

# e-BEMS: e-SAFE Building Energy Management System

SAMPAŞ Holding  
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## OBJECTIVE

The **e-SAFE** project aims to create a market-ready deep renovation system for non-historic buildings in the EU. It integrates decarbonization, earthquake safety, indoor comfort, cost-effectiveness, and public engagement.

This involves innovative technologies and processes to provide energy-efficient solutions, including recyclable materials and seismic resistance. Additionally, it promotes market uptake through co-design protocols, financing solutions, and public awareness campaigns.

## e-BEMS

The main aim of the **e-BEMS** in the context of **e-SAFE** is to facilitate comprehensive monitoring, reporting, and control of building energy systems, with a focus on enhancing energy efficiency and indoor comfort in the pilot building located in Catania.

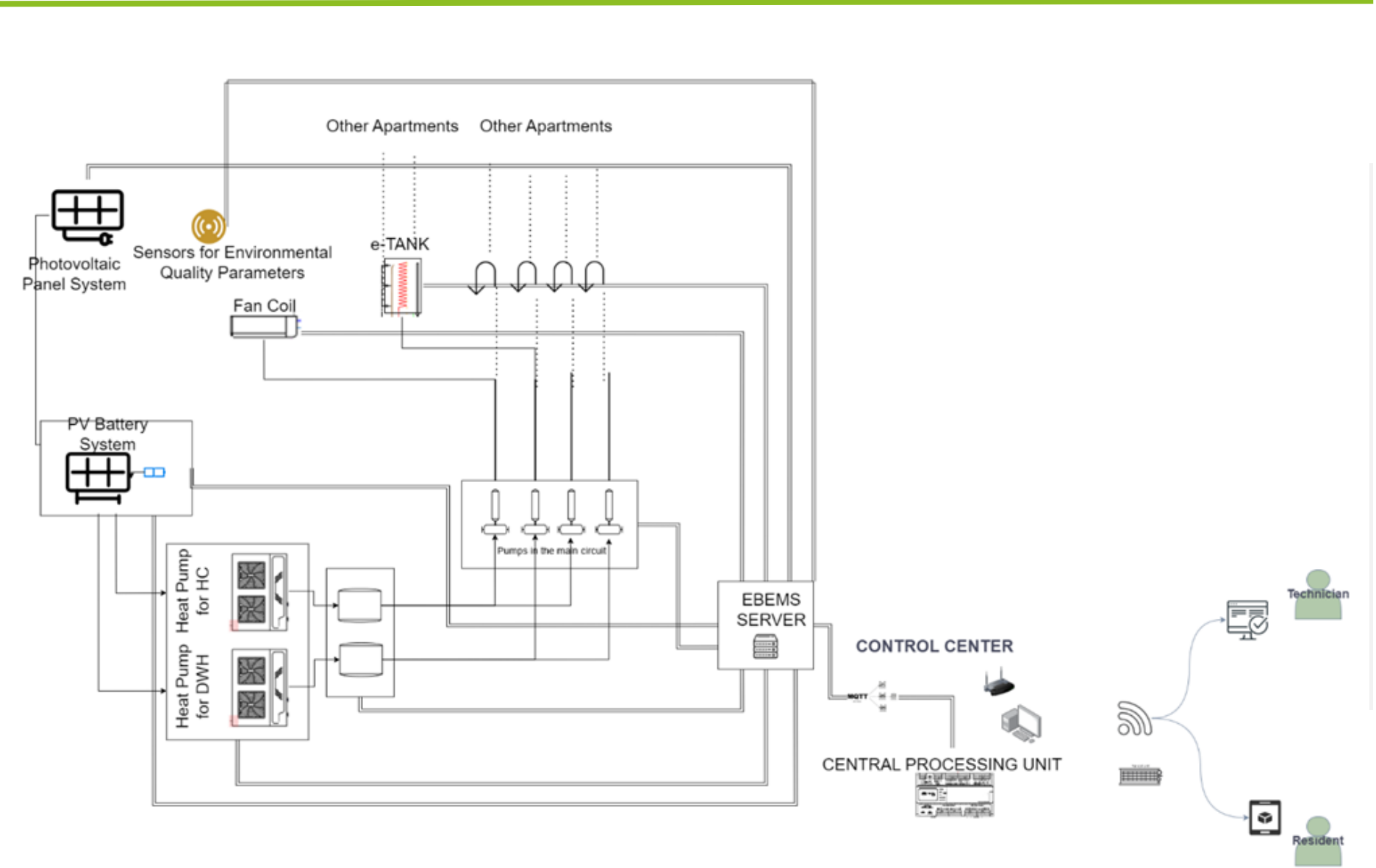
The **e-BEMS** enables end-users, including residents and technicians, to access real-time information about indoor comfort conditions, energy consumption, environmental and climatic factors. By utilizing suitable devices, sensors, and the OpenHAB open-source framework, the **e-BEMS** facilitates data collection, storage, and dissemination via web and mobile applications.

Overall, the **e-BEMS** aims to support the **e-SAFE** project's objectives by quantifying the actual benefits of renovation technologies, such as improved comfort, indoor air quality, and energy savings, in the pilot building in Catania.

## e-BEMS WEB INTERFACE & MOBILE APPLICATION

Figure 1: e-BEMS System Configuration

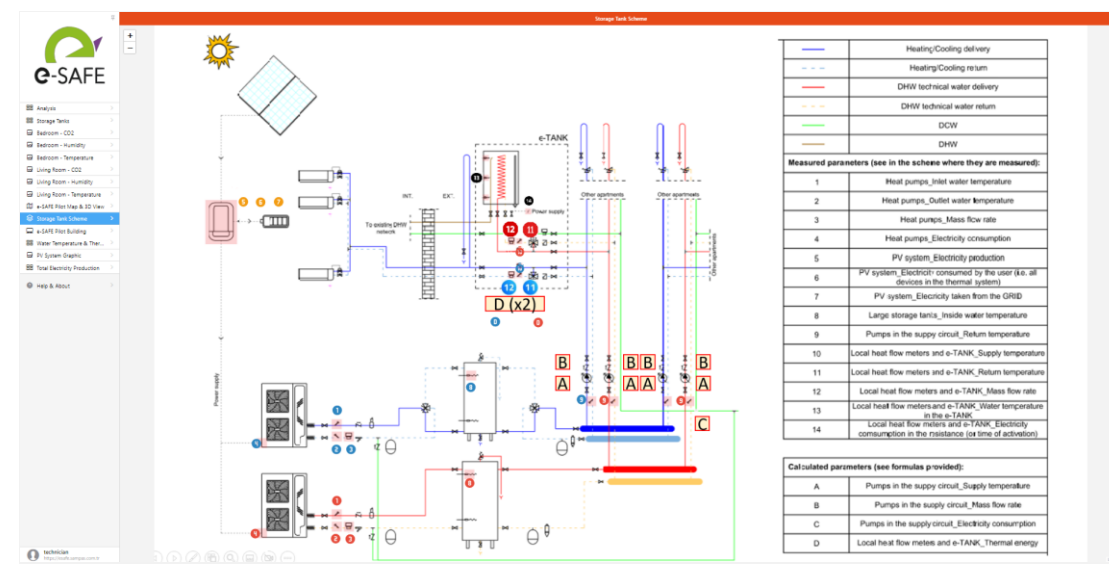
The **e-BEMS** model is a web and mobile-based system for efficiently managing the energy usage. It digitally replicates the physical environment and exploits sensors in the building to monitor energy consumption and production.



The e-BEMS will exploit several different hardware components to collect and transfer all data from the probes to the server: *SmartX Sensor*, *SmartX RP-C Controller*, *SmartX AS-B Server*

Figure 3: Web Interface Module for Technician User

The web interface for technicians provides complex functionalities in a user-friendly structure. It offers extensive data control with functions such as data analysis, graphical visualization, and data downloading.



Thermal system architecture chart

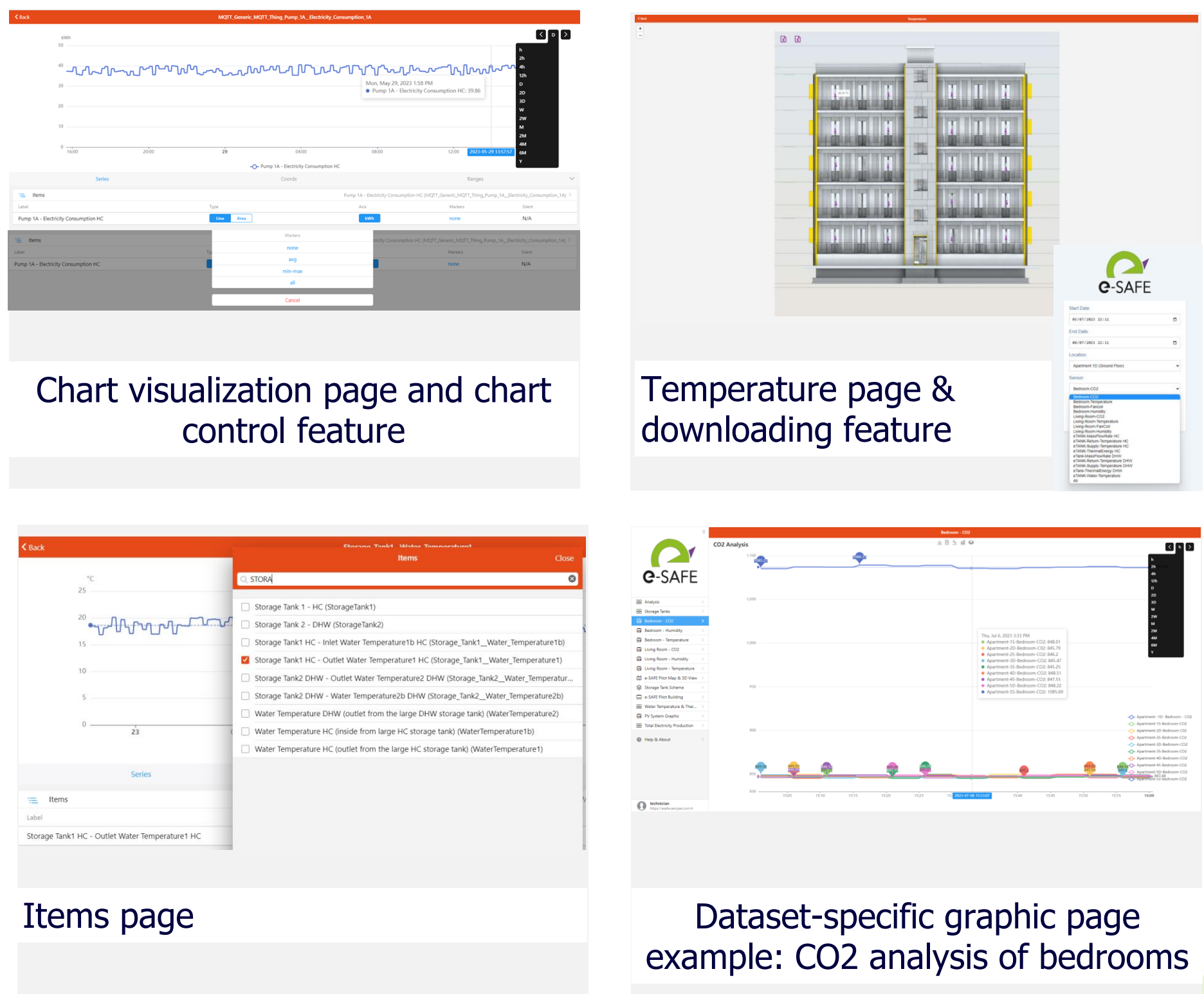


Chart visualization page and chart control feature

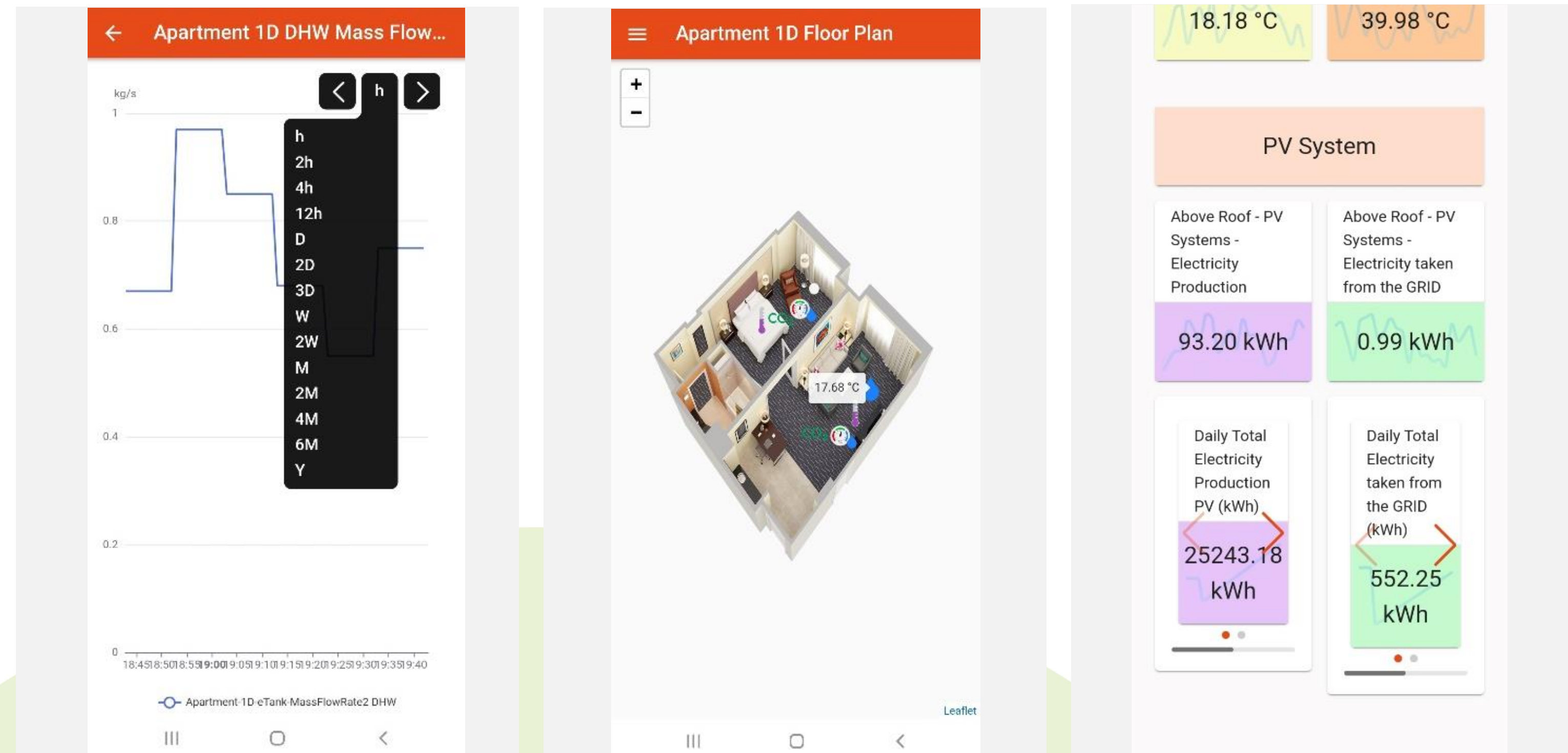
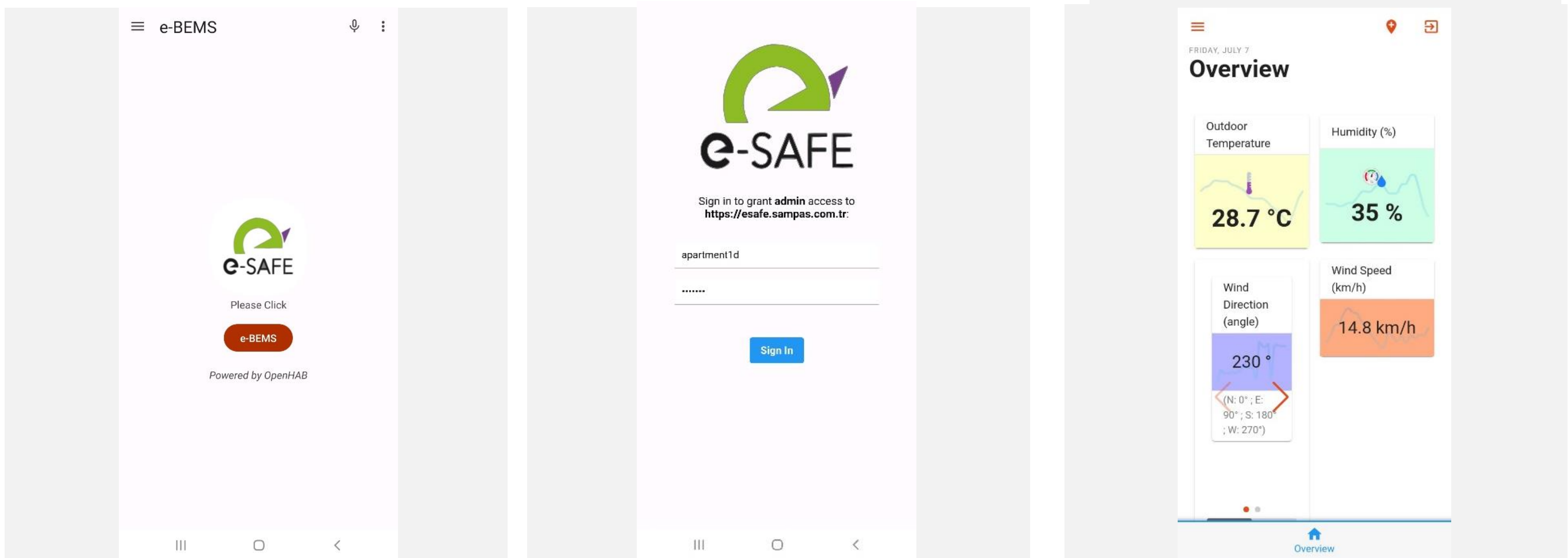
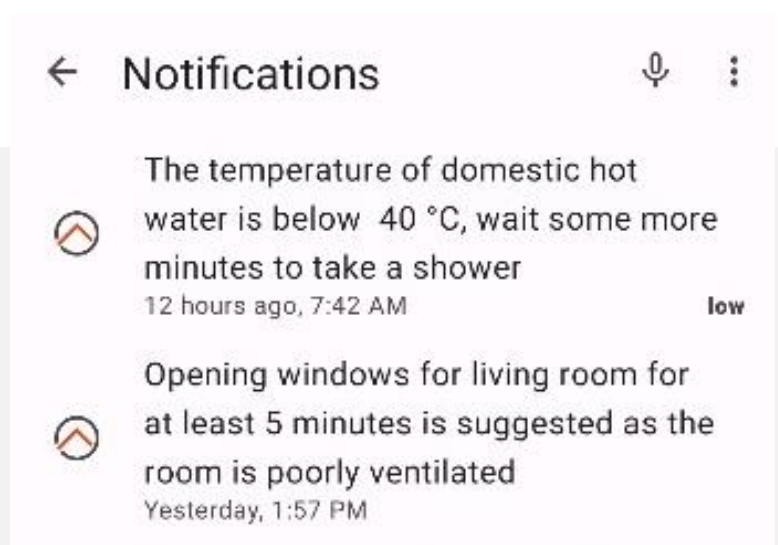
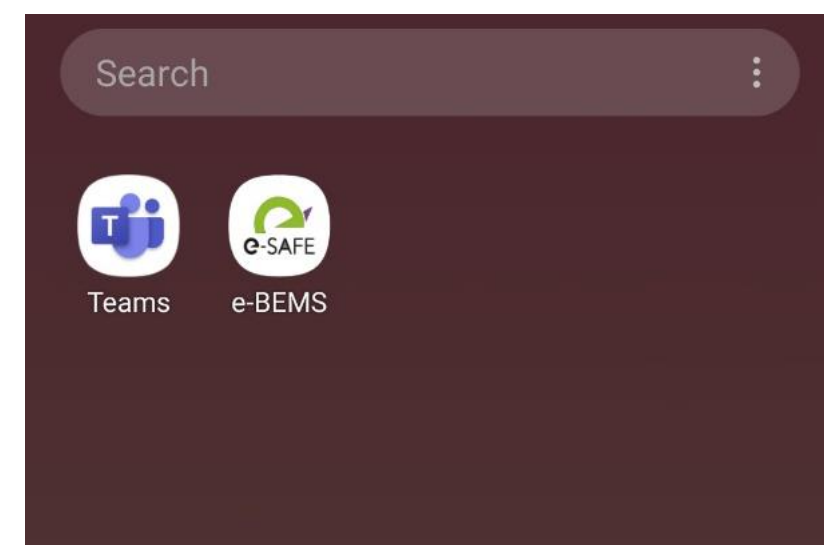
Temperature page & downloading feature

Items page

Dataset-specific graphic page example: CO2 analysis of bedrooms

Figure 2: Mobile App Module for Resident User

The mobile application focuses on the daily needs of apartment residents. Through its simple interface, residents can monitor temperature, humidity, and CO<sub>2</sub> levels in their rooms, solar energy productions, water temperature, and get various useful notifications.



## SUMMARY

e-BEMS serves several key purposes:

- Monitoring: Continuously tracking sensor measurements related to indoor temperature, CO<sub>2</sub> concentration, indoor humidity, energy consumption from the thermal system, and energy production from the PV system.
- Controlling: Implementing control algorithms to optimize the behavior of building facilities, thereby improving energy efficiency and indoor comfort levels.
- Optimizing: Determining the best performance of the building's energy systems through data analysis and optimization techniques.
- Reporting: Documenting both intermediate and final results, providing insights into the performance of the building's energy systems and the effectiveness of implemented strategies.

Technicians have access to real-time monitoring of the pilot building's weather station, PV system, DHW system, and e-TANK, providing real-time visualization and analysis of measured and calculated parameters.

They also access the calculation and monitoring of daily and monthly total electricity production. These data allow technicians to monitor energy consumption, production, and system performance and intervene when necessary.

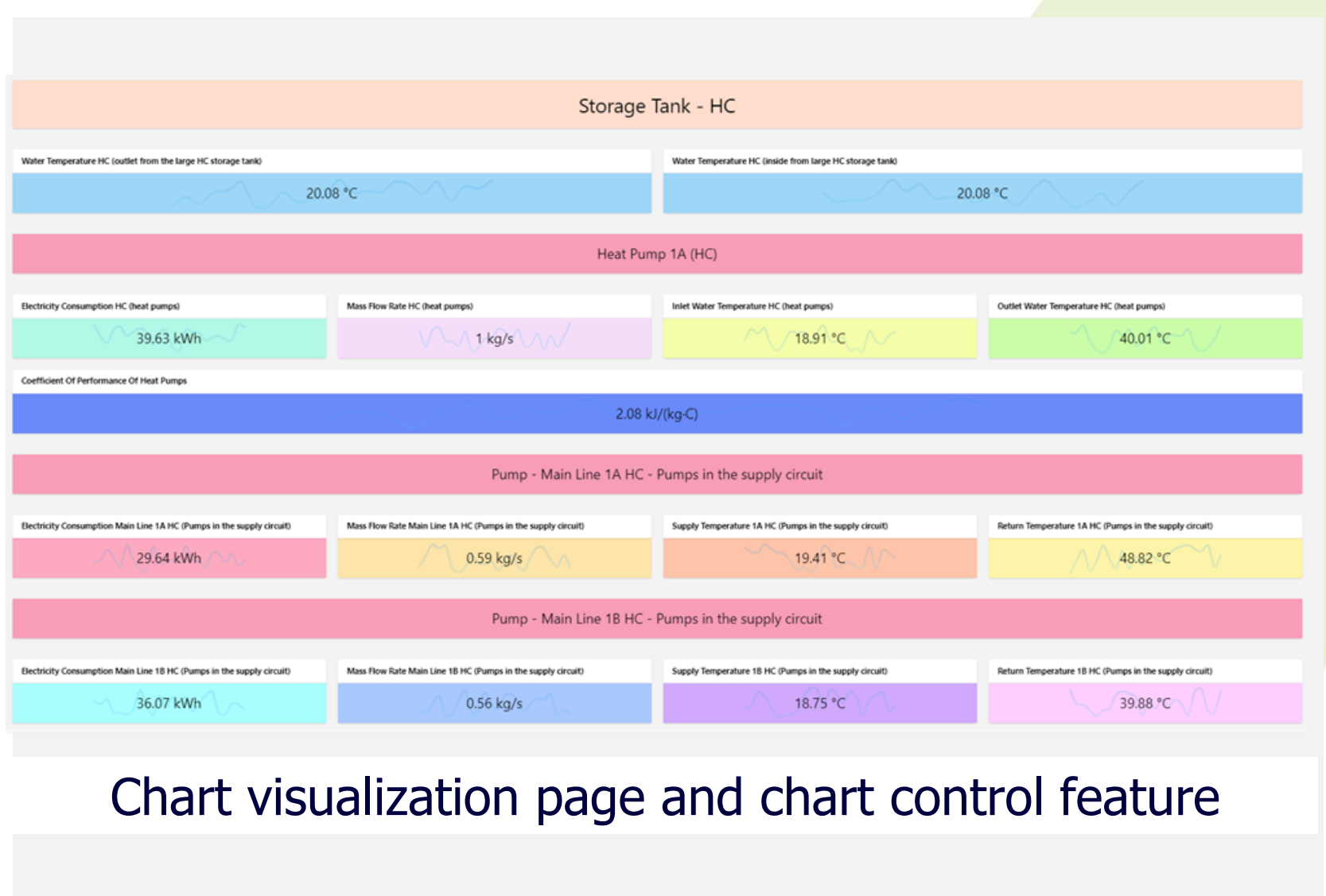


Chart visualization page and chart control feature