



"I've come to realize that the coffee machine is the most important place in research."

Government councillor Markus Kägi is Head of the Building Department in the Canton of Zurich, which supports NEST with substantial start-up funding.

"We're absolutely convinced by NEST."

*Compact building and energy efficiency are key topics all over Switzerland. What strategy is the Canton of Zurich pursuing here?*

As regards energy efficiency, we primarily rely on technical progress, the further education of experts and keeping the public informed. Evidently, our strategy is a success as the renovation rate is above the national average. And we're also on target for the reduction of CO2 emissions.

*NEST offers efficient housing units with a low space requirement. How does the project help you to achieve your strategic targets?*  
NEST is a great opportunity for research. As you know, you can't tell research what goals it should achieve. But you can support it financially, which we do and are confident it yields good products that in turn will accommodate our goals. Therefore, we promote NEST out of conviction, and it also fits in with our spatial development strategy, which sends out strong signals as regards densification. What's more, the project is a true lighthouse. It isn't just about theory; the modules are also inhabited. For me, this means that anyone who wants to research something new in this building also has to live with it. That's very direct, immediate access.

*Has research been too far removed from practice until now?*  
No, not at all. But with NEST, you follow a different path. Anyone who wants to try out something experiences it first-hand. Research doesn't get much more empirical than that.

*What other insights do you personally expect from NEST?*  
The project should provide stimuli for technical progress – both for energy efficiency and spatial densification. But I'd like to stress that, as a canton, we provide start-up funding. We don't want to intervene directly in the market, but rather take on more of a mentor role. This enables us to boost the economy's innovative strength and help prepare new technologies for the market.

*The City of Zurich and its agglomeration rank among the most urban areas of Switzerland. How rapidly will we see innovations here that hark back to NEST?*

NEST should reduce the development time for innovations. I invite entrepreneurs and industries to seize these opportunities, too. This will enable new technologies to reach the practical application stage sooner. If industry continues to be so involved, I'm confident that the first innovations based on NEST will already be on the market in a few years' time.

*The Canton of Zurich boasts a unique concentration of universities and research facilities. How important is NEST as an ambassador for this expertise?*

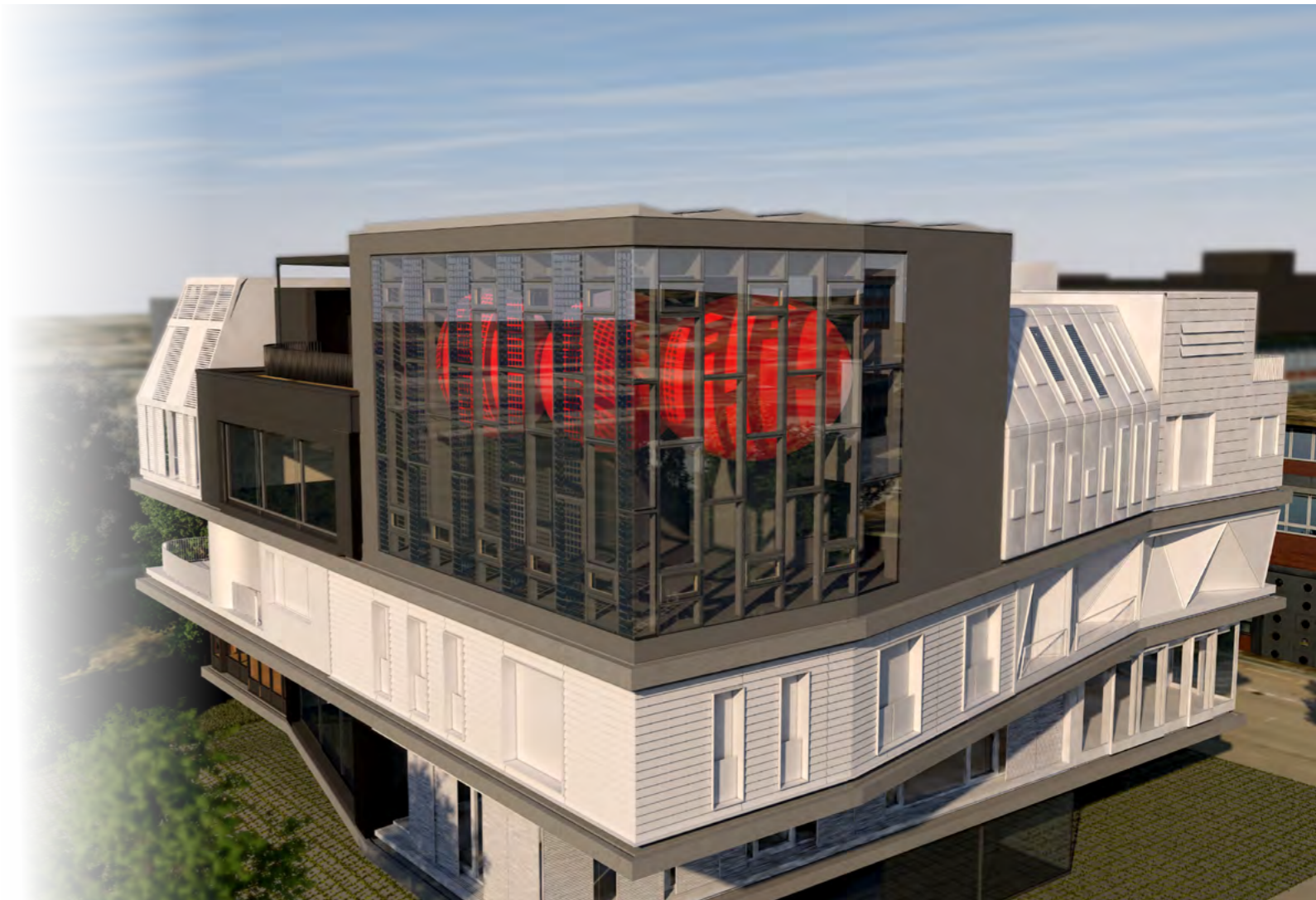
NEST is another brick for Zurich as a research and development hub. Like the numerous institutions of higher education in our canton, it too should serve the entire population. NEST is in a prime location if you think of the forthcoming Innovation Park in Dübendorf. This provides good stability as the closer together people from research are, the better the results will be. I've learnt that the most important place in a research institution is the coffee machine. People meet there and bounce ideas off each other. We're absolutely convinced by NEST; otherwise, we wouldn't have invested a single franc. And I'm personally behind it 100 percent.

INTERVIEW: Michael Staub

## Solar quality of life

A fitness and wellness center is currently being constructed at NEST. Not only is it particularly energy-efficient compared to conventional facilities, it also supplies its own power.

TEXT: Amanda Arroyo / PICTURES: Empa



The unit Solar Fitness and Wellness will be ready on the northeastern side of NEST at the end of 2016.

A short bike ride through the streets of Hong Kong with a colleague during lunchbreak. This might sound like a business trip, but it isn't. Instead, it is a vision for the staff at Empa and Eawag: slap-bang in the middle of the Dübendorf campus, a unique fitness center is currently under construction with support from the building services association suissetec and designed by well-known solar architect Peter Dransfeld. It is well worth pedaling away on the high-tech machines. Apart from a special motivation program, which enables you for example to explore various cities virtually or work off a special reward and the health benefit, you actually generate power, too – energy that can be put to good use in the wellness oasis.

“When cycling, I produce roughly the same amount of electricity as one square meter of solar cells,” says Mark Zimmermann, Innovation Manager at Empa's fitness and wellness unit. His goal is to satisfy society's needs in a sustainable way. Sauna landscapes are particularly monumental power guzzlers. A conventional fitness center with two saunas and a steam bath consumes about 120,000 kWh electricity per year. “That's a lot,” says Zimmermann. “There's plenty of energy-saving potential here.” The energy-optimized wellness center at NEST, however, requires only 17 percent of that, which are produced by the building itself thanks to photovoltaics, solar thermal collectors – and the sweat and tears of the fitness-center goers.

#### A heat pump at the heart

Zimmermann gladly reveals how he can save so much energy: Firstly, the steam room and saunas are only heated up when they are actually used. Thanks to a booking system, employees can reserve the Finnish sauna, the bio-sauna or the steam room, which will then be ready for their slot. Secondly, the unit boasts an ingenious system to prevent heat and moisture losses. The showers have a heat recovery system that uses the warm waste water for warming up the cold water. The same goes for the saunas and the steam room, where heat and moisture is recovered from the used air.

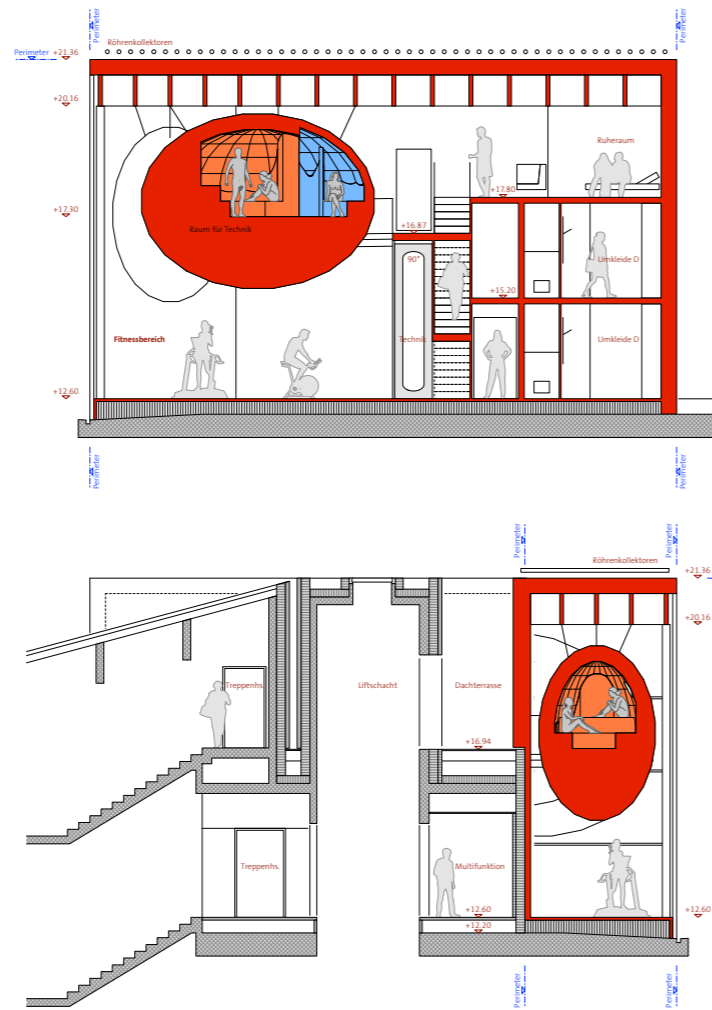
However, the largest energy savings are achieved with the central, so-called high-temperature CO2 heat pump. This centerpi-

First the toil, then the reward: the fitness equipment on the lower floor. The reward hangs in plain view on the ceiling in the form of the sauna landscape.

ece provides the heat of the entire unit. Using solar power, it can heat up carbon dioxide to 130 degrees. The hot CO2 flows to various water tanks and heats them to different temperatures. “This allows to use the temperature stepwise,” says Zimmermann. It is used to heat the storage tank of the Finnish sauna to 120 degrees, of the steam room and bio sauna to 90 degrees. In addition, it warms up the shower water to 50 degrees and the heating water to 30 degrees. This concept allows an optimum use of the heat, without any unnecessary losses whatsoever.

#### Air-conditioning for free

Even though the fitness and wellness unit doesn't need any fossil energy sources and is brimming with technical features, the fitness-center-goers don't have to forfeit any creature comforts, either. The efficient heat pump systems allows in summer also for free cooling of the fitness area. Also a very special spatial concept was designed to make the guest feel at home. Although the fitness and wellness sections are housed in the same room, the three elliptical wellness



units “float” way above the heads of the people working out.

As a result, the unit will not only boost the physical and mental wellbeing of the staff, it will also move research a step further. Consequently, all will be revealed as to whether the latest developments from the lab will also prove successful in practice. //

“In the past, everyone did their own thing. You can't afford this anymore.”



Daniel Huser, the Central President of the building services association Suissetec, regards NEST as an innovation engine.

“Researchers and workmen collaborate more closely than ever before.”

*Switzerland's building stock still consumes too much energy. What can building services do to help?*

State-of-the-art technology is used in new buildings, which usually brings extremely high efficiency gains. Intelligent control systems and operating optimizations can also make major savings – using this method, I can reach both old and new buildings. Another point is the production of sustainable energy. Photovoltaic or solar thermal systems come into consideration for virtually any building.

*Your industry already enjoys a sound reputation today and the technical level is very high. What additional innovations will NEST bring for building services?*

It demands solutions that have never been asked for before. The backbone, into which the individual modules can be slotted, was very challenging from a building services perspective. Water and sewage pipes, for instance, are usually supposed to be as solid and permanent as possible. It's a completely new mindset to effectively be able to plug this kind of piping in and out. And normally we install piping once and the building is finished. At NEST, this all needs to be far more flexible.

*Building technicians aren't just involved in the backbone. Your association supports the NEST module “Solar Fitness and Wellness”. How did that come about?*

Suissetec will be 125 years old this year. Rather than just mark it with a celebration and a commemorative publication, we also wanted to do something for the entire industry. In the wellness module, we use a special, newly developed CO2 heat pump, for instance. It isn't even on the market yet, it's so new. And we can also test how effectively the wellness module's technology can be combined with the layout. The sauna wouldn't be heated in advance, for instance, but only when users actually come.

*The innovation cycles in the building industry are around eight to ten years. How can NEST help reduce these periods?*

As the initiator, Empa is very strong in research and development. It's very close to new technologies. For our part, we building technicians are strong in realization. At NEST, people now sit around the table who would otherwise have very little contact with each other. It's a congregation of research, industry and skilled crafts and trades, and there's a direct exchange. This will automatically shorten the cycles because nobody is doing anything purely for themselves. As an association, we see ourselves a bit like bridge-builders here.

*So is NEST an “enabler” for the building services industry because the communication is becoming more intensive?*

I originally qualified as a sanitary planner and tinsmith. Back then, you drew your plans, but never really spoke to the heating engineer or electrician. Everyone did his or her thing, on both the drawing board and the building site. You can't afford this blinkered thinking these days. Today, you have to plan together from the outset because the projects are far more complex. Apart from heating, air conditioning and sanitation, there is also the entire building automation now, including electrical planning. At NEST, you can test how this collaboration works under ideal conditions. And one key aspect is the permanent access to the project. Normally, we fire up the systems in a building, then the doors are closed. With NEST, we can ask the users questions and record the latest findings. We're on board throughout the entire project. //