

## Indoor climate monitoring platform

## CLIMIFY

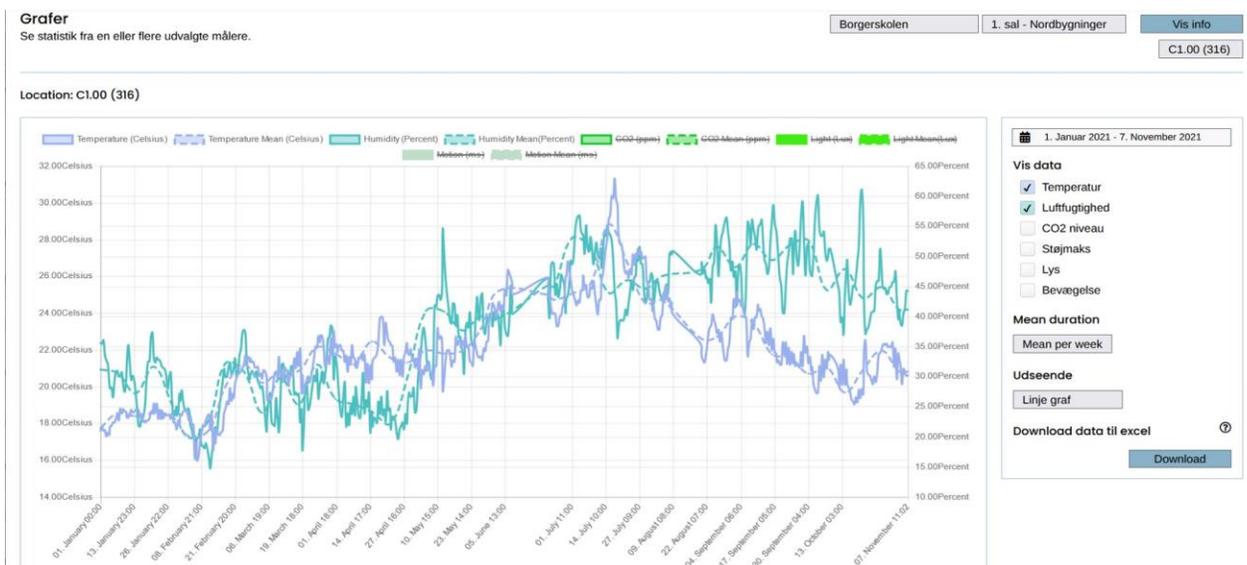


Figure 1: An example of the interface used in Climify: the user is able to zoom in and out in time and display multiple attributes,

### Summary of IoT case

The platform developed by CLIMIFY consists of data collection and visualisation for the indoor climate in buildings and all the components in the HVAC system. The platform presents to users an easy-to-understand graphs and visualisation to inform the user about the state of the indoor climate in rooms, and to report potential problems/issues of the indoor climate. The service also enables occupants to rate the indoor climate, to get subjective opinions on its state.

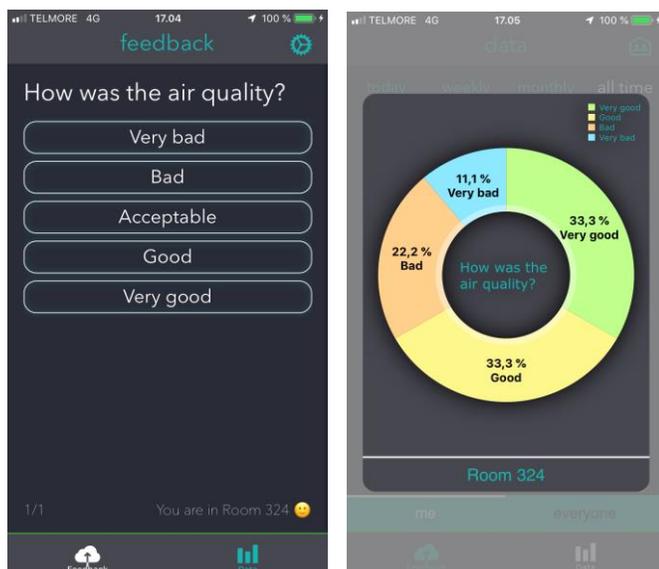
Not only does Climify present to its users objective measurements from IoT-sensors; it also presents the feedback from the occupants, to include subjective measurements on the indoor climate (See screen dumps from the FeedMe app on the next page). The subjective and objective measurements are not necessarily aligned. In the end, it is all about satisfying the occupants while at the same time optimising the buildings' operations.

The software service processes data from indoor climate IoT-sensors located in rooms of interest (plus IoT-sensors collecting data from the heating system, e.g. the heat

pump state, forward and return water temperature etc.). The software presents the data to the users and enables them to find rooms that do not reach the required indoor climate standards. E.g. if a room consistently is too cold or suffers from too high concentrations of CO<sub>2</sub>.

The user is thus equipped with a software tool that enables him/her to identify problems related to the indoor climate. The software uses data-driven methods to deliver insights and analyses, to inform the user where problems arise as to mitigate them and ensure an optimal indoor climate.

In the very near future, the software will be able to automatically report potential faults and/or bad behavioural patterns of the indoor climate in rooms, in order for the user to know about such problems as soon as possible. Another future feature is automatic optimisation of the operations of the indoor climate w.r.t. parameters such as CO<sub>2</sub>-emissions, energy usage, and electricity price. CLIMIFY does this by regulating e.g. thermostats, ventilation system, forward temperatures etc. in order to optimise the operation of the heating, ventilation, and air conditioning systems.



**Figure 2: User feedback over phone app.**

To date, customers include municipalities that use Climify for schools, to optimise the indoor climate and the learning capabilities of pupils, for gyms, and for other public buildings. Also, Skylab at DTU uses the software to monitor and present to the users with information about the indoor current indoor climate.

## Results

End users and building managers are able to monitor and optimise the indoor climate in rooms according to both objective measurements (IoT-sensors) and subjective measurements (feedback from occupants). Thus, the user is able to regulate the heat pump in the building to optimise and satisfy the user's needs, and also being alerted of potential faults in the heating system. In the future, such optimisation and heat pump regulation will be automatic.

## Contact information

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## FACTS ABOUT THE IOT CASE

**IoT category:** Monitoring, fault diagnostics, and optimisation of indoor climate.

**Heat supply capacity:** No specific requirements regarding heating capacities.

**Heat source:** No specific requirements regarding types of heat sources.

**Analysis method:** Data-driven methods.

**Modelling requirements:** Data-driven.

**Data required:** Indoor climate data and data on the heating system for the building.

**Quality-of-Service:** Real-time.

**Technology Readiness Level:** TRL 8 (system prototype demonstration in an operational environment).

**Webpage:** <https://climify.com/>