

Sensor selection and placement in pilot buildings

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During the period covered by the task, a general methodology for sensor placement has been discussed amongst the project partners and stakeholders. The outcome of this methodology is described below:

PLACEMENT OF SENSORS / GENERAL RULES

DEFINED IAQ MONITORING GUIDELINES:

1. **FREQUENCY:** 1 minute, Time series

2. **PLACEMENT OF SENSORS:**

The sensor should be placed at least 1 m to 2 m from a wall and at a height of 1,50 m or 1 m to 1,2 m in case of offices where the sitting position is normal. Locations close to strong sources should be avoided. Places in the sun, close to heating systems, with noticeable draught or close to ventilation channels and near an open window area should be avoided, because this may influence the measurement results. Preferable sensors should be placed on inner wall (5 mm away from the wall) and avoided from other adverse conditions in the indoor environment (not installed there): too high humidity of the wall, floor, ceiling; dust; strong vibrations etc.

Microlocations should be defined for each room separately based on these criteria.

3. **ADDITIONAL COMMENTS:**

Air quality sensors are usually placed indoor and outdoor as outdoor air quality has a big impact on the indoor air quality – therefore we suggest placement of outdoor air quality sensors too.

Please note that this part is not officially part of the project and therefore has not been officially implemented, however we could compare indoor sensor measures with outdoor ones and observe trends – this aspect is subject to future work.

ADDITIONAL SURVEYS:

Additional surveys should be conducted for each case study building and for each room, where IAQ measurements are taking place:

1. **SURVEY ABOUT THE BUILDING**

General information like when was it built, size etc., construction material, MEP requirements ...

2. **SURVEY ABOUT THE ROOM WHERE SENSORS ARE PLACED**

Different questions like: is there ventilation (where is air intake and exhaust, can you open the windows – which windows, how many people are there, materials used in the room – furniture, finishing, etc., any special characteristics like greenery, printer etc.

SENSOR LOCATIONS: GENERAL METHODOLOGY

The InnoRenew CoE's building construction was finalized in February 2022. The building structure is a hybrid combination of timber, concrete and steel. The upper three floors of the main building are entirely wooden. Since VOCs are mainly emitted from wood, we expect to detect higher VOC emissions in upper floors. The network reaches all building rooms, and sensors will link to wireless access points. The sensors placement was defined in online meetings with the ZVKDS partner.

SENSOR LOCATIONS:

Sensor 1: conference room

Sensor 2: laboratory

Sensor 3: laboratory

Sensor 4: Workshop

Sensor 5: office 1

Sensor 6: office 2

Sensor 7: kitchen

Sensor 8: hallway

Groundfloor:

- Building entrance hallway
- 011: carpentry workshop
- 027: chemical laboratory: standard laboratory room, windows are generally closed
- 029: characterization laboratory: standard laboratory room, windows are generally closed

1st floor:

- 101 conference room Pseudotsuga: the largest conference room, the sensor is located near the presenting position

2nd floor:

- Kitchen: a small kitchen (3x4 meters) with many cooking tools (static oven, two coffee machines, microwave oven, electric cooker, fridge, washbasin, dishwasher. etc)
- Office 206: a printer is located in the office, the office is used by 7 people
- Office 220: There is some greenery (based on the sight visit the used greenery shouldn't have impact on IAQ – option: placement of other plants here to measure influence of greenery on IAQ, based on the research), the office is used by 8 people

Outdoor:

The outdoor air conditions will be obtained from local meteorological stations, and later an additional IAQ sensor will be positioned outdoors, on the building facade.

DEPLOYMENT: primary school Danilo Lokar, Ajdovščina

The primary school was opened in August 2016. The building's structure is mainly made from concrete and steel. The sensor placement was first outlined through e-mail communication and then finalized when we personally deployed the sensors at the primary school. We exchanged several e-mails with Polonca Vodopivec and Janez Furlan, both from the department of economy and development affairs of the municipality of Ajdovščina. Through e-mails, we were introduced to Boštjan Lemut, the school's network administrator, who described to us the building's settings. With the help of Boštjan, we agreed to attach our sensors to the Eduroam wireless network provided by the school. On Wednesday, 30.11.2022, we met at the school with Polonca and Janez, and they introduced us to the school's director Irena Kodele Krašna. After a short visit through the school to examine the potential deployment locations, we agreed on the below list.

SENSOR LOCATIONS:

Dining room:

- large room for cca. 50 persons
- furniture: tables and chairs
- a food counter, and one washbasin
- large windows on the northern part of the room

Hallway: the main hallway used to access classrooms

Teachers room: the room has a printer

Classrooms: all classrooms have similar dimensions, furniture and equipment

- cca. 20 persons
- furniture: large closet, tables, chairs, washbasin, blackboard
- equipment: pc, stereo, projector
- large windows covering one side of the classroom (the windows can be opened)

Sensors were deployed in 5 classrooms: 4c,4b, 11, 18, 3a

Outdoor:

The outdoor air conditions will be obtained from local meteorological stations.