

The Vauban Quarter in Freiburg, Germany

Tobias Bube

Rolf Disch SolarArchitecture, Freiburg

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1. History

Freiburg is well known as one of the paradigmatic „Green Cities“ of the world, and it is presented on this years' World Exhibition in Shanghai. How did a 200,000 inhabitants university city with a medieaval core at the edge of the Black Forest in the very south-west of Germany get into such a position?

In the 1980es there were plans to build a nuclear power plant in a beautiful vineyard area near Freiburg. Not only environmental activists, but virtually all the citizens and many politicians of Freiburg and the region, the students and the farmers came together in a quite unique alliance. The power plant was the first worldwide to actually be prevented by citizens' opposition. Saying „No“ to nuclear power required alternatives. Out of the grassroots movement, a great number of initiatives, of companies, and scientific institutions were founded. The Vauban quarter is only one of many results. And it would not have been possible with the supporting infrastructure that had evolved and without the very outspoken will of the citizens and their public participation.

- *And this is also already one major issue in sustainable development: Take the citizens along all the way from the start.*

- *And the second issue: Get away from nuclear-fossil fuels and replace them by renewables.*

The Vauban Quarter itself used to be about 40 ha of army barracks. Built in 1938, it was used by the French occupation army between the end of WW II and the German reunification. In 1992, the city of Freiburg bought the land from the German state for ca. 20 Mio € (300 Mio Mex. \$), and decided to develop it into a new urban quarter, close to the mountainside in the south of the city, yet also close to the city centre (12 min by public transport). It was intended for 5,000 inhabitants, in 2,000 flats. Here we already have the next guideline for sustainable development:

- Give priority of the development of spaces already used, to inner development instead of outer development.

2. Basic Decisions

The basic mistakes are always made at the beginning. You cannot make the big decisions and THEN add some sustainability. (We see many examples of such “green washing” ex post.) So the city authorities fixed a number of points for the urban planning competition in 1994 which was won by Kohlhoff & Kohlhoff, Stuttgart:

The situation of the army barracks area allowed for a real urban, not suburban development. This means: high density of residential space, and mixed use in order to create work space close to where people live. And this means: You can reduce the space used for traffic. As an effect, generous open and green space could be part of the design. The existing mature tree population was kept as far as possible. The natural brook to the south and the pond and brook to the west were left untouched and put under site preservation. Almost all rainwater is led through infiltration ditches, and then conducted into the natural cycles.

One of the main sustainability issues was density: A suburban setting would have meant three times the land use. The plot ratio is 0.5 and the floor-area ratio (FAR) is 1.4 – almost like in the “classic” inner city residential quarters of around 1900 – which required a special permission according to federal building regulations.

Most of the army barracks, situated in the northern part, were refurbished. The Students Services Union of Freiburg University bought the buildings and those 4 ha of the land to turn them into students’ halls of residence. Some of the buildings had been illegally occupied by squatters, and it is one of the great achievements of the authorities to come to an agreement with them rather than chasing them away. New buildings were put in between, with a high redensification factor.

To the west and the south completely new residential areas were built as perimeter block development along “loop” access roads. To the north, there is a mixed use area.

Of 40 ha, there are 6 ha of green space, mostly those 20 meters wide segments between the “loop roads”. There is a central market square which is used for diverse purposes, and another public square at the main entrance of Vauban, where the public transport is concentrated.

Let us analyze the basic decisions:

- *No sustainability without intensive urban planning! This task cannot be given to developers: The creation of high quality quarters is a public good, and it belongs into public hands.*
- *Create mixed use quarters to give people a chance to work close to where they live – to avoid mere sleeping communities and to avoid traffic. New Urbanism would say: “Do not sprawl!” And Albert Speer, one of the masterminds of sustainable urban planning would call this “polycentric*

concentration” – which is another way of saying: Back to the “barrio”.

- Keep the spaces open to counterbalance the density, and create public space for community life.

3. Architecture

Some things need to be decided at the very beginning. Other things need to be left undecided as long as possible, to ensure flexibility in details, and to keep the process open for learning.

Thus, the eaves height had to be below 13 meters, the distance between the houses was defined at 19 meters, and the distance between the distinct building units at 20 meters. But the rest was left to the house builders. Also the division into different sizes of single plots was handled very flexibly. So what you typically get is multistorey buildings of four floors with maisonette flats and access balconies – but also completely different solutions like single town houses or terraced houses. The single plot sizes range between 162 square meters for private builders (70 %) and 5,400 square meters for commercial investors (only 30 %). Instead of having one developer, there were 200 single projects.

There were no regulations in terms of aesthetics, which was a great risk. But with only very few exceptions, the formal solutions were rather of a much higher quality than what could have been expected.

A very typical form of ownership in Vauban is the “Baugruppe” – a joint development scheme: Several individuals come together, find an architect and plan and finance a house or house group together, including some shared spaces. Some of them have special interests like multigeneration living.

- Keep things flexible. And avoid monoculture.

4. Traffic

Traffic was successfully reduced: There are only two access roads for cars, with a tempo limit of 30 km/h.

The number of parking space on the main streets is limited and costs money, and there is no car parking allowed in the residential streets, and parking spaces on private lots were excluded by building regulations. Instead, there are parking garages at the entrances to Vauban where people are obliged to leave their cars. If they have cars, they are obliged to buy or rent a space in one of them.

People are allowed to drive in front of their house, for example to get their shopping close to their entrance, but they have to remove the car afterwards. The system works very well by social rather than by police control.

There are areas exclusively for pedestrians, and there are bike lanes on the access roads and also on the roads leading into the city. You reach the centre by bike in 15 minutes – faster than by car.

Public transport: There are city and regional bus connections, and there is a tram line. A train station for the regional lines will be built soon.

There is a car sharing association, which will soon be restructured: The cars will be replaced by electro mobiles. Moreover, the idea is to open the scheme up so that not only members, but everyone can use the cars, and you simply pay by credit card. There are also plans to complement this with bike sharing and electro bike sharing schemes. All these semi-public traffic is organized by private enterprise, but in rather communitary forms of business.

The results: There are only 209 cars per 1,000 inhabitants, as opposed to 480 per 1,000 in Freiburg as a whole. As opposed to initial fears that reducing private traffic drastically would make sales difficult, the “car free” issue has become a point of attraction and of identity building for the quarter. It is a status symbol to NOT have a car. And the citizens’ “Car Free Association” together with some companies in the field of sustainable traffic have pushed everything much further than the authorities had inaugurated – and they are still pushing, for example in terms of car sharing.

- Reduce private traffic, reduce parking space in the streets and concentrate it outside. Give priority to “slow traffic” and to public transport. Think about new chances of intelligent semi-public transport and e-mobility.

5. Community

From the very beginning, the planning process and the competition were laid open to the public, and there was a very lively debate in the city council, in the local (and even national) newspapers, and in a series of citizens’ forums organized by the city authorities and by the architects’ chamber.

The authorities put the organization of public participation into the hands of the “Forum Vauban”, a citizens’ association – with all the risks of endless debates involved. The Forum managed to get funding by the German Environmental Foundation and other such institutions, and so the work could be professionalized. Thematic working units were set up for environmental issues, traffic, energy, Vauban for women, infrastructure etc. At a later stage, the Forum also concentrated on social work for the quarter, on the publication of a regular neighbourhood magazine, and on organizing festivals and cultural activities.

There was (and still is) also a special “Vauban” group in the city council, consisting of members of the council as well as of Vauban inhabitants and architects.

There were, of course, a number of conflicts between the city authorities and the Forum, and

this is still going on. But the conflicts got channeled in a mostly productive way. Without the citizens' participation, Vauban would not have become a model quarter. In all important sustainability aspects, the citizens pushed the politicians and the administration further than they initially intended to go.

This was also important for the identification of the citizens with "their" neighbourhood. A lot of cultural and social activities originate in this participation. The social cohesion is considerably better than in the other new neighbourhood in Freiburg developed at the same time.

- In participation processes, both the authorities and the citizens have to go through a learning process. There will be conflicts, but if it works out, the urban planning itself will become an open learning process.

6. Energy – The Solar settlement

The Vauban quarter has a cogeneration plant district heating system for room heating and warm water. It is run with wood chips, and a second component burns gas and will soon be heated exclusively with biogas.

For all buildings, a maximum room heating consumption of 65 kWh/m²a was prescribed, but many projects went even further than that. There are many passive house projects. And the Solar settlement part of Vauban consists of "PlusEnergy Houses" that generate more energy than they consume.

The Solar Settlement is an ensemble of multistory townhomes and a commercial building, the Sun Ship. The 59 homes are divided among 11,000 m², 9 of which are penthouses on the Sun Ship roof. The single homes range from 75 to 162 m², all the homes together with over 7,850 m² of floor space.

The Solar Settlement generates 420,000 kWh of solar energy from a total photovoltaic output of about 445 kW peak per year. If one calculates the energy savings from the optimal efficiency, here annually 200,000 liters of oil and 500 tons of CO₂ are saved. For the first time worldwide, even until today, PlusEnergy was implemented as a community in Freiburg – receiving heavy worldwide response and exciting awards.

The Sun Ship is the service center for the Solar Settlement in Freiburg – and the first commercial PlusEnergy building. It extends itself over 125 meters along a main road and functions as a sound barrier for the housing community on its opposite side. The Sun Ship is three stories, with a northern front section that is five stories. Embedded in roof garden landscaping, nine three level penthouses were constructed. In two underground floors you will find storage rooms and a parking garage with 138 parking spaces.

The north front end of the Sun Ship is home to the renowned German Eco Institute. On the ground floor of the main building are large sales spaces totaling 1,200 m², used by an eco-supermarket,

a pharmacy/convenience store and a bank. In the two upper floors you will find offices, studios and clinical practices. The entire office space of the Sun Ship aggregates to 3,600 m².

The supporting structure is made from reinforced concrete; the energy optimized façade is wooden however. In a post-beam construction the special triple-paned windows and vacuum insulation panels are fit into place. The interior walls have phase changing material to reinforce the thermal activation of building mass. The offices do not need air-con, because a ventilation system with heat recovery and ventilation flaps for natural night cooling are enough.

The terraced houses produce a surplus of 36 kWh/m²a, and they are completely supplied with regenerative energy. The building costs (excluding the PV system) are only about 12% higher than a conventional house, and the payback period of less than 10 years – due to cutting down heating costs by more than 90%. The PV system pays for itself, due to the German feed-in tariff.

The plusenergy concept is maybe the aspect of Vauban architecture with the greatest resonance. The next housing estate of this kind will be built in 2011, there are negotiations with a dozen German cities, as well as with developers from Norway over China to Brazil – which shows that the concept can be adapted to very different conditions and climates. We also work on plusenergy concepts for social housing.

We know, that in many places it does not make sense now to go all the way, but the first step of reducing energy consumption drastically, and the second step of moving towards 100% regenerative energy supply are on the agenda almost everywhere. And with fossil supplies running out, energy prices and the needs for thermal comfort are rising we do believe that Plusenergy is the future.

- *Find the right dimension for regenerative energy supply.*
- *Every house a power plant!*