Success story: Energy funding programme

A heat pump for the hot water in the bathroom

Three universities and the Bern-based company Swissframe have developed a decentralised system for producing hot water in the bathroom. It uses the residual heat from the home ventilation system as an energy source for a mini heat pump and is an ideal solution for renovation projects.

In newer apartment blocks in Switzerland it is normal for the hot water to be produced centrally and distributed to the individual apartments via a network of pipes. This results in high heat and energy losses, which often amount to more than half of the hot water consumption. The taller the building, the greater the inefficiency.

Another alternative is an electric boiler in each apartment to heat the water. Many older buildings have decentralised systems of this kind. However, the boilers consume large amounts of electricity and will need to be replaced in the medium to long term. Switching to a centralised system would result in the losses that have already been mentioned. In addition, the retrospective installation of hot water pipes is very costly.

System uses air as a heat source
In a CTI project an energy-efficient solution was developed that is also suitable for new buildings. It consists of a ready-made front-wall unit containing the entire bathroom system, which uses very little energy. The manufacturer is Swissframe AG, a company based in the Swiss town of Münchenbuchsee. Together with the Laboratory for Photovoltaic Systems at Bern University of Applied Sciences (BFH), the Institute for Solar Technology at the University of
Together we looked for a more energy-efficient, cost-effective solution and identified new milestones.

Felix Kunz, CTI head innovation mentor

Applied Sciences in Rapperswil (HSR) and the Institute for Energy Systems at the NTB Interstate University of Applied Sciences and Technology Buchs (NTB), Swissframe managing director Balz Hegi developed a system that uses the exhaust air from the home ventilation system as a heat source and heats water in a tank with a small, highly efficient heat pump.

Restricted spaces require special solutions
The restricted space in the cavity, which is only 30 cm wide, presented a major challenge for the production of the prototypes of the individual components in the front-wall unit. The water tank was designed as a flat cube with an innovative vacuum insulation system. The heat pump is very small and operates almost continuously, but uses very little power.

Swissframe and Urs Muntwyler, professor of photovoltaics at the BFH, originally had the idea of producing the hot water using a flow heater, which would be powered by solar energy generated on the facades of apartment blocks. The CTI rejected this application, but CTI head innovation mentor Felix Kunz encouraged the applicants to submit a second one. “Together we looked for a more energy-efficient, cost-effective solution and identified new milestones.” The second application involving the use of a heat pump was approved.

Today Swissframe is mass producing the front-wall unit. The new system was first installed in a block with 30 apartments. Five units were monitored and tested as part of a pilot and demonstration project by the Swiss Federal Office of Energy.

Support from the CTI
- Innovation cheque for the feasibility of a solar hot water system
- Co-financing of an R&D project