

**Project Proposal: Digital Building**

**Project:**

**HEATING DIGITALIZATION IN STARTUP BUILDING**

**Proposed by:**



**December 2023**

**Designed and proposed for:**



## Project Proposal: Digital Building

### Disclaimer

The information provided by Enchele is for general informational purposes only. We make no warranties about the accuracy, completeness, or suitability of the information as the data analysis is done in a very basic way by only one visit to the building site. Any reliance on this information is at your own risk.

The content is not a substitute for professional advice. Seek guidance from qualified professionals for specific needs. We reserve the right to change information without notice.

Details may evolve with new project updates. Dates of delivery are projected if the project is confirmed within 2023. Recommendations and estimations may change after a more detailed analysis. External factors can impact results, and ongoing assessment is advised. Enchele is not liable for any damages resulting from reliance on this information.

Enchele is not liable for any loss or damage arising from the use of our services. By using our services, you agree to this disclaimer.

### Contents

<b>Digitalization of Heating and Energy Monitoring of the “Startup Building”</b> .....	<b>3</b>
<b>1. Introduction</b> .....	<b>3</b>
<b>2. Project Objectives</b> .....	<b>3</b>
<b>3. Project Scope</b> .....	<b>3</b>
<b>4. Building analysis</b> .....	<b>3</b>
<b>5. Problem Statement</b> .....	<b>4</b>
<b>6. Consequences:</b> .....	<b>6</b>
<b>7. Proposed Solution</b> .....	<b>7</b>
<b>8. PROPOSED HARDWARE</b> .....	Error! Bookmark not defined.
<b>9. SOFTWARE</b> .....	<b>8</b>
Mobile App to Monitor, Control, and Manage Heating along with electricity .....	8
Web App to manage the entire heating on the entire building and monitor electricity consumption .....	8
<b>10. Key Stakeholders:</b> .....	<b>9</b>
<b>11. Timeframe</b> .....	<b>10</b>
<b>12. Project Budget</b> .....	<b>10</b>
<b>13. Key Stakeholders</b> .....	<b>10</b>
<b>14. Progress Evaluation:</b> .....	<b>10</b>

## **Project Proposal: Digital Building**

# **Digitalization of Heating and Energy Monitoring of the “Startup Building”**

## **1. Introduction**

Enchele is delighted to present this project proposal for the implementation of an advanced smart heating system at the "Startup Building." This transformative initiative aims to address the current inefficiencies in the building's heating infrastructure, enhance energy efficiency, and create a user-friendly, adaptive environment.

## **2. Project Objectives**

### **Enhance Energy Efficiency:**

- Objective: Achieve up to 30% reduction in heating energy consumption compared to the current state.
- Measurement: Compare energy consumption before and after the smart heating system implementation.

### ***Optimize Occupant Comfort:***

- Objective: Maintain indoor temperatures within the optimal comfort range of 22°C during working hours.
- Measurement: Monitor indoor temperatures using smart heat controllers and gather feedback from occupants.

### ***Implement Weather-Adaptive Controls:***

- Objective: Reduce heating intensity during milder weather conditions (above 10°C) to optimize weather-adaptive controls.
- Measurement: Compare heating patterns during different weather conditions and assess energy savings.

## **3. Project Scope**

The project will result in the implementation of a comprehensive smart heating system, including:

- Digitalization of 36 radiators with smart heat controllers.
- Installation of 3 clamp meters per floor for efficient energy monitoring.
- Integration of smart heating valves, occupancy-based heating, temperature optimization, weatheradaptive controls, window opening detection, and self-adjusting heating.

## **4. Building analysis**

The “Startup Building” is a three-floor (3) with a space of approximately ~800m<sup>2</sup> that runs the heating on fossil fuels.

It includes a total of 18 offices (6 offices per floor), 9 bathrooms (3 bathrooms per floor), and a total of 3 corridors (3 floors).

## Project Proposal: Digital Building

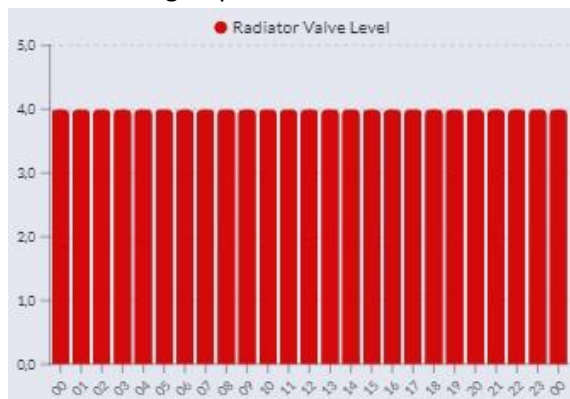


### 5. Problem Statement

The "Startup Building" currently relies on an oil-based heating system that operates continuously as a result of constant heating needs, resulting in excessive energy consumption and suboptimal indoor conditions. After a thorough assessment, several critical issues have been identified:

#### **Constant Heating:**

The building is heated based on a continuous and constant energy consumption pattern, irrespective of actual heating requirements.



#### **Radiator Valve at 24°C:**

Most of the heating valves in offices, corridors, and bathrooms are consistently set at Level 4, which means that the radiators will heat constantly at 24°C for 24/7, contributing to unnecessary heating in areas with varying occupancy and thermal needs. Heating valves control the water flows on radiators, resulting in higher or lower temperatures.

---

#### **Lack of Weather-Adaptive Controls:**

Weather outside has a significant impact on building temperature inside, during milder winter days, the heating system operates with the same intensity as during colder periods, lacking adaptability to weather conditions.

## Project Proposal: Digital Building

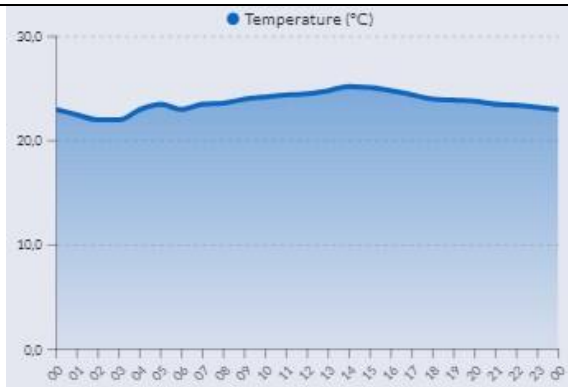
### ***Inefficient Heating Operation Hours:***

Offices are primarily frequented from 07:30 AM to 5:30 PM; however, the heating system operates continuously, even in unoccupied spaces and during non-working hours, weekends, and holidays. While heating remains active during non-working hours, energy waste is at its peak.



### ***Continuous Operation Despite Open Windows:***

The heating system remains active even when windows are open, resulting in energy waste and inefficient thermal management.



### ***Inconsistent Indoor Temperatures:***

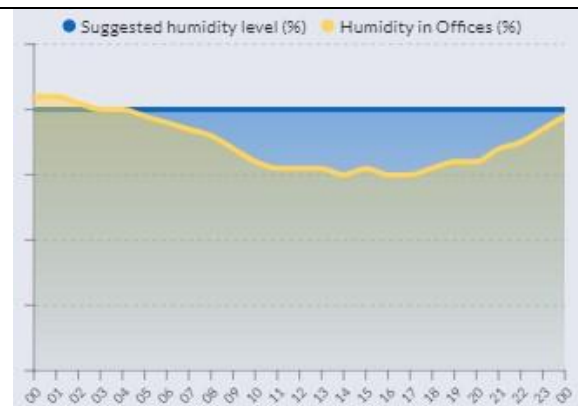
The indoor temperature of 24°C consistently exceeds the comfort and energy-efficient zone of 22°C, negatively impacting both occupant comfort and energy efficiency. External weather conditions directly influence indoor temperatures.

### ***Manual heating control:***

The existing heating system relies on human interaction to manually control heating in their offices, leading to inconsistencies and high energy waste.

### ***Low Air Humidity in Offices:***

Some offices experience low air humidity levels, impacting both occupant comfort and productivity, as air humidity is crucially linked to well-being and efficiency as the ideal range of indoor humidity is 40%-60%, below 40% or even the minimum of 30% can be very unhealthy.



## Project Proposal: Digital Building

### 6. Consequences:

The current state of the heating system in the "Startup Building" poses several significant challenges:

#### ***Excessive Energy Consumption:***

The continuous heating operation leads to unnecessary energy consumption, contributing to high utility costs.

#### ***Reduced Comfort and Productivity:***

Inconsistent indoor temperatures, coupled with low air humidity in certain areas, negatively impact occupant comfort, well-being, and overall productivity.

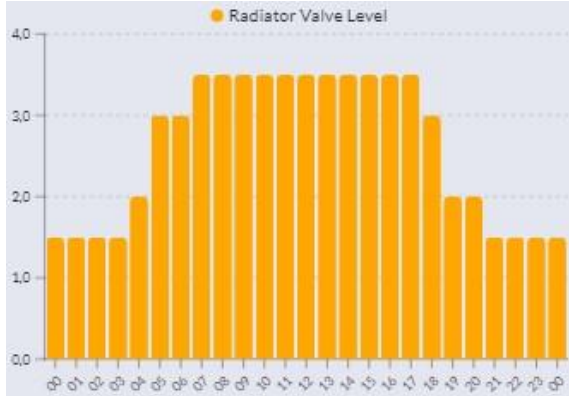
#### ***Environmental Impact:***

The lack of adaptive controls and continuous operation irrespective of occupancy and weather conditions result in an avoidable carbon footprint, contributing to environmental degradation.

## Project Proposal: Digital Building

### 7. Proposed Solution

To address the identified challenges and create an efficient, adaptive, and user-friendly heating system for the "Startup Building," Enchele proposes the implementation of a comprehensive smart heating solution. The proposed system will incorporate the following key features:

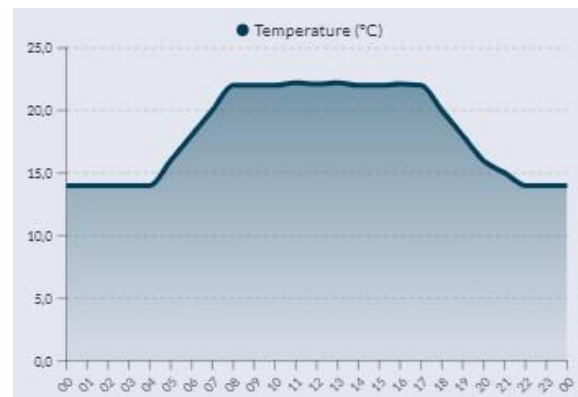


#### Occupancy-Based Heating:

The system will leverage human activity data to selectively heat specific offices based on occupancy. Offices that are not in use or during non-working hours will have heating automatically deactivated, contributing to energy savings.

#### Smart Heating Valves:

Intelligent heating valves will autonomously adjust to heat the building only when necessary. To maintain a temperature of 22°C during the day, the radiator level will automatically adjust to 3.5, while during the night, it will decrease to 1.5, ensuring a comfortable 14°C.



#### Temperature Optimization:

The indoor temperature will be automatically regulated to remain at an optimal and efficient 22°C during the day. During the night, the system will autonomously adjust the temperature to a more energy-efficient 14°C, potentially resulting in energy savings of up to 35%.

#### Human Comfort Focus:

The smart heating system is designed to prioritize human comfort, ensuring that indoor temperatures are conducive to high productivity and well-being.

#### Weather-Adaptive Controls:

The system will integrate weather-responsive algorithms to adaptively control the heating in response to external weather conditions. This feature ensures that the building's heating strategy aligns with the current climate, optimizing energy use.

#### Window Opening Detection:

Advanced sensors will detect window openings, prompting the system to cease heating in those areas. This feature prevents energy wastage by avoiding heating when natural ventilation is available.

#### Occupant Guidance:

The system will proactively remind occupants to open windows for fresh air, contributing to improved indoor air quality and overall well-being.

#### Self-Adjusting Heating:

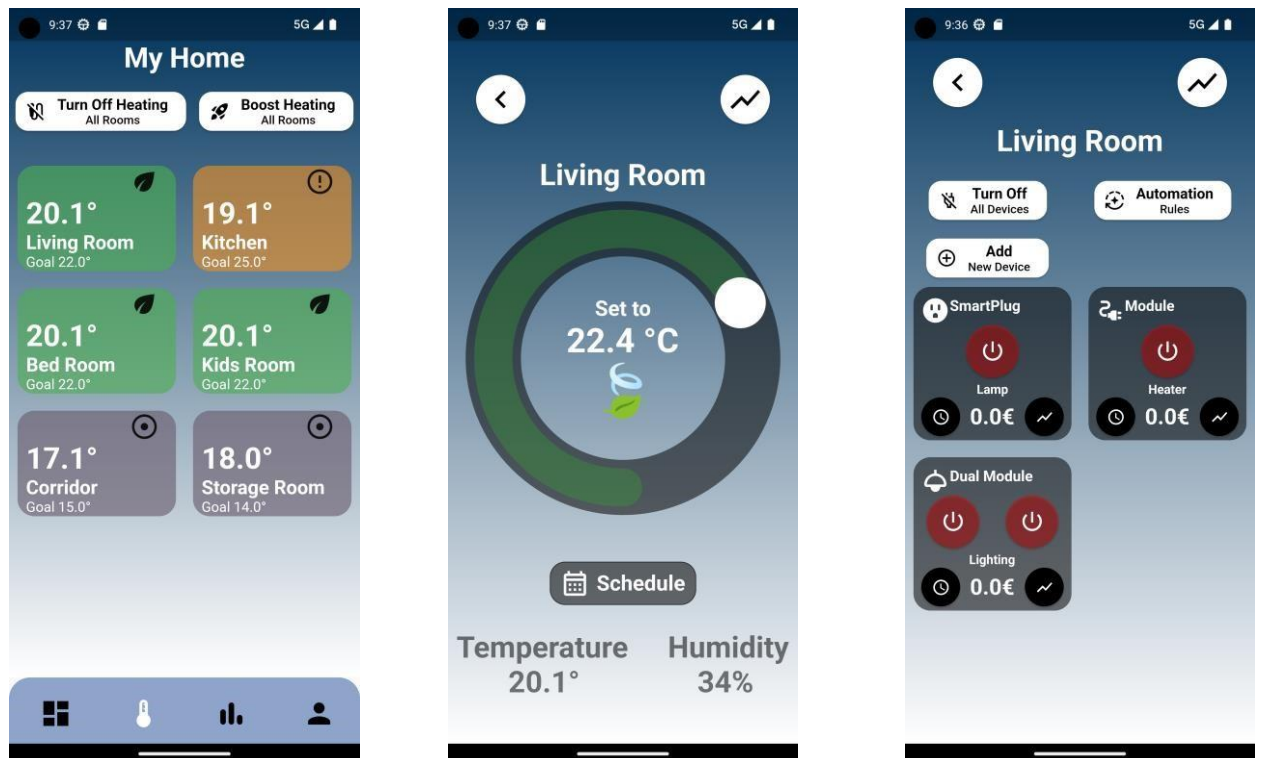
## Project Proposal: Digital Building

The smart heating solution will operate in a self-adjusting mode, autonomously optimizing heating patterns based on real-time data inputs, occupancy, weather forecasts, and user preferences.

The proposed solution aims to transform the heating system at the "Startup Building" into an intelligent, energy-efficient, and user-centric ecosystem that not only ensures comfortable indoor conditions but also significantly reduces energy consumption and environmental impact.

## 8. SOFTWARE

*Mobile App to Monitor, Control, and Manage Heating along with electricity.*



*Web App to manage the entire heating on the entire building and monitor electricity consumption*





## Project Proposal: Digital Building



### Features and Functionalities

- Remote heating control,
- Remote programming,
- Weather adoption,
- Energy demand prediction,
- Self-learning heating,
- Heating performance analysis,
- Geofencing,
- Real-time electricity consumption
- Electricity monthly billing,

### Facilitate integrations of near-future energy systems, such as:

- Heat pumps,
- Solar Panels,
- Battery Systems,
- Charging Stations,
- Variable electricity tariffs adoption and
- Path to Net zero buildings.

## 9. Key Stakeholders:

### Building Management Team:

- Responsible for overseeing the implementation and day-to-day operation of the smart heating system.

### Occupants:

- Directly impacted by the system; their feedback and comfort are crucial for the project's success.

### Facility Maintenance Team:

- Involved in the installation and ongoing maintenance of the smart heating infrastructure.

### Environmental Sustainability Department: