum comfort requirements.

Second parts of the training, last two weeks were dedicated to practical training in Process Equipment Design Laboratory. The data-loggers are placed in four representative offices in two buildings: building of Faculty of Mechanical engineering and the building of Faculty of Civil engineering in order to measure and record the temperatures and relative humidity in every 15 minutes. The offices are chosen in the opposite part of the buildings in order to have representative data in south and northern part. Also the CO<sub>2</sub> values are measured in one office in PEDL and in one classroom in the building of Faculty of Civil engineering. The CO<sub>2</sub> values are observed during the working hours and in function of the number of occupants in order to determine the minimum number of air changes per hour. The snapshots with infrared thermal camera are also done for both buildings. The U-values and the temperatures of the surfaces are measured in two offices in building of Faculty of Mechanical engineering. Also, the measurements of the U-values and the temperatures of the surfaces are done and compared for 23 residential buildings in Thessaloniki.

At the end of the training, the final meeting was held. The meeting included the summary of the results that are achieved and also plans for future collaboration and research. The main idea was to compare the achieved results with the results that are going to be done within the research in Belgrade, Serbia.

27.03.2015.

*Report prepared by:*



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