

Report

To:
Participants

Lucerne, 23 June 2023

Business
Institute of Tourism and Mobility
ITM

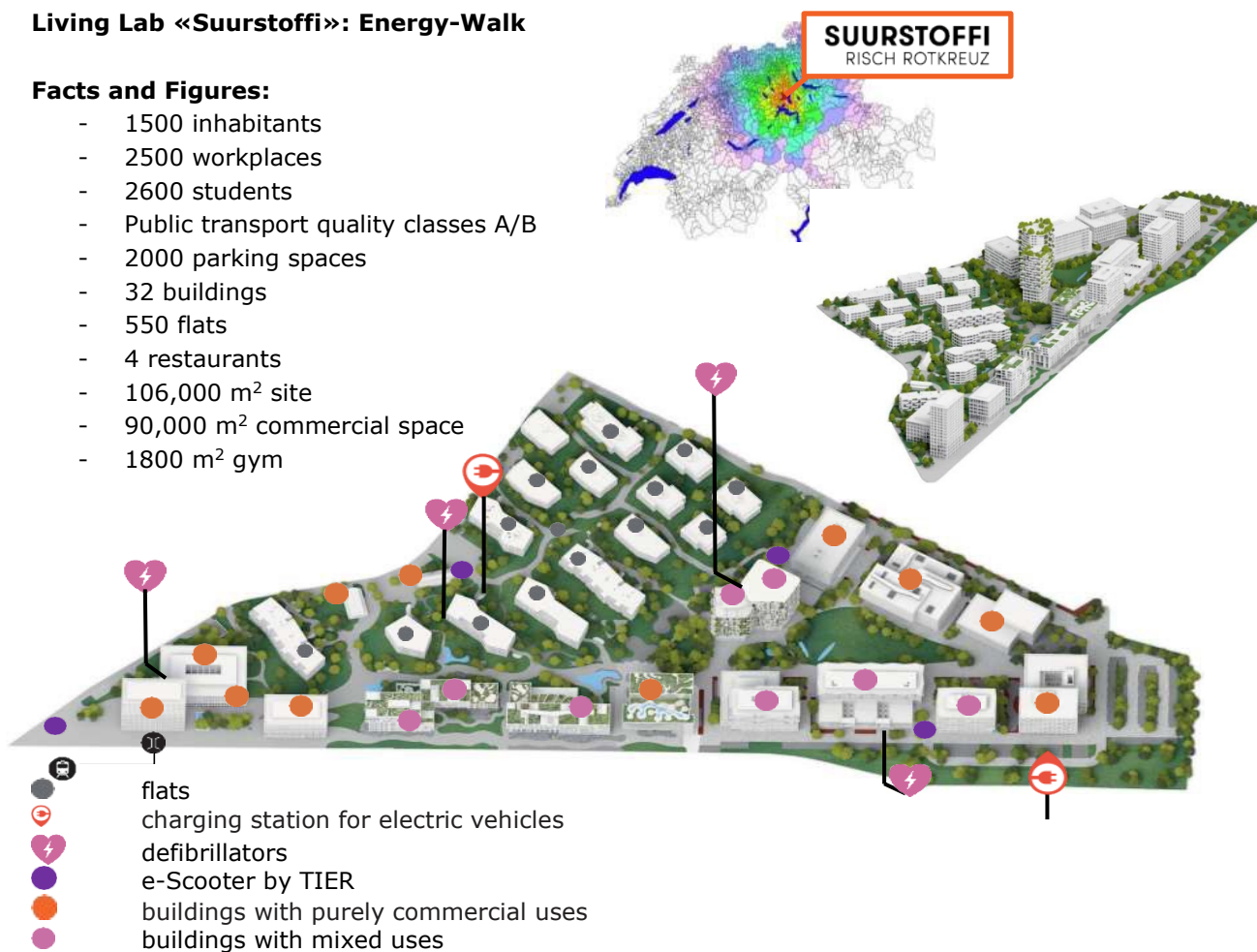
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Living Lab «Suurstoffi»: Energy-Walk

Facts and Figures:

- 1500 inhabitants
- 2500 workplaces
- 2600 students
- Public transport quality classes A/B
- 2000 parking spaces
- 32 buildings
- 550 flats
- 4 restaurants
- 106,000 m² site
- 90,000 m² commercial space
- 1800 m² gym



Energy-Walk «Suurstoffi»



Energy-Walk 1: ● ● ● ● ● ● ●

Energy-Walk 2: ● ● ● ● ● ● ●

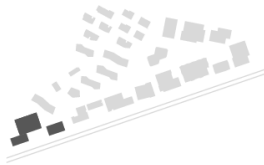
History ●

Suurstoffi 7/11

The "Suurstoffi" site is a **residential and working area** in the municipality of Risch-Rotkreuz, near the town of Rotkreuz in the canton of Zug. The municipality is located between the cities of Zurich and Lucerne. Suurstoffi's history goes back to the beginning of the last century, having started not in Rotkreuz, but in Lucerne. It was in 1909, that the company "**Sauerstoff- & Wasserstoff-Werk Luzern AG**" (swwl) was founded. The company constructed the first air-separation plant in Switzerland. Four years later, the company built the first acetylene dissous plant in Horw, where the hydrogen plant produced gases and sold the apparatus needed to use the gas. With the advent of the use of pure oxygen in welding, the company flourished. In 1923, however, an explosion at the acetylene dissous plant put an end to the business in Horw. For logistical reasons, Wasserstoff-Werk Luzern AG decided to relocate to Rotkreuz. In 1926 the company built an exposed **brick building on the site** to produce mainly acetyl, not oxygen. The two historic brick buildings served Sauerstoff- & Wasserstoff-Werk Luzern AG as industrial production facilities. The name 'Suurstoffi' quickly became established in the vernacular, and the site still bears this name today. The company name was **concise, simple and conveyed a certain sympathy**. At almost the same time the company opened another plant in Winterthur, which was greatly expanded in 1957, and from then on processed the waste product from the production. The strengthening of the Winterthur site and the construction of another plant in Kriens-Obernau in the 1960s led to the closure and sale. After that, Suurstoffi remained quiet until the 1980s, when the Buochser company, Tyro AG, used the premises to **produce glue for a few years**. The factory lay idle until 2010, when Zug Estates AG took over the site and launched the **Suurstoffi large-scale construction project**. Since 2010, the Suurstoffi site in Risch Rotkreuz has been an integrated, car-free area.

Suurstoffi offers space for around 1,500 residents, 2,000 students and over 2,500 employees. The former industrial site is a mixed-use, climate-neutral area for living, working and leisure activities. It offers a choice of different types of housing and workplaces, green spaces with water elements adventure playgrounds. No expense has been spared in preserving its historical features. The striking building from the early industrial period has been extensively renovated. It provides an architectural contrast to the surrounding modern architecture and, with its solid form, is a symbol of the ephemeral history and name of the area. Today, the buildings serve as a kindergarten and accommodate the International School's primary class.

The HSLU and Facts ●



Suurstoffi 1/2/4/6

According to the real estate company, Zug Estates AG, the first phase with 228 rental flats and approximately 13,000 m² of commercial space was completed in summer 2013. At the beginning, the site accommodated about 400 residents, about 400 workers and about 80 pre-school children. In the second development phase, which was completed in 2015 and involved an investment of approximately 100 million Swiss francs, an office building and a residential area with 156 units were built. The site has a triangular structure with a transverse axis. Access to the underground parking spaces for cars is via roads at **the edge of the site**. Three buildings mark the entrance to the Suurstoffi **site from the railway station**. The buildings of the university are distinguished by their hybrid wooden construction. With its ecological construction, consisting of masonry and timber, the building of the Lucerne School of Computer Science is the **largest wooden structure in central Switzerland**. The high-rise building houses offices on the upper floors and a canteen on the ground floor. A special feature of the building is that it is one metre wider at the top. A special highlight of the building's interior is the spiral staircase. There is an e-scooter park by the level crossing. The scooters are often used by students to get a quick lunch in the village. In the area of the station square, **a rotating lime tree** has been planted in a tub to create an artificial representation of nature. The idea behind this is to give visitors a sense of gradual change. The tree was deliberately created with an asymmetrical structure in order to make the sense of movement tangible. Its rotation takes place in exchange with the sun's energy and is perceived as a kind of magical machine by the visitors, especially students sitting on the curved benches nearby.

Energy

On the site, solar use, several dynamic earth storage tanks and an anergy network form the basis for achieving the "zero-zero" goal. This means that the Suurstoffi site, which covers over 100,000 square metres, is committed to **CO₂ neutrality**. The site's zero-zero vision aims to reduce CO₂ emissions on the site to zero and not to use externally sourced energy. An **anergy network is a low-temperature network that uses waste heat**. It connects each building to the ground storage tanks and uses ground probes that are connected to each other via a ring main. In the winter months, heat is extracted from the ground storage tank with the help of a heat pump, while in the summer months the cooled ground is used for the direct cooling of facilities and buildings. In order to achieve a annual energy balance, outside air is used in the summer half-year to heat the ground storage tank when the outside air temperature is three degrees higher than the ground temperature. In the transitional period, the energy grid alone can provide the necessary heat with a recooling. The electricity needed for this is generated by **solar cells** on the site. The energy for hot water, heating and cooling in summer is supplied by large geothermal probe fields under the site. Each building is connected to them via a **heating network**.

The goal is complete self-sufficiency in primary energy for heating and water treatment. The concept of a decentralized energy supply was chosen to exploit synergies between the buildings and to increase efficiency. The site is considered a pioneer in energy research and has influenced the development of site concepts and multi-energy hub systems. It falls below the guideline values for the operation of new buildings according to the 2000-Watt Society. The site's infrastructure is planned to be open to technology and allows for **flexible adaptation to future developments**. It has an intelligent power grid, charging stations for electric cars and a thermal infrastructure that enables energy to be exchanged with other sites. A trend towards a 24-hour area is emerging, which enables users to use services outside business and office hours.

Urban working and living ●



Suurstoffi 8/10/12/14/16/18/20

In Suurstoffi, housing, services, commerce and education come together in one neighbourhood. This mixture requires different forms of outdoor space design with individual uses. The buildings, a mixture of flats and offices, have a wide variety of room sizes, materials and colours. The buildings feature different residential typologies and structures that are suitable for both services and retail. They contain **flats, maisonettes, stacked single-family houses, large shared flats and student flats**. The flats are cut differently and offer variety, so that it is not possible to tell from the outside how large a flat is behind the façade. The design of the buildings was intended to connect west and east conveniently and create good visibility on the garden. The buildings are broken up by **green open spaces**, which are intended to create a relationship with nature and offer beautiful views.

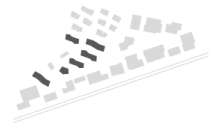
On the entire Suurstoffi site, great attention is paid not only to the high-quality architecture but also to the outdoor spaces. The garden architecture is therefore a defining element for the entire site. The so-called "**residential garden**" placed among the residential buildings in the west and north of the site is a quiet horticultural area criss-crossed by paths for walking. The area of the west entrance is different. Use of Suurstoffi's south side and east flank is more heterogeneous. Here, residential, commercial and campus uses intermingle. The "**city garden**" created in these zones takes this into account in consisting of a green centre with a playground and sports and recreation areas, following the example of English squares (public green spaces in cities). These open urban spaces are characterized by a lot of space for movement along the buildings. The lifeline and connecting element between the residential and urban gardens, as well as the east and west of the site, is the **Boulevard, which serves as a leisurely traffic axis for cyclists and pedestrians**, as well as being a playground for children and a zone for outdoor dining. "Climbing Forest", "Primeval Forest Relic" and "Meadow Lake" are reminiscent of real landscape elements such as the prehistoric shoreline of Lake Zug or the fens. More than a third of the meadows and borders between the residential buildings are planted with native plants. Hornbeam, ash and maple, as well as hazelnut, cultivated apples and walnut trees, offer green islands that differ in their density, sense of colour and height.

Family living ●



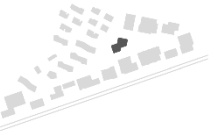
Suurstoffi 19/21/27/29

The design of the buildings, which combines a white sheet-metal façade with wooden elements, is intended to be reminiscent of pavilion buildings in parks and underlines the garden theme. **Wood as a building material** also plays a central role in these buildings. It is not only sustainable, it also allows rapid construction methods because the speed at which the buildings were to be built was a major challenge for everyone. The wooden elements can be prefabricated at various locations and assembled on site.



Suurstoffi 3/5/9/13/15/17

What is special about these flats is that all ninety of them have different floor plans so as to appeal to as many people as possible. The idea behind this variety of flat types was to appeal to commuters and offer them flats that can hardly be found in the city in this form and quality. The aim was to create a special quality of living that meets the needs and demands of this target group.



Suurstoffi 37

The Aglaya in Rotkreuz is the first and so far the **highest Swiss garden tower**. The residents of the seventy-metre building enjoy the unique pleasure of a true garden feeling. It is a private green space, whose maintenance is billed via the service charge. Gardeners take care to maintain the green façade. The high-rise consists of two parts and is accentuated by the golden pipes of the irrigation system. **Rainwater is collected** and distributed to the plant pots via a cascade irrigation system. The plants are watered automatically on a prompt from a sensor. The green façade regulates the microclimate by humidifying the air and providing shade. This integration of nature into a high-rise building, in combination with the efficient use of resources, makes the garden high-rise a beacon project for settlement concepts.

Suurstoffi App for all residents, employers and employees

The Suurstoffi app promotes communal living and communication between the tenants on the site. It offers a **noticeboard for exchange, a chat function** and **direct connection to the administration**. In addition, various household services can be booked via Living Services. The administration receives messages via the app, which are then converted into tickets and **simplify communication between both parties**. Partner companies are also connected to the message system, which enables the efficient processing of repair and maintenance orders. By using the Suurstoffi app, **companies can present themselves** and introduce their offers. Although the app is available to all tenants, it is mainly used by private tenants.

Waste disposal

At Suurstoffi, the emphasis is on modern and environmentally friendly waste disposal. Four underground containers (quadromats) have been installed in the area, in which the waste is compressed and brought to the surface by a lift for emptying. The quadromats are **strategically placed** so that users can reach a collection point on foot within a few minutes. The heart of the system is a powerful compactor that **compacts the waste**. This means that a quadromat with a volume of up to twenty cubic metres of compacted filling can replace 80 to 100 small containers, resulting in fewer trips. A **venting system** with an integrated fan prevents odours. Residents dispose of their waste through a drop shaft that is opened with a disposal card.

Mobility ●

The area is well connected to the transport infrastructure, whether via the **motorway**, which connects it with Lucerne, Zurich or Chiasso, or via Rotkreuz **railway station**. There are a variety of different businesses and services in Rotkreuz. Originally, the area consisted mainly of **flats**. Over time, however, more and more **businesses** were added, which also required parking spaces. The legally permitted number of 1950 parking spaces in the Suurstoffi proved insufficient. Around 2500 parking spaces were needed. There was a danger of running out of space in the underground garages even before the site was completed. To avoid bottlenecks, a **pool parking system** for sharing parking spaces was introduced to accommodate more cars in the underground garages. While the flat tenants are away during the day, those who work at Suurstoffi can use the same parking spaces. Although this raised concerns at the beginning, the feedback was positive. Participants recognised the advantage of the system, as they pay less for a pooled space than if they used it solely themselves. Since autumn 2020, all Suurstoffi tenants have also been able to rent **private charging stations for electric vehicles** in the underground car park. There is a need for this among tenants, and e-mobility helps to make everyday mobility CO₂-free. Public charging stations are located at Suurstoffi 11 and Suurstoffi 22.

Base-Line Study in the LivingLab

While the building standard can be classified as energy-saving, the **traffic situation has been identified as problematic** by the municipality, the companies on site and the property management itself. Although Risch-Rotkreuz offers a variety of uses and infrastructures that are advantageous for a polycentric city in terms of short distances, energy consumption for mobility purposes is comparatively high among the residents of the Suurstoffi area. The reason for this is that the **share of motorized private vehicles in total traffic is high**. In view of the overloaded infrastructure during rush hours and the dwindling supply of parking spaces, mobility-management measures are necessary. The Suurstoffi site in Risch-Rotkreuz in the canton of Zug thus represents a good starting point for a suitable investigation in a Living Lab in order to initiate energy reductions in the area of car mobility. From October to November 2022, a survey of Suurstoffi residents was conducted in the areas of living, working and mobility. This representative survey was used to examine existing attitudes to mobility and other mobility-relevant characteristics on the site. The survey serves as a "**base-line study**" for several key issues to be examined in the course of the project in terms of sustainable consumption styles. The study will provide key data to describe the residents in terms of mobility, working lives (home office) and household structure. These benchmarks can serve as a basis for comparison after the introduction of interventions. The results also form a basis for the development of mobility-management measures.

Key points arising out of the survey are as follows:

- 50% are woman
- The average age is 41 years
- 38% of respondents live in a couple household, 32% in a family household, 20% in a single household and 10% in a shared apartment (an average of 2.4 persons per household)
- The average gross income per household is 10,149 Swiss Francs
- The employment rate is 84%, with 75% working full-time
- 23% of households are car-free, 53% have one car, and 24% have two or more cars (an average of 1.0 cars per household)
- 73% of households have at least one bicycle (an average of 2.0 bicycles per household)
- Season ticket: 86% of the respondents have one (71% a half-price travelcard)

Suurstoffi residents are above the Swiss average in terms of **car ownership at 84%** (average: 73%) and in the ownership of a **public transport season ticket at 93%** (average: 72%). However, locations with sufficient parking spaces, as in Suurstoffi, and a high use of private motorized transport for commuting to work represent **difficult conditions** for testing and promoting multimodality.

Own compilation, extension and translation, based on the following documents: Site presentation Zug Estates AG, book "Suurstoffi - Eine Quartierentwicklung in Rotkreuz", www.suurstoffi.ch