

# HSB LIVING LAB

Here is a short film about HSB Living Lab that explains how it was constructed and its purpose, as well as offer a glimpse of what daily life is like for those that live there.

The HSB Living Lab is a habitation infrastructure in the form of student housing, which was created in 2016. The aim is to be a co-creative social space for experimenting with sustainable technology and lifestyles, in order to develop innovative concepts and products. It has been developed through open-innovation processes between HSB (a Swedish housing association), Chalmers University of Technology and Johanneberg Science Park, along with other industry partners.

## **Facts:**

- There are 29 permanent dwellings for students and guest researchers, who live in an environment that is constantly changing and being evaluated.
- The lab is built in 44 modules, with all parts and sections being replaceable.
- Wires and cables are clearly visible to remind you that research is taking place around the clock.
- So far, more than 100 projects have taken place in the HSB Living Lab.
- The HSB Living Lab is an open arena for anyone who has ideas about future sustainable housing.
- Partners: HSB, Chalmers University of Technology, Johanneberg Science Park, Bengt Dahlgren, Tengbom, TietoEVRY, Göteborg Energi, PEAB, Electrolux Professional, Akademiska Hus, Vedum, and Elfa. The building is also part of Climate-Kic's Flagship project BTA.

Read more about HSB Living Lab at <https://www.hsb.se/en/hsblivinglab/about-us>

## THE NEXT GENERATION OF WINDOWS

With a new type of molecular solar thermal (MOST) window, we can absorb sunlight and transform it into stored energy which can later be released as heat during the night. In this way, the window contributes to cooling during daytime and heating at nighttime, without compromising in window transparency.

**Partners:** Chalmers

## INTEGRATED SOLAR CELLS

On one facade, different types of building-integrated solar cells are being tested. The solar cells can be used as building materials and have the same properties as traditional facade materials.

**Partners:** Göteborg Energi, Chalmers, HSB, Mera Sol

## INNOVATIVE INSULATION

In this short film, the researchers and developers behind WoodXZip explain what they hope to achieve through testing at HSB Living Lab.

The WoodXZip project tests how sustainable and feasible it is to combine wooden walls with an innovative insulation material.

**Partners:** Chalmers, Zenergy

## SENSOR CONTROLLED WASTE MANAGEMENT

Waste management can be more efficient by mounting sensors on bins to better control waste pick-ups. Tests have proven that sensor-controlled pick-ups are better both financially and environmentally than scheduled pick-ups, since bins are only emptied when they are full.

**Partners:** Stena Recycling, M2M Solutions AB, HSB

## DIGITALIZED BEEHIVES

To contribute to research into the conservation of biodiversity, this project connects beehives to the internet. Sensors and IoT technology are helping the team to collect data to better monitor the bees' well-being.

**Partners:** TietoEVRY

## THE FUTURE OF LAUNDRY

Human behaviour in laundries causes massive waste in textiles, water and electricity, and avoidable climate and water pollution. This project aims to improve the environmental impact by reducing uncertainty in existing systems and find out how to improve consumer behaviour in laundries.

A chip in the garment tells the washing machine what kind of garment it is, so that the machine in turn can provide information on how much water should be used, what temperature it should be and how long it needs to wash for. The laundry also measures the detergent dosage, as well as how the drying cupboards and dryers are used.

**Partners:** Electrolux Professional, Chalmers

## MINSHED MINIMISES MICROPLASTICS

The contamination of microplastics in our oceans comes from, among other things, when we wash clothes and fabrics made of acrylic, polyester and nylon. MinShed has the overall goal of helping the textile industry to design clothes made of synthetic fabrics that won't release microplastics. In the washing machines at the HSB Living Lab, special filters have been installed, which capture microfibrils and microplastics to investigate the differences between different textiles.

**Partners:** Electrolux Professional, Chalmers

## GREY WATER RECOVERY

Using a closed-loop, this circular water purification system recycles greywater from bathroom sinks, bathtubs, and showers for reuse as warm, clean water.

**Partners:** Bengt Dahlgren AB, Chalmers, Greytec

## FRESH HERBS FROM VERTICAL FARMING

Thanks to an indoor vertical hydroponic farming system the residents at the HSB Living Lab can get fresh garden herbs year-round.

**Partners:** Green City Farming, Grow Pipes, HSB

## CONSTANTLY CHANGING CO-LIVING

Clusters consisting of six apartments share common areas such as kitchen, living room, bathroom and balcony. The project carries out in-depth analysis on newly built student and co-living residences, all of which are experimenting with increased sharing of services, resources and functions in the shared home. The aim is to obtain clearer answers on how to design different types of co-housing in the future.

**Partners:** Akademiska Hus, Nordic Choice Hotels, Studentbostäder i Linköping AB, Chalmers, KTH, Zynka BIM, Tengbom, Arkitema, Semrén & Månsson, GG arkitekter

## SMART HOME INTERACTIONS

Here is a film that provides an overview of the 2 000 sensors located throughout HSB Living Lab, and explains their functions.

A multi-sensor system featuring over 2,000 sensors and 15,000 meters of data cable, monitors the tenants and their environment on a 24/7 basis. The sensors measure temperature, moisture and light, and therefore allow for the insulation function to be managed with a few buttons.

A Smart Home has great potential if used correctly. According to estimates, the average household could reduce its energy consumption by up to 20 % by using the decision support available in a Smart Home.

**Partners:** Interaktiva Fastigheter, HSB

## LIVE IN A CUBE

The space-efficient apartments are built at height and measured in cubic meters – 47 cubic meters to be precise. They are also cube-shaped, with each side of the apartment measuring 3.6 meters.

## REDUCED ENERGY CONSUMPTION

The ventilated air in the HSB Living Lab is maintained at an ideal temperature. HSB FTX heat exchanger technology is used to utilise the heat in the ground to enhance efficiency and reduce energy consumption. The data from the HSB Living Lab is still insufficient, but from previous measurements the HSB FTX system has reduced 15 metric tons of carbon dioxide emissions per year for a 4,400 sqm apartment building. The operating cost for the same building was reduced by SEK 42,000 per year.

**Partners:** Bengt Dahlgren AB, HSB

## DISTRICT HEATING IN LOW-TEMPERATURE SYSTEMS

The HSB Living Lab uses district heating that is used not just once – but twice. An extra pipe feeds in low-temperature return heat from the district heating system in the area. This means the heat can be used one more time for the building. The low-temperature return heat system is currently being tested in the underfloor heating, but it is also possible to use the return heat in the building's radiators.

**Partners:** Bengt Dahlgren AB, Göteborg Energi