# Swiss Living Challenge

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# Press Kit

U.S. DEPARTMENT OF ENERGY SOLAR DECATHLON

U.S. DEPARTMENT OF ENERGY

ENERGETICS

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HEIA-FR HTA-FR

HEAD Genève

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# Solar Decathlon

Organized by the US Department of Energy, the Solar Decathlon competition is an academic competition structured into 10 contests that challenge student teams to design and build full-scale homes that are energy-efficient and exclusively powered by solar energy. The winning team is the one that successfully combines design with optimal energy and water management strategies, while simultaneously maintaining the innovative character and sales potential of the house.

The Solar Decathlon is open to the public from October 5-9 and October 12-15, 2017 and is located near the 61st & Peña station of the Denver International Airport train line, in Colorado, the event will also include a sustainability exhibit, educational workshops for professionals and users as well as events for college students.

Created in Washington D.C. in 2002, the Solar Decathlon has been held in Africa, China, Europe, Latin America and the Middle East and draws over 200 teams and 35,000 academic participants from around the world. The Solar Decathlon is a unique opportunity for students to gain practical experience and training as future advocates of green energy. At the same time, the competition allows students to promote renewable energy and raise visitor awareness of the importance of energy efficiency.

Selected for the 2017 competition, the Swiss team will fly to Denver, Colorado, where the solar prototype will be assembled and presented. The house is called NeighborHub to reflect the idea of it serving as the heart of the neighborhood, drawing neighbors together and allowing them to find ways to consume less and better.

# Solar Decathlon

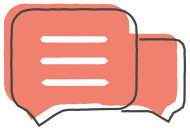


©Thomas Kelsey/U.S. Department of Energy Solar Decathlon

**Architecture**
A jury of architects will evaluate the architectural concept and design approach, architectural implementation, innovation and documentation required for the project.

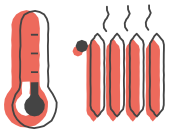
**Market Potential**
Each team is required to design a primary residence for year-round occupancy for a specific target client of its choosing. A jury of professionals from the homebuilding industry will evaluate the overall attractiveness of the design to the target client and the market impact potential.

**Engineering**
A jury of engineers will evaluate the engineering design and implementation of each team's house based on the approach, design, efficiency and performance.

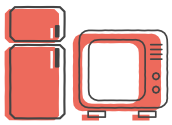


**Communication**
A jury of communication professionals will evaluate each team's communication strategy, implementation and on-site materials used to inform and engage local communities in the respective team's region of origin at the competition venue and other locations.

**Innovation**
This contest has been introduced for the first time in 2017. A jury of industry professionals will evaluate each team's research, integration of sustainability, innovative solutions for specific target markets.

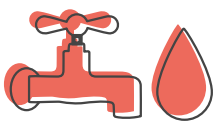


**Health and Comfort**
Teams are challenged to build a house that minimizes the flow of cooled air in summer or heated air in winter to the outdoors, operate heating and cooling systems that keep temperature and humidity steady, all while maintaining healthy indoor air quality.

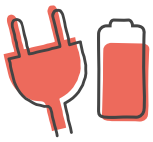


**Appliances**
Houses must be designed in such a way as to mimic the appliance use of an average U.S. home.

**Home Life**
Teams are required to engage in a variety of electricity-using activities just like real homeowners. They cook and share meals with friends and neighbors, watch television, use their computers, and host games nights.



**Water Management**
This contest is another new one introduced in 2017. A jury of industry professionals will evaluate each team's approach to water conservation, use, and reuse as well as the impact on landscaping.



**Energy**
Evaluation of this contest is based on whether each team manages to produce at least as much energy as its house needs, thus achieving a net energy consumption of zero during the competition as determined by each team's energy production and a theoretical value to a utility of the energy they both contribute to and take from the Solar Decathlon electricity grid.

# 10 Contests

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# Swiss Team

# Swiss Team

The Swiss team is comprised of students from the Swiss Federal Institute of Technology in Lausanne (EPFL), the School of Engineering and Architecture of Fribourg (HEIA-FR), the Geneva School of Art and Design (HEAD) and the University of Fribourg (UNIFR).

These four schools have teamed up in pursuit of experimental pedagogical objectives to create this unique learning context. The main focus is on practical work carried out by a multidisciplinary team (engineering, energy, urban planning, environmental assessments, IT equipment, communication, graphic design, fundraising, budget and project management).

At the Smart Living Lab where the NeighborHub was built, EPFL, HEIA-FR and UNIFR combine their skills to design an energy-efficient house and demonstrate Switzerland's ability to address sustainable lifestyle issues. For its part, the HEAD, explores different design options.

ÉCOLE POLYTECHNIQUE FÉDÉRALE DE LAUSANNE

The Swiss Federal Institute of Technology Lausanne is the most cosmopolitan institute of its kind in Europe, drawing students from 120 different countries. It is ranked among the world's top universities.

HEIA-FR HTA-FR

Founded in 1896, the School is at the forefront of technology. Study programs prepare students to work as civil engineers and architects. HEIA-FR also maintains direct ties with companies in this sector.

HEAD Genève

The Geneva School of Art and Design follows two guiding principles: know-how and critical thinking. It rejects all forms of dogmatism to encourage a critical and creative perception of the world.

UNI FR

Founded in 1889, the University of Fribourg is Switzerland's only bilingual university. The human being is main focus of research activities and scientific study programs.

## Overall concept

The Solar Decathlon competition uses solar power as a means of promoting renewable energy sources. Teams participating in the competition must create a house that is entirely powered by solar energy.
The Swiss Living Challenge project is intended to encourage the Swiss population to reduce its energy consumption and preserve the world's natural resources. How can this be achieved? In order to truly reduce our energy consumption, we must change our daily habits, from the way we move around to the types of food we eat.

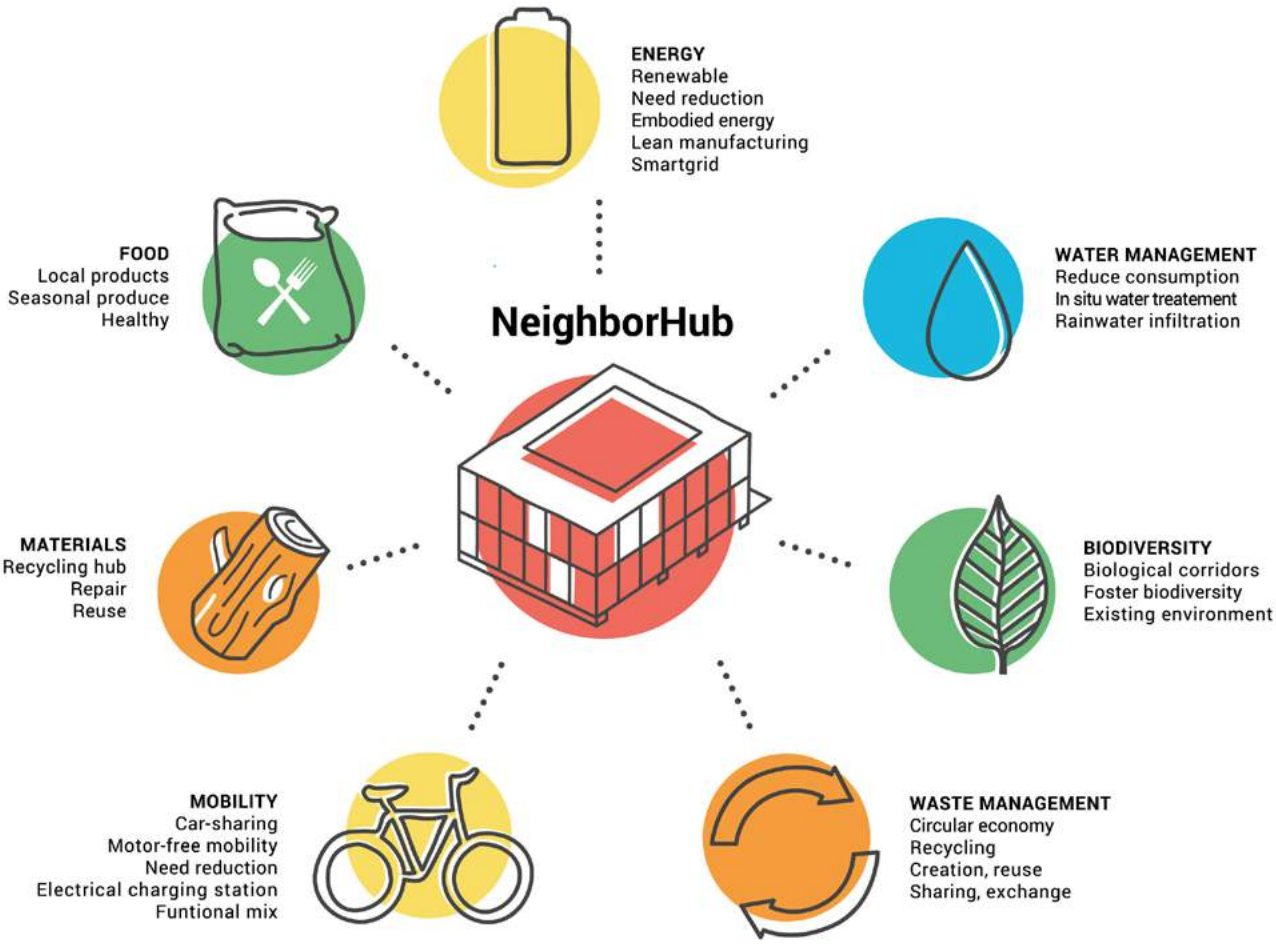
The Swiss Living Challenge project proposes alternatives at various levels. It encourages inhabitants to adopt sustainable habits with the help of technical equipment and structures.

## Social impact

In order to reduce our consumption, we must act together. The NeighborHub is intended as a place where people meet up and interact with each other, where activities and conferences take place and where people spend time with one another. The house includes tools and alternatives targeting seven areas of action: energy, water management, waste management, mobility, food, materials and biodiversity.

**By changing today's habits, we can change tomorrow's world.**

# Swiss Living Challenge



# NeighborHub

# NeighborHub

## ENERGY

Electrical power is supplied by twenty-nine photovoltaic solar panels, which are arranged only on the facade. Two batteries enable management of production and consumption flows, thereby ensuring that the amount of electricity supplied matches the needs of inhabitants.

## BIODIVERSITY

The green roof and phytopurification pond serve as a habitat for fauna and flora. In addition, vertical greenhouses are built into the door structure to accommodate local plant shoots.

## MOBILITY

Mobility is one of the main sources of energy consumption. A change in our habits, combined with the availability of shared electric cars, bicycles or even scooters, would greatly reduce our consumption.

## MATERIALS

Our health and the environment depend on the types of materials we surround ourselves with. Some materials emit harmful particles that affect air quality. The entire structure of the NeighborHub is made of wood. In addition, 75% of the cooking surfaces in the kitchen are composed of recycled materials such as porcelain, ceramics, glass or mirrors.

## WATER MANAGEMENT

The Swiss Living Challenge does not focus merely on reducing water consumption. Instead, it makes a crucial distinction between different qualities of water that enter and leave the house. Each type of water is assigned a specific use and value. For example, the rainwater harvested from the roof is used to wash clothes in the washing machine.

## WASTE MANAGEMENT

In the area of waste management, the aim is first and foremost to reduce volumes of waste. This involves choices such as shopping at the local grocery shop and buying vegetables without packaging. Since zero waste is not so easy to achieve, product reuse and recycling remain important ways to conserve resources.

## FOOD

In the NeighborHub, all of the inhabitants use a shared kitchen. They can organize courses to share cooking tips and develop sustainable consumption habits together.
There are also gardens around the NeighborHub where gardening classes can be given.

# What sets the Swiss team's project apart from the competition...

## A house open to the world

The NeighborHub is more than a solar home designed for family living, the predominant scenario featured in the Solar Decathlon competition. Instead, the bold concept defended by the Swiss team is that of a modular house for neighborhood living. This house is intended to eventually become an eco-responsible and unifying place bringing together citizens of surrounding areas, encouraging them to work together for a more sustainable future. In addition, seven themes (energy, water management, biodiversity, waste management, mobility, materials and food) were chosen by students and highlighted thanks to a colorful design, catchy phrases and a dash of humor. The Swiss team is the only one to have developed this neighborhood house scenario built around these seven themes. It is also the only team that takes this concept so far. The NeighborHub also features flexible architecture, movable or foldable furniture, storage spaces containing tools shared by all and practical interior design. All of these aspects lend themselves to a wide range of different activities: repair coffee, urban vegetable gardens, yoga or eco-responsible cooking courses. All doors are open.

## Every raindrop counts

Water management in the NeighborHub is intended to reduce consumption, but also to restore nutrient cycles as a means of limiting the impact of wastewater on the environment. Thus, different types of water in the house are separated according to their specific characteristics. This allows different types of water to be used and treated differently in a way that is respectful of the environment. As such, the NeighborHub uses dry toilets, an independent waterless system that uses straw and worms to transform organic waste into compost. A phyto-purification pond comprised of reeds and gravel is used to naturally treat wastewater coming from the washing machine, shower and the sinks. This closed water cycle is one of the great strengths of the NeighborHub over its competitors.

## Solar energy collected exclusively from the facade

The NeighborHub has twenty-nine solar panels, all placed on the facade. With this system, the team wishes to demonstrate the current feasibility of solar cells placed exclusively on walls. This approach produces more than enough electricity, even with the risk of shading in urban settings. Power optimizers in each solar panel are used in an original way to continuously monitor and adjust the performance of photovoltaic cells. The solar panels laid to the east and west allow electricity to be produced earlier in the morning and later in the evening, which corresponds to peaks in electricity consumption. As a result, electricity production is smoother than with solar panels facing exclusively towards the south.

The doors of the outer skin open upwards, which provides ideal ventilation during the summer and an optimal angle for the built-in solar panels to produce energy. This bold strategy of only producing energy on the facade is another feature that sets the Swiss team apart from other teams.

## A flourishing NeighborHub

In addition to the 10 contests already imposed by the competition, the Swiss team also seeks to preserve biodiversity. The roof is entirely free of solar panels, which allows it to be used as a green roof. The various plants on the roof provide nectar for honeybees and the phyto-purification pond on the ground serves as a habitat for fauna and flora. In addition, vertical greenhouses built into the facades are used to grow shoots of local plants. Named after their inventor, Graetzel cells are a budding Swiss technology from EPFL. These solar cells have been installed in these vertical greenhouses to demonstrate that solar energy can also be produced by a process inspired by photosynthesis. In particular, these cells offer the advantage of allowing light to pass through and of being colored. The orange-red hue was chosen because it favors the growth of plants placed behind the Graetzel panels.

# The Swiss Living Challenge adventure in figures!

The Swiss Living Challenge project covers a period **3 years** (**2015-2016-2017**).

To date, over **250 students** have helped to design and build the NeighborHub, the current name of their solar home.

**4 higher education institutions** have joined forces to form the most interdisciplinary team possible: EPFL, HEIA-FR, HEAD and UNIFR.

**150 supervisors** provide essential advice and experience to students.

Over **50 semester projects** were carried out by students as part of the Swiss Living Challenge.

Students devoted over **7,500 hours** to building the NeighborHub.

The project is backed by **45** public and private sector **partners**, who have provided both financial support and invaluable know-how.

**44 students** will fly to Denver, Colorado (USA) to represent Switzerland at the Solar Decathlon 2017 competition.

The Swiss team's NeighborHub will be transported **6,200 miles** to reach Colorado to take part in the Solar Decathlon competition.

The Solar Decathlon competition will take place from October 5-15, 2017. It includes **10 contests**: Architecture, Market potential, Engineering, Communications, Innovation, Water, Health and Comfort, Appliances, Home life, and Energy.

The NeighborHub addresses **7 driving themes** that are crucial for the environment: energy, water management, waste management, mobility, food, materials and biodiversity,

**12 teams** are competing with one another. Only two of these teams are not American, but rather from the Netherlands and Switzerland.

The Swiss Living Challenge has a three-year budget of roughly **$4,3 million** , which includes project design and coordination, construction and competition constraints, including transportation of the NeighborHub to and from the USA.

The NeighborHub prototype has a budgeted cost between **$820,000** and **$920,000** (the actual cost will be clearer once the competition is over).

Under typical sunlight conditions in the Canton of Fribourg, the NeighborHub produces **6,250 kWh** per year , an average production of **15 kWh** per day, which is sufficient to meet consumption needs.

The NeighborHub consists of **38 active panels**:
**29 photovoltaic solar panels**
**6 Graetzel panels**
**3 homemade solar thermal panels**

The outer façade, the skin, consists of **128 panels** :
**67 transparent polycarbonate panels**
**5 opal polycarbonate panels**
**18 acrylic panels**

How much does the NeighborHub weigh?
NeighborHub weighs **30.5 US short tons** with a ballast weight of **28.5 US short tons**, which brings the total to about **59 US short tons**. Each doors of the facade weighs about **400 lbs.**

What is the surface area of the NeighborHub?
The surface area of the Core is **622 sq. feet.** and the surface area of the skin **958 sq. feet**. This brings the total surface area of the NeighborHub to **1,580 sq. feet.**

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# One word that students use to describe the project!

**Margaux Peltier** from the EPFL chose the word sharing. In her own words: '**sharing** knowledge and experience! You learn a lot. Sharing between students but also with partners.'

**Florian Meyer**, a graduate of HEIA-FR, could not decide which of the following two words was better: **incredible and difficult**. 'Incredible that the interdisciplinary team managed to complete the project from start to finish. Difficult too, because there were many constraints and we always had to find the best possible compromise,' he explains.

**Laure Christinat** from HEAD chose the word **exchange**, which she equates with 'an exchange of knowledge, mutual assistance and communication. This project has been an enormous learning experience. Personally, I had never worked with so many people from so many different backgrounds.'

**Salma Derouiche** from the EPFL describes the project as a **challenge**, 'because it was really not easy and we often encountered new difficulties that had to be overcome.'

**Asli Sevcan Ozkan** from HEAD chose the word **multitasking**, 'because we had to consider and be able to handle many different things at once,' she explains.

**Elena Zambelli** from the EPFL expresses his point of view: 'I feel that the word **fellowship** is a good way to describe the experience. However, it was so much more than that because we had to work as part of a team. It was team spirit that brought the project to life.'

**Finn de Thomas Wagner** from UNIFR described the project as **enriching**, 'not only because of the unique learning experience for students but also for our country since we help to address some of the most pressing social and environmental issues.

**Guillaume Gruet** from the EPFL chose the word **venture**: 'this was much more than a student project or a course attended once per week. It required a lot more time and energy than normally devoted to a simple project. Not only that, the project extended over a long period of time and required a great deal of personal commitment. That's why I would describe it as a venture.'

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# Events

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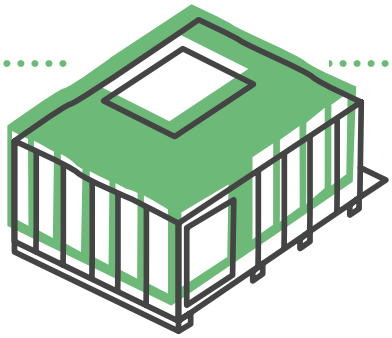
# Events

## United States

| | |
|---|---|
| **October 5-9 and 12-15 2017** | Solar Decathon 2017 competition |
| October 5 | Opening ceremony |
| October 13 | Results Architecture and Water management |
| October 14 | Results Communication and Innovation |
| October 14 | Event celebration |
| October 15 | Results Engineering and Market potential |
| | Closing ceremony |



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# Partners

## Public Sector

Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra

Swiss Confederation

**Swiss Federal Office of Energy SFOE**

ETAT DE FRIBOURG
STAAT FREIBURG
WWW.FR.CH

Ville de Fribourg

smart living lab

## Private Sector

groupe E

LANDOLT 1780 & CIE SA

JPF-DUCRET Constructions bois

REGENT LIGHTING

la Mobilière

SETIMAC

ABB

VELUX

D.E.S. SYSTÈMES DE SÉCURITÉ

SINEF

SOTTAS BUILD

ECAB KGV

la fraîche ferme urbaine modulaire

BCF FKB

urbaplan

hinkEE

polysun

PVSYST

Debrunner Acifer

STUDER

zehnder

Hoval

meige

RHONE

SANITAS TROESCH

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KUEHNE+NAGEL

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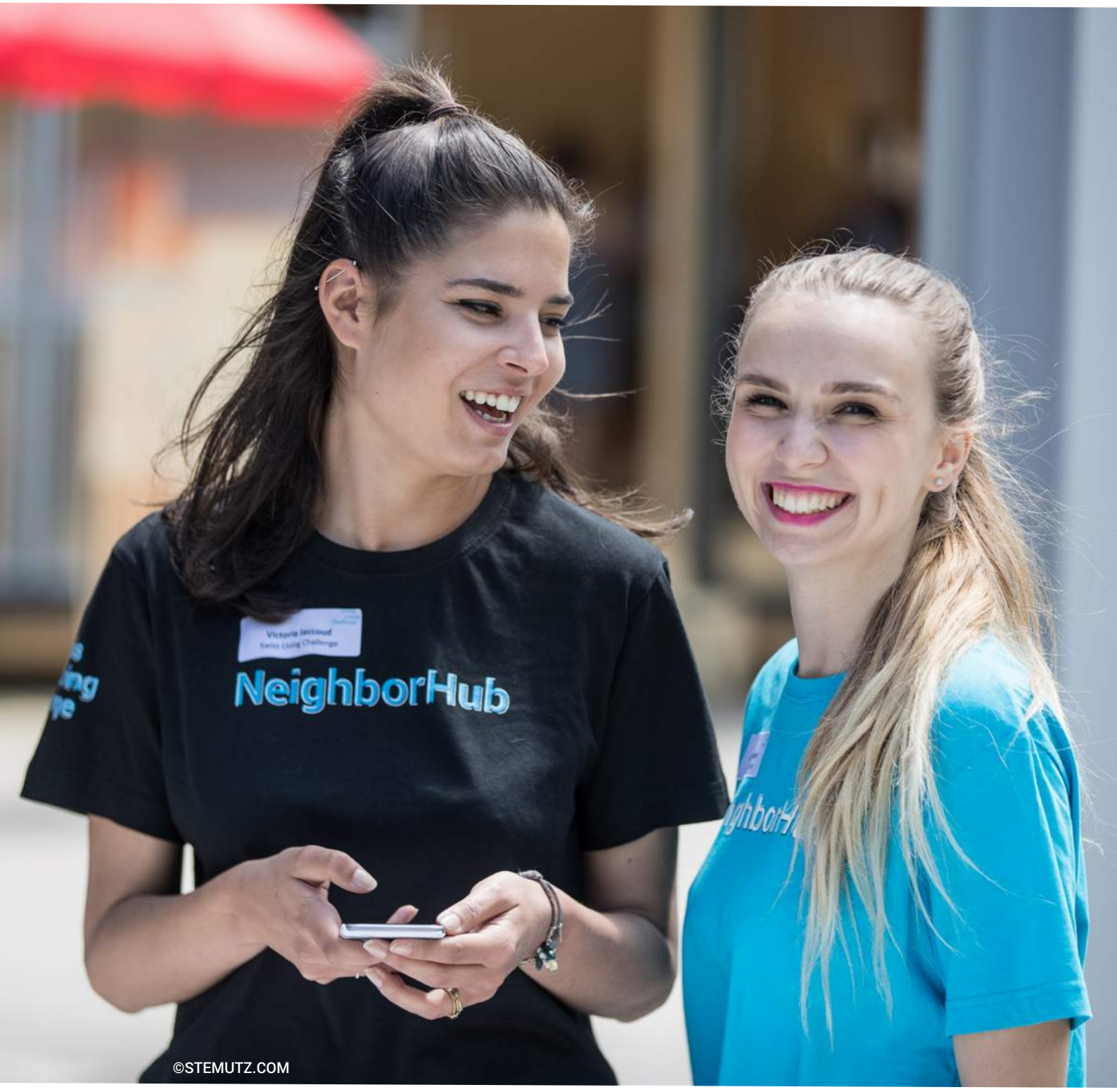
CSD ENGINEERS

INTERMOUNTAIN

RIEDO

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