



Baugruppe apartment buildings & townhouses
Freiburg, 2006

Lessons from Freiburg on Creating a Sustainable Urban Community

Contents

Introduction

Part 1

Creating Sustainable Communities in the UK and Ireland
The Genesis of Quartier Vauban
Organisation
The Master Plan
Transport

Part 2

Baugruppe
Three Fundamental Criteria
Where and How Did It Originate?

Part 3

Tendering for a Site
'To Give Everyone a Chance'
Baugruppe Funding and Research Partners

Part 4

'Wohnen & Arbeiten' – an Example of the *Baugruppe* Ethos
'Wohnen & Arbeiten' – Aspects of Its Specification & Energy Use

Part 5

Facilitating
Financial & Legal Aspects of Developing
Contrast between Commercial & *Baugruppen* Development
Surveyed costs

Part 6

Value for Money, Freiburg and Dublin
Is Vauban a success?
Do Baugruppen Build More Sustainably?
Conclusion
Limitations & Wider Implications of This Work

Introduction

In April 2006 the Author and fellow student Kirsten Priebe visited Quartier Vauban and Rieselfeld in Freiburg close to Germany's borders with France and Switzerland. The purpose of the trip was to visit buildings built to the 'Passiv Haus' standard and meet their architects. One of these architects, Heinrich Böwer, explained that many of these buildings had been procured by 'Baugruppen' (literally 'building groups'). Coming to understand the significance of this approach was a revelation.

The usual approach in looking at environmental buildings or settlements is to focus on (a) reducing the energy requirement (often through the design of the building envelope), (b) creating the most sustainable way of supplying that energy and sometimes (c) transport. This essay however aims to address what is arguably the most important aspect of all: the people-side. What were the principles and organizational structures that made it possible, desirable and affordable to build a settlement of 38 hectares (94 acres) in a sustainable way and how was an actively supportive community created to live in it? For the purpose of this essay the Author calls these 'soft' systems to contrast with 'hard' technology and construction.



Baugruppe townhouses at Vauban, Freiburg, 2006

Part 1

Creating Sustainable Communities in the UK and Ireland

CAT in Wales, the eco-village of Cloughjordan in Ireland and Findhorn in the north of Scotland are all examples of 'intentional communities' that have chosen to step outside the normal bounds of society to create the kind of community they want to live in at a price they are willing to pay. In each case there was a core of people that led the process and in each case they created a unique organizational structure. Based on the Author's discussions with leaders of two of the three communities it would appear that these are often based on co-operative principles. Decisions are arrived at after long discussions and leadership rotates. The gestation of these communities is often long and the management of them can be intense.

The 'Village' community that eventually found a site to develop at Cloughjordan (pronounced 'clock-jordan') has been in existence six years. To find land at a price they could afford to buy yet still have access to public transport they searched the length of the country. They eventually settled on a site adjacent to what was an economically-depressed village alongside an under-used spur of the Dublin to Limerick rail line. Since the land purchase site costs for each unit (most of which are terraced houses) have risen several times forcing many of the original members to leave. In Winter 2007 the site services started being laid and the Eco-village is expected to be largely complete three years from now. Given that many of the houses are self-build it may take twice this long though efforts are being made to limit that possibility.

It is a heroic story and will no doubt provide the Villagers with the community and housing they want. But it is clearly not a straight forward or widely replicable process. Environmentalists and city councils need to find a process that is, if the creation of sustainable communities in urban areas is to become the norm. Equally citizens who don't wish to leave the city or their jobs but do who wish to have more affordable and sustainable accommodation in a strong community need to know how to do so, without having to invent the procurement process each time. This is where the Quartier Vauban and the *Baugruppe* approach (the singular of *Baugruppen*) look so exciting.

The Genesis of Quartier Vauban



A refurbished barracks at Vauban

In August 1992 the French troops left their garrison at Vauban empty. Squatters moved in to some of the buildings and in 1994 the City Council bought the land from the Federal Government to develop the site as a residential district.

' "We knew the city had a duty to make a plan. We wanted to get as involved as possible," says Andreas Delleske, then a physics student who led the grass-roots initiative that co-designed Vauban. "And we were accepted as a partner of the city." '

Source Isabelle de Pommereau ¹

(Note the tram tracks running through grass in foreground and solar panels on the roof)

'Forum-Vauban e.V., Freiburg' which was formed as an NGO in 1995 emerged from this grass roots movement. It grew to about 300 members. It provided support to *Baugruppen*, proposed environmental approaches, instigated research, and lobbied. It was funded by public subscriptions, donations and grants from public bodies, including support from the EU's Quality of Life programme. In 1997 it formed 'Genova' a construction co-operative specialised in building low-cost environmental building in Vauban with resident participation (source: Gauzin-Muller, 2002 ²).

Forum-Vauban created a vision for Vauban that it felt might be replicated elsewhere called 'Sustainable Model District Vauban'. The Model attracted funding and the support of the Council which was 1/3 controlled by the Green Party. The Student's association and the SUSI settlement initiative started refurbishing 10 of the former army barracks for students and people on low income.

In 1995 the Council decided to turn Vauban into a flagship environmental and social project. A masterplan competition was held and in 1996 this went on public display. At this time Forum-Vauban were successful in obtaining funding from the German Environmental Foundation for their project 'Scientific Support for Citizen Participation'. This allowed experts to develop a set of measures for the 'Sustainable Model District Vauban' in terms of traffic, building, energy, nature in the city, sanitation and public space. These were widely discussed in the Forum and in the city. Unfortunately the Author has not been able to find these measures.^{2,3}



Baugruppe apartment buildings in Rieselhof, Freiburg, 2006

The plots of Phase 1 were laid out and the cost was set at DM800/m² (€409/m²) based on current market prices in the city². In 1997 the sites were prepared for construction. The first occupants moved-in in September 1998. Completion of Phase 3 was expected to conclude in 2006.

What is instructive is that

- (1) there was a combination of 'bottom-up' in the form of community activists who then formalized their role (in the form of Forum-Vauban) and 'top-down' (from a Green Party-dominated City Council). We will see this combination of top-down and bottom-up again in the creation of *Baugruppen*.
- (2) Once the structure of a grass roots protest group was legitimized and accepted by the local government it was able to approach central government and obtain funding to advance its environmental goals.

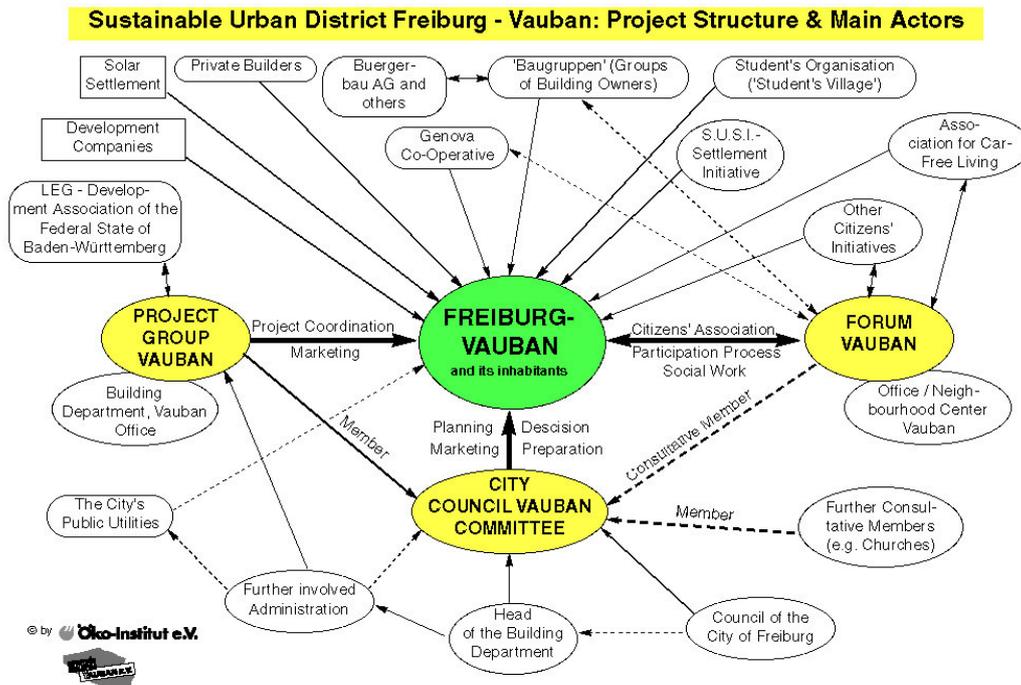
Organisation

The diagram below shows the organising structure that was put in place between 1995 and 1997. This included Forum-Vauban as the local citizens' association and the legal organisation for citizen participation, Project Group Vauban which co-ordinated funding and government bodies and did marketing, and the City Council Vauban Committee (a special Council committee created for the project). Around this core representations were made by various *Baugruppen*, builders, car-free and solar lobbies, student

groups etc. An excellent overview of Vauban's development and various lessons is given by the Forum-Vauban at: <http://www.forum-vauban.de/>³.

'...What makes Vauban unique, say experts, is that "it's as much a grass-roots initiative as it is pursued by the city council," says Mr. Scheurer. "It brings together the community, the government, and the private sector at every state of the game."'

Source Isabelle de Pommereau¹



Organisational chart from Forum Vauban web site³

The Master Plan

The development comprises 2,000 homes plus business units for 500 - 600 jobs. If all proceeded to programme it was completed in 2006. Excluding the remaining barracks buildings (shown in white to the right of the site) which were renovated and turned into student accommodation, an asylum seekers' centre and the Forum-Vauban offices, the site was to be developed in three phases.

From an early stage it was agreed that the primary goals for Vauban were:

1. To offer high quality building spaces for young families within the city's limits and to counteract urban sprawl.
2. A dense urban design concept comprising low energy standard for all buildings, green spaces, good public access (including a new tram) and further infrastructure (kindergartens and a primary school).

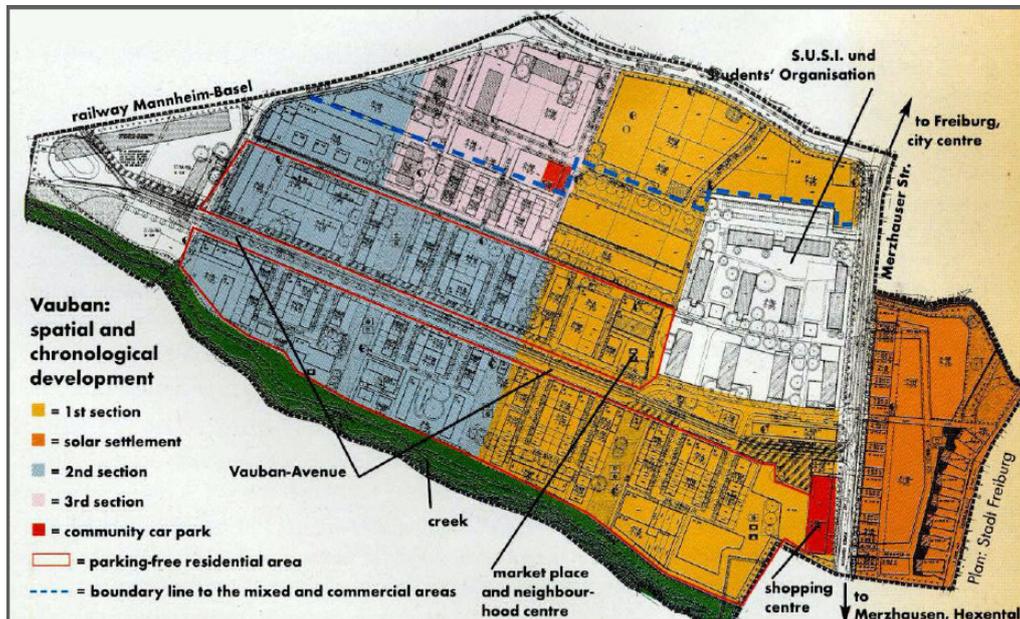
Further objectives were developed during the participation process organized by Forum-Vauban. The most important were:

3. The car-free project combined with the specific traffic concept and the special offer of alternative mobility,
4. Promotion and support of *Baugruppen*
5. A minimum of 100 buildings built to Passiv Haus Standard,
6. A central market place and a community center.

7. The Forum's priority was to develop a sustainable city district in a participatory way which could become a model for further initiatives.

Source: Forum-Vauban ³

All of this was achieved.



Quartier Vauban Masterplan Source: Forum-Vauban web site

Transport

Transport is often the Achilles heel of a supposedly sustainable development. Energy and carbon emissions saved through building can be more than offset by car use.

In this case the Council decided to connect Quartier Vauban to the rest of the city by a tram line in 1998 (cost €665,000) ². This line can be seen running left to right in the bottom third of the site on the above site plan. No home or workplace is more than 500m from public transport. Two large areas (outlined in red above) were designated entirely car free. Around 40% of the households agreed to live without their own cars, while others have leave their vehicles in two multi-storey carparks at the edge of the development. The main streets have a maximum speed of 30Km/h while side streets which are envisaged primarily as 'communication spaces' have a top speed of 10Km/h.



Parking Places for Bicycles at Vauban

Consequently most streets are pedestrian friendly and suitable for kids to play. Car pooling and cycling are actively encouraged. Typically the covered bicycle rack is near the front door while cars are often a walk away. Even by German standards the Freiburg is particularly well served by cycle path.

These physical aspects of the design were supported by a programme of public meetings and promotion by the Association for Car-Free Living and Forum Vauban. Given that Freiburg is known for its strong pro-pedestrian and cyclist policies the campaigners were not promoting an entirely foreign concept, however the levels of car ownership in Vauban are stunning. 150 cars per 1,000 inhabitants compared to 430 per 1,000 in the rest of Freiburg or 640 per 1000 in the USA (Source: de Pommereau ¹).

Part 2

Baugruppe

In the Author's view one of the organizational structures used to procure housing, *Baugruppe*, is sufficiently different as to create a paradigm shift in thinking. A different way of thinking, this 'soft' system, when taken to heart by the community and implemented by professionals, is a far more powerful environmental tool than any number of heat pumps or bicycles!

Three Fundamental Criteria

1) The principle at the core of *Baugruppe* is a recognition by the city councils of Freiburg, Tuebingen (& the town of Stühlinger) that if land held by the Council (on behalf of the city's population) is to be developed for housing that first preference to carry out the development should be given to groups of citizens over commercial developers. It is a simple but powerful principle and has had a range of positive ramifications.

2) Next to this process perhaps the most important issue is that the Council must declare the purchase cost of land it wishes to sell for development. Therefore a developer can't enter into a bidding war for the land. The fixing and announcing of the land prices has the effect of changing key questions: instead of how much was it sold for and who benefited, the question becomes who was the land sold to and why? It gives citizens clarity on how much they have to borrow to buy the land even before forming into *Baugruppen* and must cause a mindset change within the Council. How can the sale of this land best suit our citizens?

3) The final principle is that all buildings constructed by the Council or on Council land must have an annual heating requirement (space and water heating) not exceeding 65kWh/m² of useful floor area, significantly above construction standards of the state of Baden-Württemberg.

Where and how did it originate?

According to Mr. R. Schelkes architect and urban planner ⁴ the first collective building projects in the area date to the 1920s and 30s. This approach died under the central planning impetus of the post-war period to surface again in the 1970s. The first collective building project to be procured using the *Baugruppe* approach was the 'Blue House' in 1996 in the new Rieselfeld District of Freiburg. It was built by 15 socially-diverse families with their own architect. Its construction costs were exceptionally low yet it was also the unique design of its inhabitants. It attracted a lot of attention.

At time of print of 'Baugruppenarchitektur in Freiburg – vom Experiment zur Regel' ⁴ more than 150 *Baugruppe* projects had been built in Freiburg, particularly in the Rieselfeld, Vauban districts, resulting in more than 2,000 dwellings. This amounts to an investment of ~€400 million in those areas principally by the inhabitants but also the State. *Baugruppen* are now a major part of the construction and property sector of those cities and were a key part to the success of the creation of the new urban districts of Rieselfeld and Vauban.

A key step appears to be the winning of the master planning competition for Rieselfeld (literally 'sewage field') by architects and planners who were advocates of *Baugruppen*. In this huge site they created plot sizes smaller than developers were used to, but large enough for the creation of individual apartment buildings and townhouses. The Council took the brave decision to sell the land in those portions. A decline in the building market around 1997 and the past history of the site itself made commercial developers cautious about investing. The architects and Council realized that a new model of development through *Baugruppen* was the way to proceed ⁴.

Part 3

Tendering for a site

While *Baugruppe*-procured projects have tended to be apartment buildings (by virtue of economy) mixed-use, multi-storey buildings and townhouses have also been completed by groups.



Baugruppe apartment building in Vauban, Freiburg, 2006

In terms of the Council's involvement a *Baugruppe* project can happen either informally or formally. The former occurs where a group of citizens applies to the Council to develop a city-owned plot which was publicly advertised for development. Advocates of the *Baugruppe* Principle, such as Heinrich Böwer, believe this still happens too rarely.

The second happens where the Council has decided to develop a district using *Baugruppen* (alongside other housing and mixed use units). In this case the Council advertises for expressions of interest by individuals or already formed *Baugruppen*. Individuals or groups that are too small are then match-made by facilitators to form groups of a viable size for that development of between 10 and 50 families.

Because the land prices are fixed if there is competition by more than one *Baugruppe* for a site the 'tenders' are judged on which group has the greater demographic mix and which has the most impressive yet achievable environmental goal. This way of judging immediately changes the 'bottom line' from lowest cost to greatest social and environmental benefit!

'To Give Everyone a Chance'

This was the motto adopted by the Council during the planning of Vauban. A model by which to judge applicants was created called 'Blockprofil' (literally 'block profile'). The categories reflect the desired diversity of the settlement. They included: marital status, number of children, occupation, age, previous address and location of workplace, type of housing desired (low energy or *Passiv Haus*), owner or tenant status and possible need for financial assistance.

Potential buyers were invited to a personal interview at which the *Blockprofil* was further explained. Requests to buy were then reviewed by the Vauban Working Group and the final decision on applicants was made by the Council.²

It was strongly desired that a vibrant, mixed and stable community be created at Vauban. A similar in mix to what one might find in an older part of the city where the mix of residents had grown organically over time, not a transitory place, only suited to singles (let's say), or a ghetto for a particular economic group.



A Freiburg Baugruppe

An analysis of resident types in the 450 new homes of Phase 1 of the Vauban development in 2002 shows that this focus on diversity succeeded:

- 60% own their own homes, 40% rent.
- 25% are labourers, lower-ranking employees or civil servants; 55% are at management level and 20% are self-employed professionals
- 10% of households are headed by single parents, 25% are couples without children and 65% are families with children.
- 75% of residents moved to Vauban from within Freiburg and 25% from outside the city.

Source: Gauzin-Muller, D. (2002), p.73

Baugruppe funding and research partners

Groups were also required to form an association, which would work with research partners.

Porteous & MacGregor (2005), p.121

It is not clear whether all *Baugruppen* in Vauban or only those in the more experimental first phase were expected to link with research partners. However it is clear that the architect Michael Gies and engineer Jörg Lange were very much in favour of this approach for the mixed-use building they wished to build to *Passiv Haus* standard with advanced water and biogas technologies.

In this case the project was given the title 'Wohnen & Arbeiten' (Living and Working), and the association 'Ökobauverein e.V., Freiburg' (Association for Sustainable Buildings) was founded. All residents were required to be members of Ökobauverein. Architect Micheal Gies of IDarchitektur, together with the Fraunhofer Institut für Solare Energiesysteme and the Fraunhofer Institut für Systemtechnik und Innovationsforschung in Freiburg, then designed the building.

Porteous & MacGregor (2005)⁵, p.121

Panesar explains how this is useful in developing experimental buildings
This association is able to apply for funds and to handle the financial aspect as well as to run the experimental project phase. All future residents of the model house became members of the "Ökobauverein" and signed a contract that they will cooperate with the research projects.

Panesar & Lange (2003)⁶

It can be seen that a significant benefit of *Baugruppen* is this ability to make association and attract funding that would be closed to an individual (without their own finance).

Part 4

'Wohnen & Arbeiten' – an Example of the *Baugruppe* Ethos

'Wohnen & Arbeiten' ('W&A') is still the best known and most heavily studied *Passiv Haus* building in Vauban. It was the world's first multi-use building of that energy standard. The *Baugruppe* is made of 16 families. They all met through Forum-Vauban.



'Wohnen & Arbeiten's southern side featuring large windows and private balconies

Their differing needs led to a very individual accommodation schedule: four offices, 16 apartments ranging from one bed to duplex family-size units, communal areas and an artist's studio. It is a perfect example of the level of specificity that a *Baugruppe* can supply which a developer would not.

Most importantly, because this is another self-build cooperative development, the occupants all have a stake in responsible energy conservation. This started with the design itself, a no-frills geometrical approach where the quality of construction and services can be prioritized. Although each flat is individually tailored in terms of layout and some finishes, their container is a very straightforward rectilinear block. Thus the high proportion of shared walls and floors are thermally advantageous.

Porteous & MacGregor (2005), p.122

The 10m long transverse walls that create these 'containers' are 4m, 5m or 6m apart to accommodate the different requirements. Furthermore Michael Gies told the Author that the four storey height was fixed by the desire to avoid a lift and the building's length (40m) was set by the desire to avoid expansion joints in the structure, as this would increase cost, complicate connections and detailing.

Because circulation space is external to the building envelope the area to be heated is reduced to the apartments and offices only. The external access galleries on one side and balconies on the other are self-supporting to avoid thermal bridging of the external walls. One is capped by solar thermal collectors the other by photovoltaics imprinted on a glass canopy. While the grid of the galleries and balconies are regular the windows appear to be randomly organized thereby giving the facades an animated character. Again this is because of occupant participation in the internal design of their own units.

It can be seen therefore that a very efficient, simple but highly specific structure was created and cost ironed-out wherever possible. Instead funds were spent on achieving the energy standard, the environmental features and comfort required. Gauzin-Muller lists the construction cost as DM2,400/m² (€1,227/m²) including taxes ². Cost of the *Passiv Haus* measures are listed as 7% of the total: more on this in the chapter on 'Surveyed Costs' below. Suffice it to say this is an extraordinarily low price for a very ambitious building.

Porteous writes:

By being directly involved in the building process, residents know about the specification and what is expected of them in terms of responsible use. There is a further incentive to be economic with hot water, since this is metered, while the small amount of energy supplied to radiators is included with the rent.

Porteous & MacGregor (2005) ⁵, p.122

Key words associated with this process might be 'ownership' and 'respect'. Designer, 'developer' and future occupant are all involved. All communicate and all feel that they are personally invested in the final building. Again we see a mix of control (in the clear structural design or the water metering) and of freedom and personal input with the design of windows or unit size.



Access gallery & view out to private balconies, 'Wohnen & Arbeiten'

'Wohnen & Arbeiten' – Aspects of Its Specification & Energy Use

The external walls are heavily-insulated light weight timber frame. The transverse walls are calcium silicate blocks resting on floor slabs of screed on pre-cast concrete. The heavy mass internally is designed to absorb the significant solar gain and incidental gains and reduce the diurnal (day to night) thermal variation. U-values of the walls are $0.12\text{W/m}^2\text{K}$ for timber frame walls $0.15\text{W/m}^2\text{K}$ for masonry walls, $0.1\text{W/m}^2\text{K}$ for the roof (source Gauzin-Muller, 2002, p. 154)

Windows are timber triple-glazed to either 0.6 or $0.7\text{W/m}^2\text{K}$ (sources disagree). The south elevation is 50% glazed with large full height windows and 20% glazed on other sides. Computer simulations were used to optimize light ingress. The active and passive solar contribution to the building is estimated at 20kWh/m^2 (source: Porteous & MacGregor, 2005⁵, p. 122).

The heat recovery ventilation system delivers fresh air into the apartments at low level into bedrooms and living areas at 18°C . This is then extracted at about 20°C having picked up additional heat from solar gain and occupant use. The system is judged to be 82% efficient. Because the communal laundry is in the Basement the moisture levels are low, the rate for replenishing air can therefore also be lower than elsewhere.

Grey water from basins and showers are cleaned by an on-site ventilated sand filtration system and used for flushing the 25 vacuum toilets. These only need 25% of a conventional toilet. Sewage and organic waste are collected. An experimental biogas reactor was designed and fitted to turn this waste into the energy for all cooking. It was the idea of resident and engineer Jörg Lange. He told the Author that the commercial company funded to install the reactor went bankrupt. Sadly it has never been commissioned.



The bio-gas generator in basement, and supply and extract pipes at 'Wohnen + Arbeiten' mixed-use building in Vauban, Freiburg, 2006

When the building was visited five years after completion and monitored as part of IEA Task 28/38 'Sustainable Soar Housing'⁵, its space and water heating demand was measured at 40kWh/m². In the Author's view the controlled participation of the occupants at inception, their understanding of the specification and how the building worked are intimately related to these low levels on consumption afterwards.

Less than a quarter of the 40kWh/m² is for water (8.7kWh/m²). Nearly 18kWh/m² of the remainder needed for space heating is met by heat recovery; and in order to address a final heating deficit of about 13kWh/m², a thermal supply of some 13.25kWh/m² is required from the CHP system to top up that from the flat-plate solar array.

Porteous & MacGregor (2005)⁵, p. 123

50m² of solar collectors (supplying a 3,400 litres hot water reservoir) and the CHP unit supply all the space and water heating. 3.2kW array of photovoltaics and the CHP unit supply 80% of the electricity. The building is therefore almost 'off grid'. It has 80% less greenhouse gas emissions than a similar-sized conventional new housing block (source: Gauzin-Muller², 2002 p. 154-156.).

Part 5

Facilitating

Over the years expertise has grown within the various City Councils and certain architectural practices to ensure the process runs smoothly. Roland Veith, the Freiburg city official in charge of Planning at Vauban, has informed the author that there is no single department in the Council that manages the process, rather the aspects to do with drainage, finance, planning etc are dealt with in the relevant department; while the principle of giving preference to citizens is understood as a core Council value.

An architect, or other professional with building experience, is appointed by the Council as a facilitator for each group. Typically a group gives itself a name ('Amöbe', 'Vis-à-vis' or 'Wohnen + Arbeiten' are examples from Vauban) and perhaps a logo. The generally enjoyable processes of creating a group identity, shared vision and team-building are generally left to the group themselves.

The facilitator ensures that the brief, design and funding arrangements move forward. A key step is for the group need to create articles of association. This is because it is the group that purchases the land, retains design team and contractors, not the individuals. This allows sharing of costs and also risks but requires close co-operation.

The risk of endless meetings or impasses due to, for instance, the colour of the external wall are great when groups are formed in this way. **Heinrich Reinhard Böwer**, a Freiburg architect with extensive *Baugruppe* experience, told the Author that the keys to managing the process are two:

- 1) Create an agenda for each meeting at the start of the process with everyone's agreement. Between 15 and 20 meetings is usual. Make it clear that all items on each agenda need to be resolved in that meeting. Nothing gets carried forward.
- 2) As brief formulation and design often have to start before the *Baugruppe* has the appropriate number of members, newcomers must accept all agreements of previous meetings.



The construction sign for Baugruppe 'Vogelnest' Freiburg, 2006

Financial & Legal aspects of developing

Having carried out a masterplan for the site, received tenders for Baugruppen and ensured their facilitation the Council then appoints one mortgage lender and one lawyer for all members of the group. This has many benefits:

1. While the group acts on the scale of a developer they have access to domestic mortgage rates and tax rebates that a developer would not have.
2. The mortgage rates the Council arranges are also preferential, better than an individual could obtain.
3. Legal costs are minimal as they are split many ways.

4. Each member pays for their own unit & the relevant portion of the building yet act together as one developer hiring a design team and building contractors
5. Mortgage sums are drawn down by each member in stages as needed to fund the whole development. This can be financially efficient.
6. Risk is shared

Contrast between commercial & *Baugruppen* development

The table below, translated from Ed. Thomas Melder et al. (2005) ⁴, summarises the social, economic and environmental benefits of *Baugruppe* procurement.

conventional model	vs	<i>Baugruppe</i> model
End price = market price		End price = material price: ~ 20% under market price. Direct impact on cost / environment
Profit + cost of venture capital 5-7%		No profit + no venture capital
Small influence in cost structure of development		Direct influence in cost structure of development
Standard		Individual, ecologically, energy-optimized
No layout flexibility		The creation of need-oriented dwellings
Anonymous living		High neighbourhood quality Social stability Identification with house and location
Uniform urban design		Urban diversity
Land & capital formation for the wealthy		Land & capital formation for low earners

It is clear these two modes of procurement are so different as to come from different paradigms. The conventional is based on maximizing output and profit while eliminating end-user influence. Success and end-user satisfaction is judged by how quickly units sell at the highest price the market will take. The *Baugruppe* approach turns this on its head: the 'market' and the 'developer' are unified. Affordability, quality and end-user needs dominate.

Surveyed costs

Mr Roland Veith, Freiburg City Council supplied the following figures comparing *Baugruppen* and the market price of developer-built units by email in August 2006. All prices are per m² of living space including the relevant portion of land costs. Bear in mind again that there is no developer's profit on the *Baugruppe* unit: cost of construction and land are the 'sale' prices

<u><i>Baugruppen</i></u>	<u>end price per m² of living space</u>
District Vauban	€1,800
District Stühlinger	€1,950
District Wiehre	€2,795

<u>Open market</u>	<u>sale price per m² of living space</u>
District Vauban	€2,200 to ~€3,150
General market (excl. city centre)	€2,000 to ~€3,130

These surveyed prices for District Vauban are between 57% and 81% of the price of dwellings bought on the open market. This is a startling difference for what can only be described as more desirable dwellings. Based on this an 80m² apartment in Vauban would cost only €144,000, less than half the price in Dublin, and a good deal better built.

The 'W&A' building was completed in 1999 for €1,227/m² (incl. VAT). As it's not clear from the sources used, let's assume for a moment that this figure excluded land costs (€409/m²). When added this makes the final cost for each of the sixteen *Baugruppe* families €1,636/m². Allowing for inflation this agrees closely with the costs Roland Veith lists for Vauban above. Considering the experimental nature of the building and the fact that it is to a more exacting energy standard than many other *Baugruppe* buildings this is impressive.

Part 6

Value for Money, Freiburg and Dublin

It is interesting to compare the cost of the 'W&A' building with a Dublin apartment building constructed in 2006. This is to try to assess the savings that might be available to a *Baugruppe* building in Dublin to that specification nowadays. Of course there is an element of estimation given seven years of inflation, the fact that Germany's economy has been in recession for some of that time while Ireland's has grown significantly. Construction materials may also have had different costs from the outset.

Let's assume that there has been 2.5% inflation year-on-year from 1997 to 2006⁷. The cost of constructing the 'W&A' building (excluding land, including VAT) in Dublin could be estimated to rise from €1,227/m² to €1,492/m².

The 2006 cost database of the Royal Institute of Architects of Ireland estimates the commercial construction cost of apartment buildings (with eight units or more), of standard construction, at €2,000 to €2,700/m². This excludes the cost of land, the developer's profit, professional fees and VAT. Add a modest 7% for profit, 10% for all building professional fees, 3% for estate agents & legal and 13.5% for VAT and this figure increases to €2,670 to €3,604/m². €3,137/m² is the median of €2,670 to €3,604/m². Note land costs are excluded.

€1,492/m² the updated figure for 'W&A' is less than half the cost of the median figure for a commercial apartment building, €3,137/m². Therefore a barely compliant apartment in Dublin could cost twice the price of a super low energy apartment in Vauban that is virtually off-grid and uniquely reflects the occupants' lifestyle requirements. Staggering. It is clear that Ireland and probably the UK need a significant 'injection' of Freiburg-style construction standards, cost control and the *Baugruppe* approach.

Is Vauban a Success?

All the indicators show that it is an unqualified success. The public infrastructure, the car ownership levels, the number of inhabitants, the quality of the construction, the level of international interest all point to it being an unqualified success. It would be interesting to see how much lower the overall energy consumption and carbon emission figures for the whole settlement are compared to other urban districts.

In the Author's view the combination of top-down leadership and bottom-up activism and participation also shows the way forward for those trying to create sustainable urban communities. City Councils have a clear lead to follow in creating sustainably-planned districts. While citizens seeking cheap land prices in a commuter belt housing estate or in creating an eco-village may flee to remote parts of the country, those wishing to stay in well-serviced cities near their jobs and relations can see how their voices and how they organise (as in Forum Vauban) can change policies and gain funding.

Both the creation of Vauban and Baugruppen can be seen as exercises in enlightened citizenship: an old-fashioned but very relevant concept. Both helped the development of what the Author has titled 'soft' systems from city down to local level by showing how participation in various organizational structures can give guidance at one level but empowerment at another. That city must be considered a more integrated stable place as a result.

Do Baugruppen Build More Sustainably?

In terms of environmental standards this is more difficult to isolate than one would initially think. *Baugruppen* in Freiburg tend to build in a context where certain levels have already been imposed. One website stated that 50 more *Passiv Haus* buildings were built at Vauban than were originally planned. The Author couldn't find confirmation of this elsewhere. If true this would be proof that *Baugruppen* approach does indeed encourage higher energy standards. But what of the greater sustainable picture?



Townhouse in Quartier Vauban, Freiburg, 2006

It seems clear, as is shown in 'Wohnen & Arbeiten' that people can be, and are, excited by being their own developer. Given the chance to realize a dream home knowing that a high environmental standard will not only serve them in the future but may be the key to a successful application for admission most Freiburgers have no hesitation in making ambitious plans. The trained facilitators help them realize these plans.

In terms of the wider sustainable picture it is also possible to say the following. Building using the *Baugruppe* process has:

- Increased the availability of affordable housing: because the buying power of an individual is augmented by the group they're in and costs are driven down.
- Led to a growth of socially-diverse, mixed-age settlements: because of the *Blockprofil* approval process.

- Literally created communities through the procurement process, because agreement is needed on the Baugruppe's vision, specific design features and because of all the chances to socialize before moving in.
- Encouraged urban, not suburban, style development that is family-friendly, attractive yet of a density that can support community facilities. This is because of the careful design of the masterplan but also the low construction costs of Baugruppe projects that attract families that might otherwise be forced to 'flee' to the outer suburbs.

Like the overall development of Vauban the Baugruppe approach is a fascinating mix of top-down and bottom-up interaction. While the resident-developers have got the building they wanted it has been a managed process. Architects experienced in facilitating the process and presumably familiar to the Council help the Baugruppe realize their dream while also keeping progress on track.

The Council are able to fit the project in greater masterplan and by appointing facilitator, mortgage lender and legal team help the process along at each stage. They ensure their citizens get the highest quality housing and importantly are seen to do so. Freiburg City Council is seen as one of the world's most progressive local governments partly because of their work at Vauban and with *Baugruppen*.

Conclusion

If a widespread paradigm-shift occurred in the understanding of the importance for environmental change of these 'soft' systems, the Author believes a huge increase in the use of 'hard' systems would then occur. But it would happen in a more holistic way as these systems would be seen more clearly to be part of the greater sustainable whole.

As is clear from the study of Baugruppen and Vauban what would also grow are strong communities, united by their vision and their struggle to create their dream home and community, something that is sadly lacking in modern Irish developer-led housing estates and apartment blocks.

Limitations & Wider Implications of This Work

It has been difficult gleaning information from websites using translation machines.

A key limitation of this work in the view of the Author is that there is little information about the final number of buildings built to certain standards. Part of the problem has been that most of the websites devoted to Vauban are old and go back to the end of Phase 1. This may be partly because the great driver of Vauban, Forum-Vauban e.V. was declared bankrupt in 2004, seemingly caused by the EU. All its web site information is therefore four years out of date. Vauban and its *Baugruppen* deserve a comprehensive post-occupancy assessment.

The challenge has been to extract enough information about Vauban, *Baugruppen* and 'Wohnen & Arbeiten', without drowning in detail, so that they elucidate not overburden this account of a fascinating approach to creating an environmentally-sustainable urban community. The Examiner will judge whether the Author has succeeded or not.

This work has direct implications for how city councils, architects, activists and citizens might go about creating sustainable urban communities. There is a significant depth of experience at council, professional and activist level in Freiburg and Tuebingen. The City Council have already published a book and started a road show to promote the Baugruppe approach throughout Germany.

This roadshow, or those speakers, could help create this model in the UK and Ireland. Given the growth in awareness in energy efficiency and Climate Change, and the success of Upton town council and BedZED there may be greater willingness at all levels than heretofore.

The Author intends to launch a one-day seminar on the subject in Dublin in 2008.

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