

SEEU: A LOW EMISSION UNIVERSITY CAMPUS



3. THE SUSTAINABLE ENERGY BUILDING

The final step for the fulfillment of this ambitious project has been the realization of a pilot sustainable initiative, aimed at showing the Campus commitment towards energy efficiency and renewable energies. Building 304, hosting the Institute for Environment and Health, has been selected to this goal: thanks to the introduction of small renewable energy plants and energy saving technologies, it has been converted into a sustainable energy building, as much independent as possible from fossil fuel and external electricity purchase, with reduced dispersions, energy losses and, finally, low CO₂ emissions.

The layouts of this panel show the internal cross section and the external view of the building before and after the conversion, in order to present the interventions applied.

After the realization of a specific energy analysis, necessary to assess the energy consumption, needs and sources, the project has foreseen the installation of the following technologies:

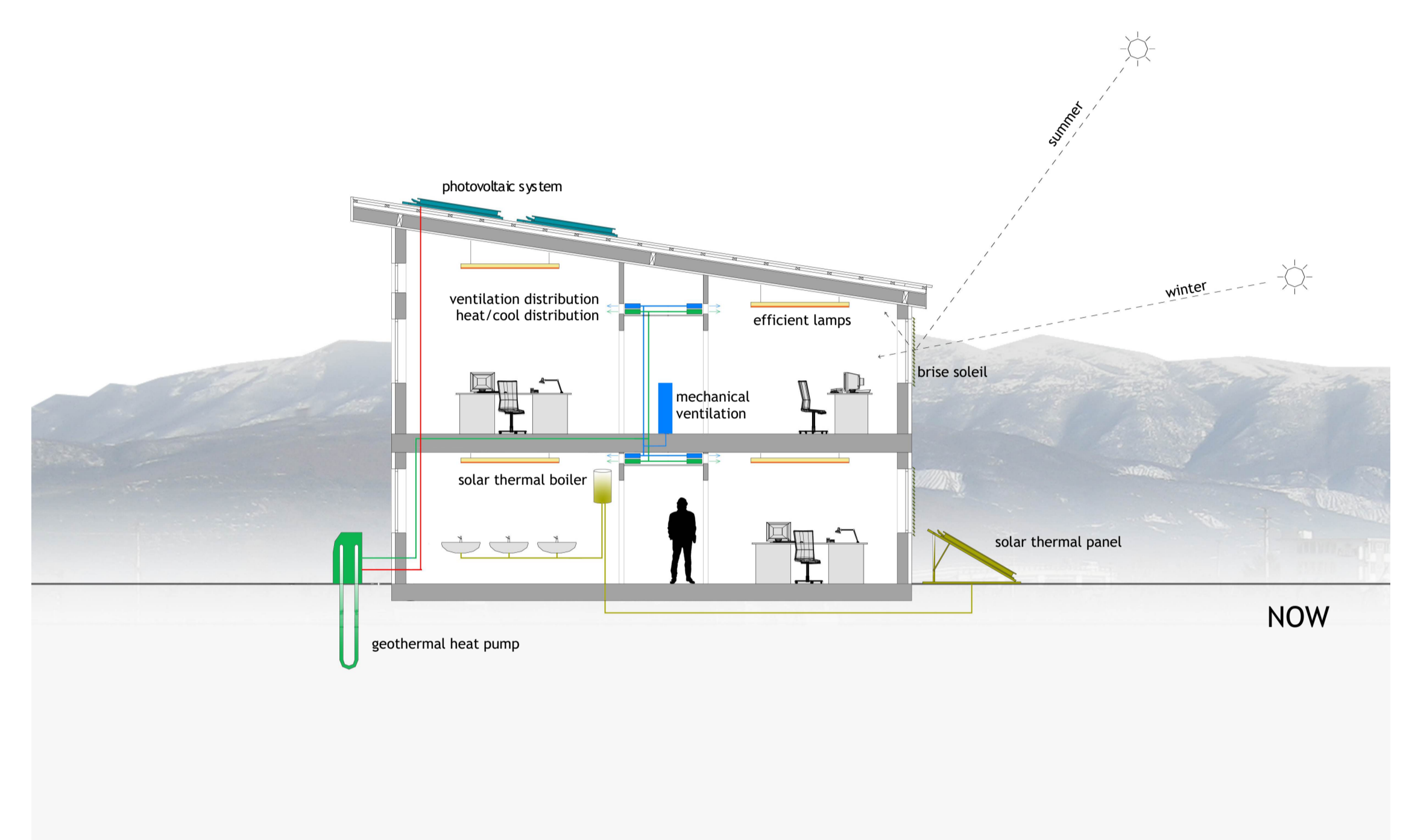
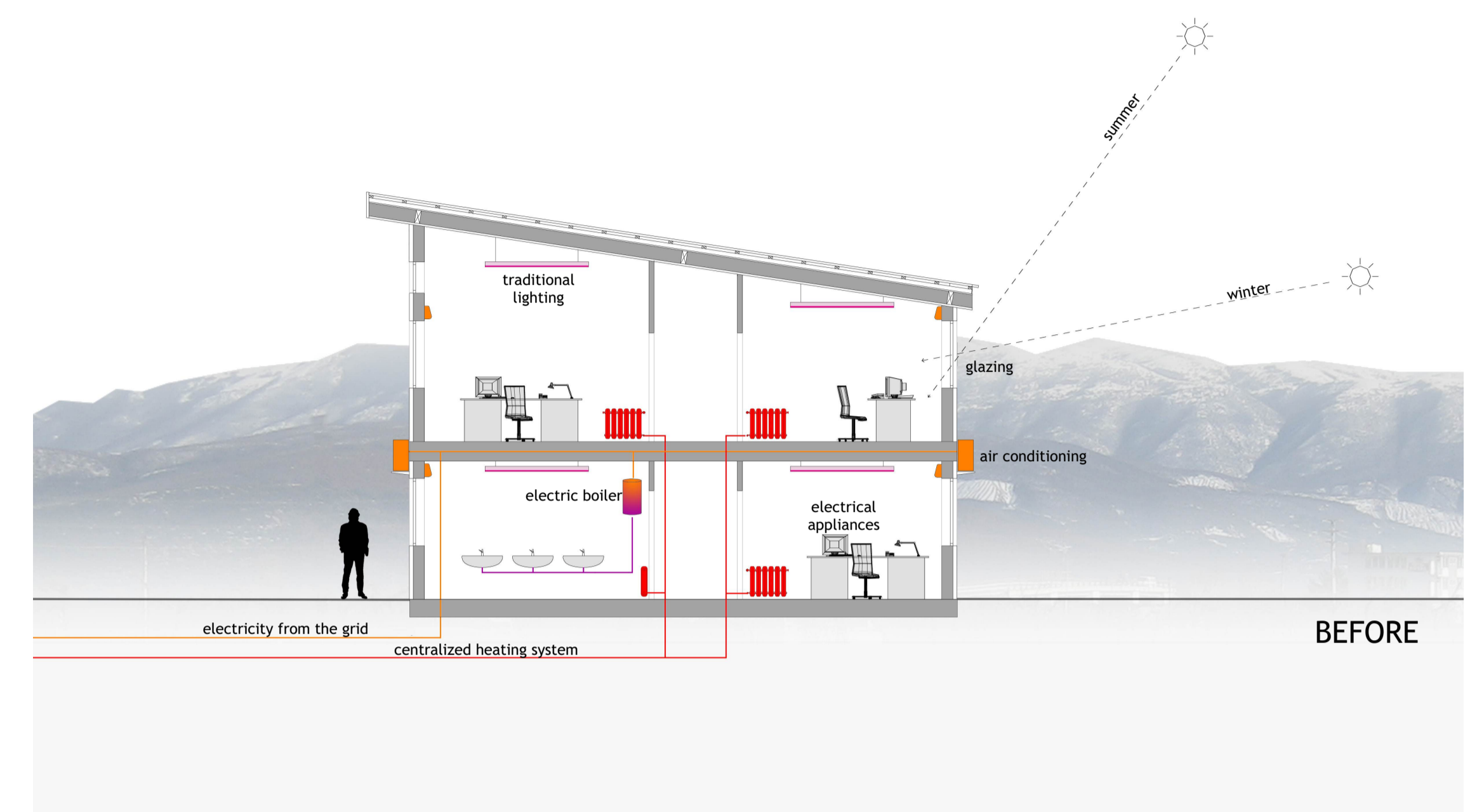
- **geothermal heat pump**, a heating and cooling system which allows replacing the conventional centralized heating system fuelled with heavy fuel oil. This system exploits an aquifer flowing under the Campus and it is based on two 40 meter deep wells located in the building yard;
- **solar thermal system**, consisting of a 2 m² solar panel located on the ground next to the building, and a storage tank, installed in a technical room within the building. The system allows collecting the solar radiation to produce domestic hot water, thus replacing the use of the traditional electrical boiler;
- **controlled mechanical ventilation system**: this technology allows the exchange between fresh air from outside and the moist and polluted air in the premises, minimizing the heat losses due to uncontrolled windows opening for air circulation. The heat exchangers installed for the system functioning allow strong energy savings both in winter and in summer: during the cold season they allow the pre-heating of the fresh air coming from outside through the warm exhaust air in exit; during the warm season the system refreshes the new air from outside and expels the stale air. In this way, it reduces dispersions and the use of air conditioners;
- **solar shading structures**, consisting in the installation of blinds on the external frame of the windows. Their aim is to limit the incoming solar radiation in summer and consequently reduce the energy consumption of the air conditioning system;
- **solar photovoltaic plant**, integrated with batteries, installed part on the building roof and part on the shelter positioned in the garden close to the building. The electricity produced by the solar panels is used to cover the self consumption of the geothermal heat pump system and of the electricity needs of some building equipment;
- **foundations insulation** in order to reduce the heating dispersions to the ground in winter;
- **data monitoring system** for the evaluation of the energy performance of the building.

Beside these interventions, the pilot project included also the design of the following energy saving technologies which could be realized in the future to complete the goal of self sustainable building:

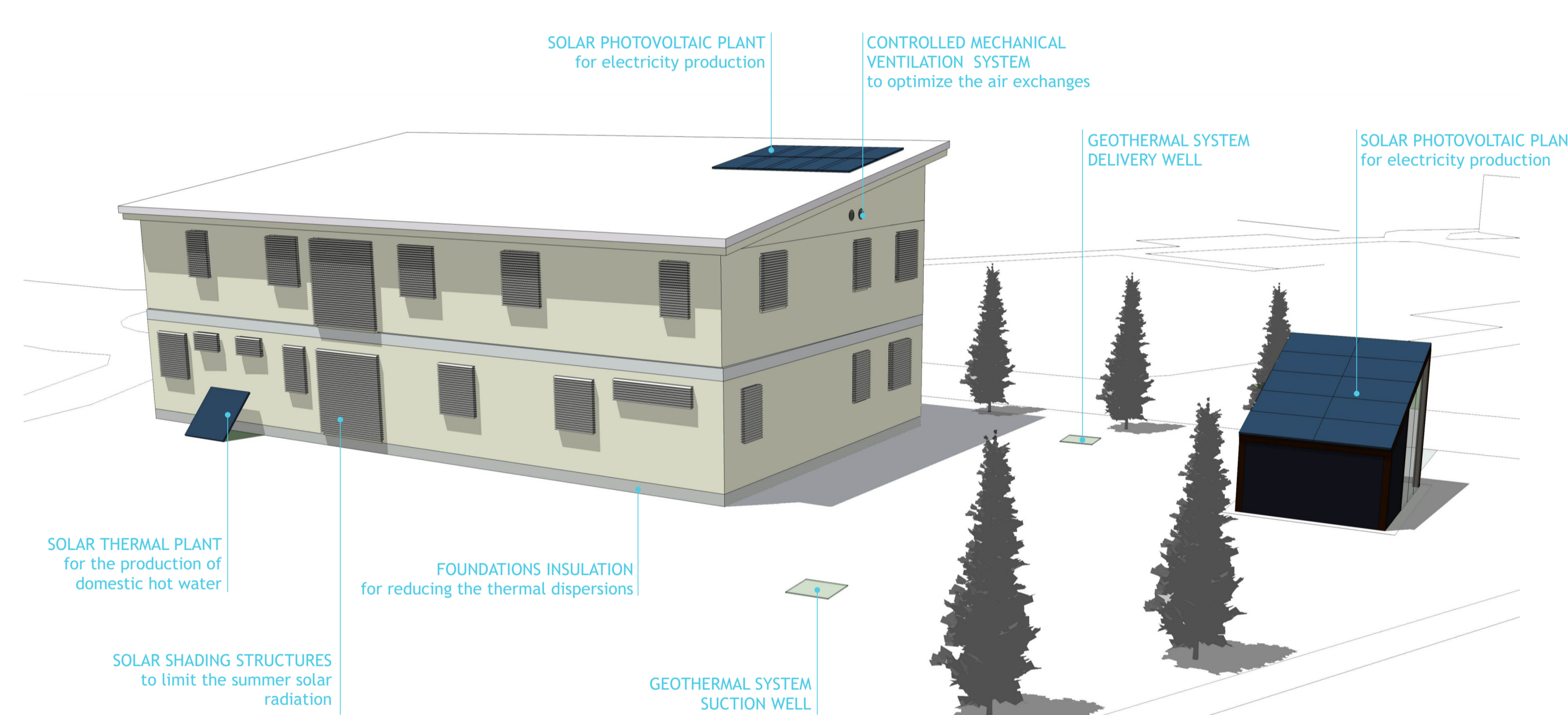
- **ventilated façade**, consisting of a cladding structure built at a certain distance from the external walls which improves the thermal and acoustic insulation of the building;
- **current fluorescent lamps replacement** with high efficient ones;
- **automatic lighting management systems**, as movement sensors, light dimmers, etc.

The small shelter built in the garden next to the pilot building has been realized for a twofold reason: technical room where to manage all the energy plants of the building, and front accessible living area, available for the students and the university staff for different scopes, as planned by the University management. The solar photovoltaic panels installed on the roof contribute to the pilot building electricity production.

The important results achieved by the pilot building in terms of energy saving and emissions avoided can be constantly shared with the Campus community through a LCD monitor hosted in the living area within the shelter: in fact, it displays in real time the building primary energy consumption, the CO₂ generated emissions, the emissions avoided and the energy saving.



Pilot building conversion from conventional to sustainable (internal cross section)



Overview of the Sustainable Energy Building and adjacent shelter showing the sustainable technologies applied



Project Developed by

DAPPOLONIA

IEH SEEU
Institute for Environment and Health

1. OUR PROJECT

2. GHG INVENTORY AND CLIMATE ACTION PLAN

3. THE SUSTAINABLE ENERGY BUILDING