

## SHORT TERM SCIENTIFIC MISSION (STSM) SCIENTIFIC REPORT

This report is submitted for approval by the STSM applicant to the STSM coordinator

**Action number:** CA17136 - Indoor Air Pollution Network

**STSM title:** Analysis of Data, uncertainties in relation to various building types and its parameters for sensors

**STSM start and end date:** 01/09/2021 to 12/09/2021

**Grantee name:** Dipl.Ing. Dr. Gerald Leindecker M.Arch

### PURPOSE OF THE STSM:

The Indoor Air and Energy Systems Research Group ( IndEnSe) belongs to the Laboratory of Energy Systems and Anti-pollution Technology Engineering of the Department of Mechanical Engineering of University of Western Macedonia and is lead by Prof.Dr Girogos Panaras.

The host institute has strong expertise in experimental investigation and modelling, and the assessment of estimation of the uncertainties of the measured quantities and relation to sensors and position in buildings.

The expertises is necessary to have a combined view on the various building types and to categorise the buildings in relation to selection of parameters and position of sensors in various building types. Strong focus is particular on office buildings, sport facilities and libraries.

The STSM contributes to the goal of the Action, especially to WG 5 and the analysis of Data in relation to parameters of sensors in building types and improves the collaboration between the applicant and the IndEnSe research group.



University of Western Macedonia, Konzani ( Members of the IndEnSe-Group with Corona measures applied)

## DESCRIPTION OF WORK CARRIED OUT DURING THE STSMS

(max.500 words)

The host institute performs research in the field of occupancy comfort assessment (thermal, optical, acoustic), energy system performance analysis and optimization, and air quality assessment in multi purpose buildings with focus on determination of unwanted pollution sources and their origination (internal or external) and correlation of pollutants with occupant comfort and potential effect on human health.

During the STSM a structured literature assesment was performed in relation to parameters such as building location, building ventilation effect on IAQ, level of occupancy / density and additional relevant parameters such as finishing materials and surface. The assessment was supported by indexing and mapping of the most relevant published papers.

This assessment is the basis for the justification of building types selected to be investigated. Strong focus was put on the analysis of data in relation to parameters of sensors in various building types, especially in respect to office buildings.

The host is using in an experimental set up techniques such as real time measurement and monitoring of data from sensors in multi-purpose buildings. During the visit, an actual measurement sequence was performed in an office building and data validation was started. The purpose of these measurements was to interpret and validate existing data as well as to gain new qualified data in respect to positioning of sensors.

Furthermore, the data can be used as basis for computational methods, and the development of generalized computer based models of those conditions, based on measured or computed parameters (modelling).

Therefore the analytic assessment of the measured quantities in relation to sensors and position in buildings is a key task for progressing with modelling and simulation.



Data loggers and devices during a measurement sequence at the site

Besides real time measurement experiment, other relevant facilities of the host institution were visited. For example, a 1:1 testing chamber ( not yet fully operational) for indoor thermal conditions and air quality was presented and potential future features were discussed as well as laboratory test facility.



Infrastructure/Equipment: Testing Chamber and Laboratory Facility

The experimental measure was assisted with a social support measure to have a holistic view on sensor data results and to get also non-technical parameters evaluated by questioners on paper to harvest the view of the users. Overall, the experimental set up should lead to techniques improving Indoor Environmental Quality (IEQ).

#### DESCRIPTION OF THE MAIN RESULTS OBTAINED

- Data validation of ongoing real measurements in university facilities such as libraries and offices was performed.
- Data interpretation in respect to sensors is dependent on the building typology and consequently influences critical parameters in relation to position of sensors.
- Comprehensive literature assessments and indexing on relevant indoor air parameters was performed.
- Combination of measurement with social support measures such as questioner and aspects of gamification are essential to fully understand the gathered data and its impact on user satisfaction and behavioural change.
- The sampling period for VOCs and aldehydes can be fully comprehensive with one half-day sampling within a week

#### FUTURE COLLABORATIONS

- Bilateral exchange of research data and a joint setup of experimental studies and sensors to obtain comparable data structure.
- Exchange of students and mobility of researchers between Austria and Greece
- Plan to have a joint publication in the journal: "Indoor Environmental Quality and Energy Sustainability", issued by the /Sustainability/ Journal (MDPI). Sustainability is an open access journal, issued by MDPI and presenting an IF of 3.251



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