Market Potential

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Towards an urban and energy transition

As the world grapples with **climate change and resource depletion**, many countries are committing themselves to taking the necessary measures to limit the global increase in temperature to a maximum of 2 degrees Celsius by the end of the century.

Switzerland takes these and other critical challenges to heart. It aspires to **protect its landscape** from urban sprawl while drastically **reducing energy consumption** and increasing the amount of **renewable energy** used.

The NeighborHub provides the ultimate solution to these critical challenges facing Switzerland. Firstly, as laid down by the country's new **energy law**, Switzerland must end its use of nuclear power, dramatically increase use of renewable energy and lower energy consumption by 43% in 2035 compared to 2000[1].

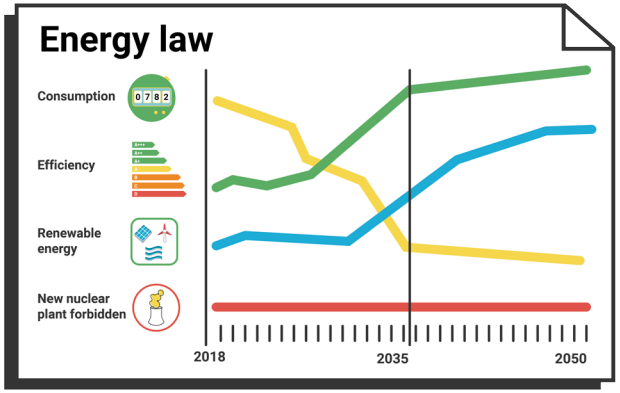
Secondly, Switzerland's new **land-use law** calls for building in existing neighborhoods instead of constructing on greenfield locations to allow the most efficient use of the country's limited constructible land.

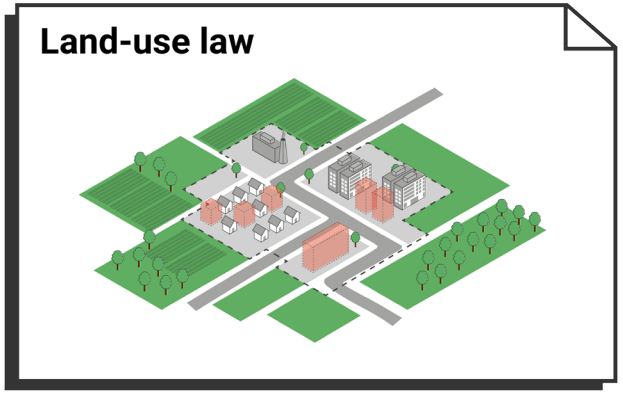
Two Swiss specificities aggravate the afore-mentioned challenges. First, Switzerland will undergo a **significant population growth** from 8.4 million to 9.8 million by 2035[2]. Providing living space for an increasing population is particularly challenging due to a significant part of the country being mountainous. This, coupled with the high value placed on **direct democracy**, citizen involvement and the importance of finding consensus, creates an environment where the two new laws can only be implemented in an integrative and collaborative manner.

To do this, we need to change our lifestyles, the way we build and the way we travel. **We need to engage in both an urban and energy transition.** These changes are best achieved by working on a neighborhood scale, allowing for commitment and engagement from the entire community. The NeighborHub provides the ideal platform from which this will happen. We believe that local stakeholders from both the public and private sector as well as associations and NGOs are the key to an effective transition.

The NeighborHub will promote Switzerland's urban and energy transition on seven **driving themes**. These include: renewable energy, water management, waste management, mobility, food, choice of materials and biodiversity. It promotes these themes amongst the population by being active on three levels of involvement. The NeighborHub is a **showcase of sustainable living**, a space where neighbors can **learn through experience** about how to live more sustainably and a space for the **collaborative planning** of Switzerland's neighborhoods of the future.

The NeighborHub provides the perfect space from which a neighborhood can kick-start its urban and energy transition, enabling Switzerland to create the most sustainable housing, neighborhoods and lifestyles possible. By taking on this role, **the NeighborHub becomes the home of Switzerland's urban and energy transition**.





Where do we act?

Candidates for urban transition

85% of Switzerland's population of 8.4 million live in its **urban centers**. These need to be densified[3] in a qualitative way to avoid urban sprawl and conserve the country's limited constructible land to allow for long term sustainable growth. At the same time, urban centers need to provide sufficient living space that offers a high quality of life despite a growing population. To overcome these challenges and achieve a qualitative urban transition through collaborative planning, urban centers need NeighborHubs.

Candidates for energy transition

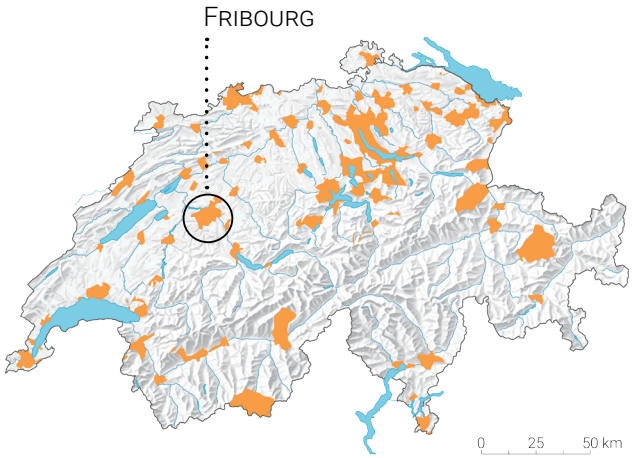
" Energy cities "[4] are municipalities which execute and actively encourage an exemplary energy policy by promoting renewable energy, eco-friendly mobility and an efficient use of resources. 418 of Switzerland's 2,294 municipalities, including all of its largest cities have already been awarded the " energy city " title. " Energy cities " represent a target market for NeighborHubs as they already promote an energy transition, and can use NeighborHubs to further their ambitions in this area of incredible importance.

Fribourg: representative of a market need

To contextualize the NeighborHub in a specific neighborhood with its specific stakeholders, we chose the **urban center of Fribourg** as a representative of a strong market need. Fribourg must undergo an urban transition due to a high population growth of 41% by 2045, and is already committed to the energy transition, having obtained the " energy city " label. These two factors make Fribourg an urban center which will definitely need the NeighborHub, and which therefore lends itself perfectly to contextualization of the NeighborHub.

Switzerland's urban centers

Switzerland's " energy cities "



Switzerland's urban centers & " energy cities "

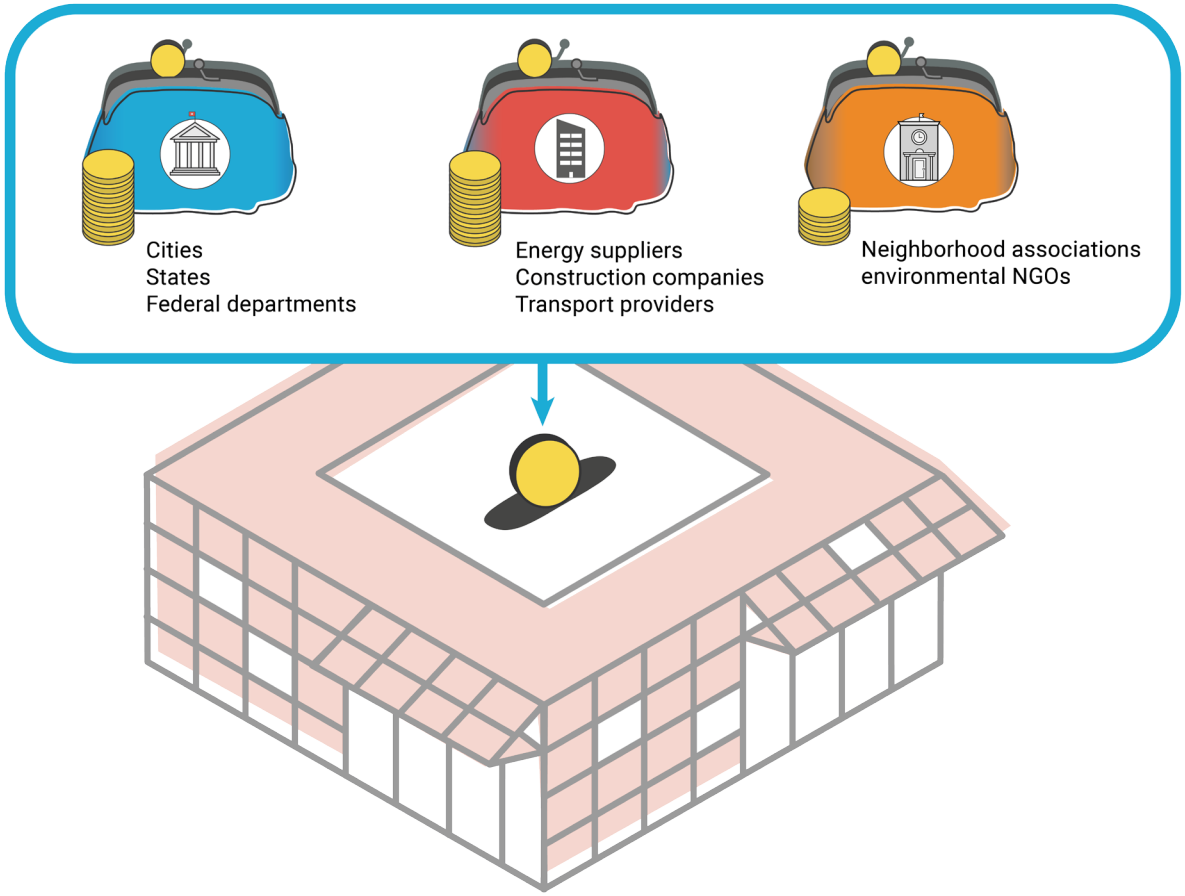
Who do we target?

We are not presenting your normal home but a **catalyst for transformation on a neighborhood scale**. An urban and energy transition can happen by gathering stakeholders together. The Neighborhub unites two stakeholder groups that can take on this challenge together: **partners and beneficiaries**.

Partners

The NeighborHub is composed of a collection of partners who are **willing to invest in a new kind of infrastructure**, one that will enable a rapid and coherent urban and energy transition.

Private entities can demonstrate solutions by showcasing their technologies in this exemplary building, while public institutions can use it to carry out collaborative planning. NGOs or associations can propose activities inside the NeighborHub to raise awareness of sustainability or specific topics relevant in a neighborhood. To establish the viability and interest of having different stakeholders come together, we interviewed **potential partners** active in our target market of Fribourg: Switzerland's largest construction company, **Implenia**, Fribourg's energy supplier, **Groupe E**, and the city government of **Fribourg**. Due to Switzerland's direct democracy and institutional processes which require high participation from all stakeholders, planning processes are particularly lengthy and expensive as all parties have ample opportunity to slow down or block any kind of project. This obstacle to achieving an urban transition is overcome by the NeighborHub.



Who do we target?

Implenia

Implenia has already tried to **bring stakeholders together** to learn about their points of view and to be able to deal with them. The advantage of this is that **potential solutions** to conflict issues can be found at an early stage, **reducing friction, expenses and loss of time** during a potentially long process, from the formal launch of the project to completion.

Implenia needs about nine years from the launch of a large real estate development project to its completion, a certain amount of this time being used up by democratic processes where the project is discussed, re-evaluated and often taken to court. The company saw that by **involving the local neighborhood** community from an early stage, project length can be **reduced by 10-15%**. They see the NeighborHub as a **perfect location** where this process can take place, thus contributing to facilitating the urban transition.

Faster urban planning processes allow stakeholders to save time and money. They not only benefit construction companies like Implenia, but also energy companies which encounter stiff resistance to projects aiming to develop production of renewable energy.

Groupe E

Groupe E has been trying to move ahead with a **project to construct a small wind park** around the city of Fribourg but is **encountering resistance from various stakeholders** like local residents and environmental NGOs. They could in this case imagine using the NeighborHub as a place where they can, together with other stakeholders such as local governments, create a **platform for discussion** about the project. To achieve this, other stakeholders such as nature protection NGOs and citizen associations could use the NeighborHub to discuss the project and find common ground, this too enabling urban and energy transition.

City of Fribourg

The city of Fribourg has a major urban development process coming up, which will see the creation of a completely new neighborhood. 11 acres of what are currently military installations on prime real estate close to the city center will be closed in 2020, and control of the land will be passed from the military to the city for residential development. During our interview with the city's architect, we were able to confirm the NeighborHub's capacity to act as a **platform for exchange between different stakeholders in the development of the new neighborhood**. The project will require five years of planning followed by fifteen years of construction. The city's architect suggested that the NeighborHub could be the first building initially set up on the undeveloped land, and serve as the **central planning location** for the project and later becoming a central **meeting point for the community** which will promote a sustainable lifestyle.

Who do we target?

Beneficiaries

Several **activities and services** will be proposed and directly **addressed to the people who live or work in the neighborhood** to further the energy and urban transition amongst the population. We have identified the following target beneficiaries:

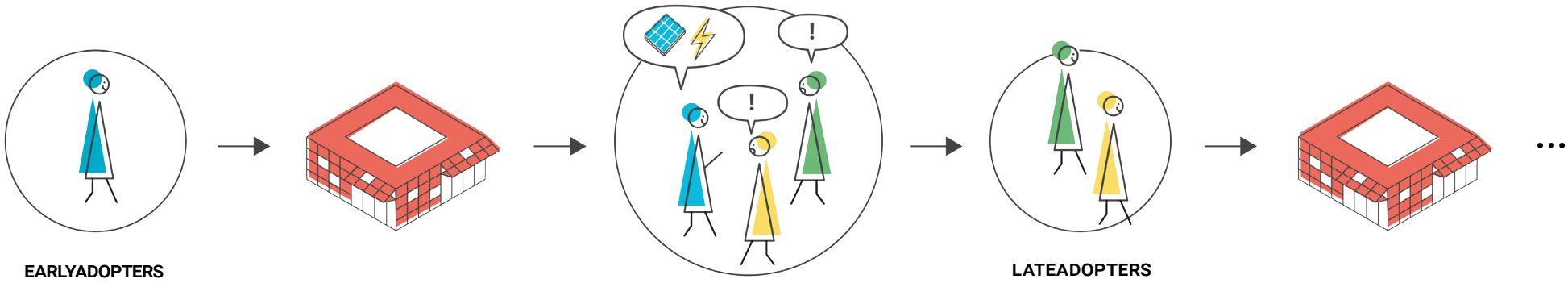
Firstly we have the **early adopters** who are mainly characterized by their **active involvement on a community level and seek a convivial neighborhood**.

The NeighborHub's design responds to the needs of early adopters as it creates a space where they live out their lives being active and engaged on a community level.

Thanks to its design, it can be **configured flexibly** for different uses, thus making it suitable for a community seeking a place where people can engage in a variety of community-based activities like **urban gardening**, **workshops on sustainability** or **tool borrowing** to promote a sharing economy. Users of the infrastructure also become its customers as they request and use the services it offers.

The second group of beneficiaries are the **late adopters**. They are initially indifferent about what the NeighborHub could bring them, but then later **see the advantages based on the positive effects being created by the NeighborHub in their community**. This motivates them to also take part in enabling an urban and energy transition.

The NeighborHub's impact will thus produce a **snowball effect**. It will grow from small significance to a piece of infrastructure which gathers momentum and popularity amongst a community, steadily involving an ever growing number of people.



How do we tackle the transition?

The NeighborHub is the ideal infrastructure to gather all the different stakeholders and establish itself in built-up areas to kick-start the urban and energy transition, and raise awareness about how it can be carried out. Three levels of involvement are discussed below.

Showcasing solutions

Urban and energy transition is often first tackled on the level of tangible and innovative solutions. Ongoing research in companies and universities helps develop new products to create more i**nnovative and sustainable products**.

The NeighborHub's modular envelope and spaces can be used to showcase these solutions, which can be of different types: **high-end or low-tech and self-made or industrially manufactured**. But whatever the solution, the NeighborHub can be used to showcase it to the public to **expand its use in people's homes**.

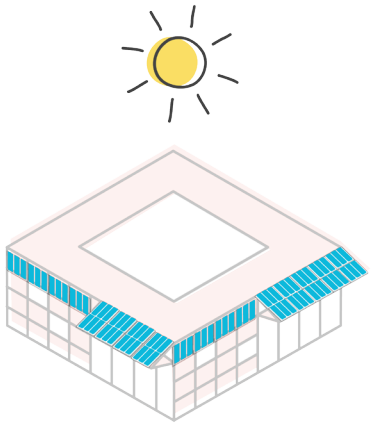
Learning by experience

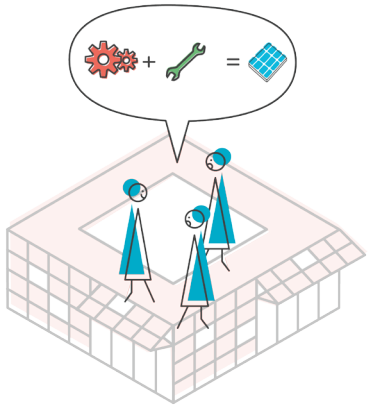
Solutions to the challenges do not only lie in using new technologies but also in adapting one's lifestyle. The NeighborHub acts as a **place where a community can acquire knowledge**, permitting them to reassess their current lifestyle and make behavioral changes based on this to become more sustainable. Thanks the NeighborHub's flexible spaces, it can be adapted quickly to provide different learning environments suited to a specific purpose. We can either organize workshops on specific themes such as saving water or energy or invite neighbors to spend a **night in the NeighborHub** to experience its many sustainable features and then use these in their own homes.

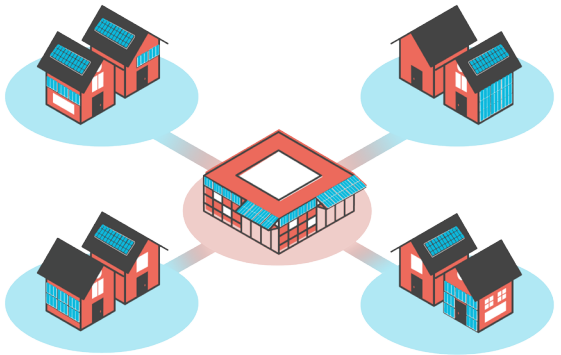
Planning collaboratively

The last step is involving all stakeholders in the process of rethinking an urban area. Having discovered sustainable solutions and having learned and experienced together, **people will want to go further and be included in more global discussions.**

The NeighborHub is the tool for such an initiative, a neutral ground where different stakeholders in the vicinity will gather to reshape the urban planning of their neighborhoods. It also serves as a central point from which new neighborhoods can be planned by including all stakeholders.







What do we propose?

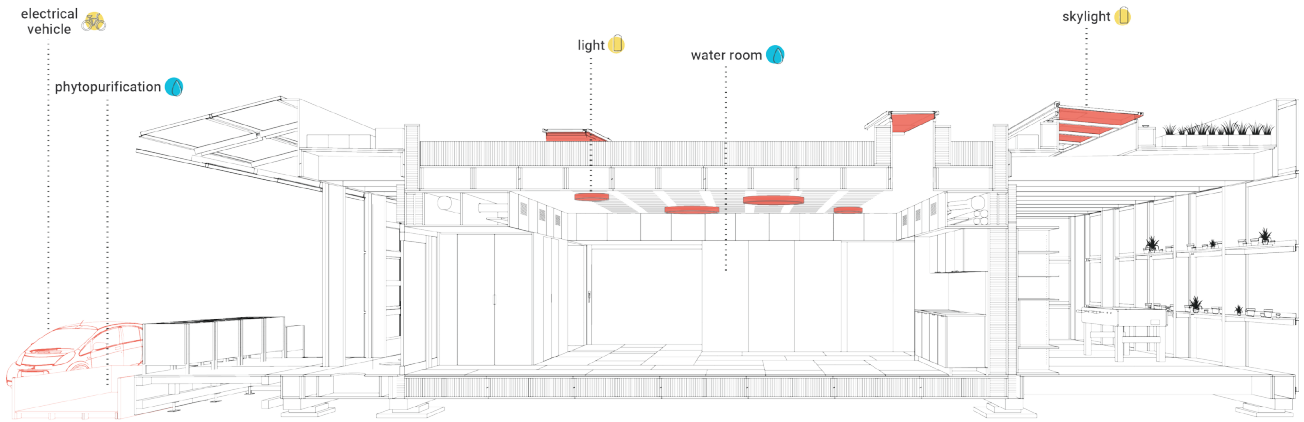
Smart think tank for water management

The NeighborHub proposes ways to collect water, to reduce consumption or to treat gray water. The latter is implemented in the building as a **phytopurification** plant that, which at the same time as treating gray water from the NeighborHub, is also used to **showcase a sustainable system** that can be integrated into new buildings. This represents an opportunity for water-related companies to reach new clients.

Many innovative features are already integrated in the NeighborHub. Rain forecasts are used to inform the user of the best period to do the laundry (using rain water) in order to have enough water stored in the tank.

On the other hand, the NeighborHub proposes easy implementation features for homes that are also effective and impactful such as metering shower water usage. A small device on the shower allows the user to keep track of water consumption, the energy label on the device informing consumers where they are as far as that consumption is concerned. It could even be possible for residents to benchmark their water consumption with their neighbors and compete to see who can use the lowest amount.

Among the different activities and services proposed in this multipurpose building, workshops to meet neighbors who are also willing to implement a local water treatment system can be attended. This allows **planning collaboratively** in order to imagine a cost-effective **phytopurification network** being implemented on a neighborhood scale.



A driving force for energy transition

The driving theme of energy concerns primarily the **energy management** developed for the NeighborHub. Thanks to **local storage** and **grid exchanges**, the NeighborHub uses predictive control. It receives for example daily weather forecast and uses a weather station for live production monitoring. Thus, a 24-hour prediction horizon is used to define optimal electrical management while covering the needs of the house.

The NeighborHub proposes a semi-automated system which uses a tablet app to support users with several solutions to a situation. For instance, they open windows when feeling warm, but at the same time the building is trying to use air conditioning to reduce the temperature. Our app provides several possible solutions.

For example if the Core, the heated part of the NeighborHub, is too dark but it the blinds are closed and the light is at maximum intensity, the app will suggest turning off the lights and opening the blinds. Tips like these will help users be more proactive in the future and will modify the way problems are dealt with. Being aware of how technical elements work and how they consume energy is a crucial first step to being able to reduce energy consumption and make it more efficient.

What do we propose?

Such an app is one of the many examples of how the NeighborHub **encourages learning by experience** in an entertaining and efficient way. Convinced users will consider implementing such a tool in their own home to reduce consumption.

The software will provide users with different lighting conditions depending on the activity (comfort, work or cozy) or will inform them about the energy production conditions of the house and whether it would be better or not to open the facade.

On the **planning** level, the aim is to start discussions about neighborhood energy grids. The NeighborHub's Core will be the home of discussion for an **energy-grid** setup. The key aspect of such a feature is the optimization of energy production, consumption and storage. In this way, instead of having several batteries in order to become autonomous, a single battery supplying the whole neighborhood could be considered. The aim is to implement solar panels on the neighborhood's buildings to locally produce electricity for the grid and to complement each other well on a neighborhood scale.

A means for a transportation reshape

As a hub for the neighborhood, the NeighborHub includes many features to answer mobility challenges. The aim is to use fewer cars and increase the use of sustainable means of transportation on an urban scale. This is why the NeighborHub provides **cargo bicycles and an electric vehicle for community sharing**.

Bicycles are convenient for small distances such as grocery shopping (5 km are covered every day in Switzerland for that purpose and mostly by car), contributing to fewer traffic jams, lower carbon emissions and a healthy body. The NeighborHub's cargo bicycles offer a convenient and clean way for residents or the business community to carry large objects or products around town.

The NeighborHub also offers an electric car which is shared by the community. Today, 92 % of motor vehicle commuters in Switzerland are alone during their journey[5]. Sharing a ride with even just one person in the neighborhood will divide the number of cars by two, reduce costs for users, free up parking and road space, enhance quality of life (more green spaces) and reduce the amount of funds which need to be invested in infrastructure by the government.

The NeighborHub's Skin, the non heated space, is the ideal place to house a **bicycle repair station** and all the required tools - in all weather conditions and under perfect lighting conditions. It promotes the use of bicycles in the community as access to maintenance is made convenient. Users can either have the bicycle repaired, or can learn how to do it themselves in regularly-provided workshops.

The Core meeting room is the space where the neighborhood's mobility will be redesigned. The NeighborHub acts as the central meeting space where all stakeholders come together to **redefine transport in a neighborhood** and the city it belongs to. With a growing population which is increasingly mobile and traveling longer distances everyday, Switzerland has to find new ways to manage mobility within its existing infrastructure. The NeighborHub provides the perfect space where stakeholders, including residents, politicians, public administrators and representatives from transport-related companies can come together to jointly develop new solutions. Apart from acting as a meeting space, the NeighborHub itself acts as an example by being a **mobility hub** for its neighborhood by offering a shared electric car and bicycles.

Implementing the NeighborHub

Construction

The as-built NeighborHub is estimated to cost[6] 900,000 CHF[7]. When adjusted for purchasing power parity to the US, this amount is equal to about **638,300 USD**[8]. The NeighborHub's prefabricated components are **Swiss made** to promote local economy and include **high-end technologies**.

The cost of the NeighborHub will be reduced when it is industrially-produced. The wooden frame is made with efficient advanced machinery that enables industrial production. Finally, by adapting the building to Swiss standards that require fewer technical features (ie no air conditioning and no fire safety system), we can estimate that the final product will cost 800,000 CHF.

As shown by the above-mentioned interviews, public institutions and companies are convinced of the need for such an infrastructure. They will thus be inclined to enter a partnership and supply land for the NeighborHub. The cost of such land is valued at 200,000 CHF[9].

The total investment can be summarized as an annual cost taking into account the building's life expectancy (25 years[10]), the amortization and the interest rate (2%).

Referring the investment to annual costs (60,000 CHF per year with the land) helps compare the investment capability of different stakeholders (public / private institutions and associations) and shows that it is a very **affordable expenditure for long-term impactful results** in driving the urban and energy transition.

The potential partners' investments in fixed assets in 2016 stood at 61,243,000 CHF for Implenia[11], 107,820,000 CHF for GroupeE[12] and 583,000 CHF for World Wildlife Fund (WWF) Switzerland[13]. The city of Fribourg spent 32,000,000 CHF on architecture and urban planning in 2016[14].

Based on the 60,000 CHF total investment costs which include financing, amortization and interest, the total annual cost for a collection of four equally paying partners is no more than 15,000 CHF (10,460 USD taking purchase power parity into account) per year for 25 years each.

This makes setting up a NeighborHub in a community highly affordable **not only for large corporations**, but also for governments and even for non-profit organizations. The partners relative investment into the NeighborHub is small compared to their own investment.

Ongoing Costs

A coordinator of the building will be responsible for allocating the different spaces to the needs of the users. The coordinator will work to create a **diverse user group** and ensure that each activity offered in the NeighborHub has a **strong link to the 7 driving themes** which define the NeighborHub.

They will also manage the fee-paying activities such as car sharing or rental of the heated space for community workshops which enhance sustainability.

Operating the NeighborHub will lead to annual expenses due to maintenance, activities and management.

NeighborHub Building Costs	Swiss Francs
NeighborHub Building	800,000
Land for NeighborHub	200,000
TOTAL FOR BUILDING & LAND	**1,000,000**

NeighborHub Cost per Year	Swiss Francs
Interest Rate	2%
Building Life Expectancy	25
Annuity Formula	0.051
TOTAL YEARLY COST	**60,000**

Synthesis

An overall break-even between expenses and revenue will be established. Revenue will come from rental (electrical vehicle + rental space) or from membership.

Membership will allow people to access different services and activities such as shared tools or rental of space in the NeighborHub. This will buildup a sense of empowerment of the community and help realize the objectives of the urban and energy transition.

NeighborHub Expenses	Swiss Francs
Coordinator salary *2,000 CHF/month for PT employment*	26,000
Building maintenance *1% of house value*	8,000
Materials for activities and services	6,000
TOTAL EXPENSES	**40,000**

NeighborHub Revenue	Swiss Francs
Car sharing *Circa 2 hours/day at 15 CHF/hour*	11,000
Rental of space *Circa 45 CHF revenue/day*	16,500
Membership fees *200 members paying 70 CHF/year*	14,000
TOTAL REVENUES	**41,500**
RESULT	**1,500**

Market potential for NeighborHubs is high not only in Switzerland, but in the entire world. The whole planet faces similar challenges of a growing population and the urge to take on climate change with innovative solutions of various kinds. As a country with particular pressure in these areas, Switzerland is the ideal test bed to prove that the NeighborHub can successfully - that is effectively and affordably - bring about the required urban and energy transition the world needs.

The NeighborHub facilitates urban and energy transition by involving all relevant stakeholders - individuals, companies, government bodies and NGOs. This wide scope of involvement is of major importance in the energy and urban transition, which can only be achieved by changing behaviors and lifestyles in and with the entire community.

The NeighborHub provides the perfect space to achieve this through its environment where new technology can be showcased, sustainability can be experienced, and where future neighborhoods can be thought out and developed collectively.

By acting in these three areas, the NeighborHub will become the home of Switzerland's energy and urban transition, and so be key in creating a sustainable future for the country.

Notes

1 Swiss federal law on energy, Switzerland

2 Swiss population forecast, Switzerland

3 Urban centers that need to be densified according to " Projet de territoire Suisse " strategies

4 Cité de l'énergie, Switzerland

5 Mobility and Transport report 2015, Switzerland

6 1 USD = 1 CHF

7 See cost estimate

8 Purchasing power parity: Prices in Switzerland are around 41% higher than in the USA

9 400 square meters at 500 CHF / square meter = 200,000 CHF

10 25 years since it is what most of the technical systems warranties specify. The structure will last more if well maintained.

11 Annual report 2016, Implenia

12 Annual report 2016, Groupe E

13 Annual report 2016, WWF Switzerland

14 Annual report 2016, City of Fribourg