Local Approaches to a Sustainable Energy Future
Cities as Models of Sustainability
Urban Planning and Energy Efficiency

"Freiburg – a model for sustainable, continuous, high quality city development – with the examples of the new suburbs of Rieselfeld and Vauban"

Profile of the city

The city of Freiburg is located in the south of the Federal Republic of Germany – approximately 20 km from the French and about 70 km from the Swiss borders. From Frankfurt airport Freiburg can be reached by Intercity train in about 2 hours; from the airport Basel/Mulhouse in a ¾ hour drive by the airport bus.

Freiburg has a population of approximately 205,000. In contrast to many other cities in Germany, Freiburg is in a region which has an influx of people. I have been responsible for the development of building in the city since 1984 – and in this time the population has grown by over 20,000 inhabitants, a trend which is still continuing today, in contrast to many other cities in Germany. Freiburg is a center for science; the university with about 30,000 students is the largest employer. Many aggregated institutions and renowned research establishments are affiliated to the University; the city has no industry worth mentioning, the main focus of employment is the service sector.

City development and building has played a significant role for many years. This sector has been an important economic factor – possibly even the most important factor – in the city and the region. The new suburbs of "Rieselfeld" and "Vauban" – about which I will speak in a moment – are well-known far beyond the boundaries of the city and Land for their urban development and their financial and ecological planning. These are model suburbs which have gained high recognition from specialists in the field of city development.

The city and its local region, with a population of approx. 750,000, is in an area of Germany which has more hours of sunshine than any other. A select group of people recognized the advantages of this location as far back as 25 years ago and worked with great determination to develop solar technology. In the meantime, international institutes specializing in research into regenerative energy sources have settled in the city, such as the "Fraunhofer Institute for Solar Energy Systems", the "Solar-Info-Center" and the "ICLEI Institute".

On February 16th of 2005 the "Kyoto Protocol" came into effect, with the obligation to reduce emissions of CO_2. This was a major signal for the countries in the German Federal Republic – in fact for all local authorities – to develop ideas and models for forward-looking energy supply systems. City planning and its implementation have therefore taken on an even more important and responsible task for the future.

The focus of city development

In city planning and development, Freiburg has always developed along its own special lines compared to other cities in the Federal Republic of Germany. For decades, the city has followed a concept of internal development and city planning on the basis of local public transport (Öffentlicher Personennahverkehr - ÖPNV). The model of a "compact city" with a mixture of widely diverse usage in the structure of areas of land has been continuously planned and developed for decades. Continuity and quality – that is, the development of planning, from the idea to its implementation, plays a key role in the success of this overall model of city development.

The tram network along the city planning development axes forms the backbone of this development. The objective of the city is to steadily increase the proportion of public local traffic (tram and bus) as well as cyclists in a "Modal split" whilst minimizing the proportion of car traffic. The degree to which costs are covered, i.e. the sum of money obtained from the operation of the tram, is over 80%, the highest in the Federal Republic of Germany.

After the destruction of the Second World War Freiburg was rebuilt in the old way but with new ideas in the city development. For example the main streets were widend so that is was possible to install the pedestrian area in the seventies. As material small

stones from the Rhine river were taken for the pavement – including the small water channels from the Middle Ages which are now a symbol of the city.
In the fifties, sixties and seventies the city grew in a continuity – that means, the population grew from 80.000 persons in the fifties to 180.000 at the beginning of the eighties – and till today the population grows every year.

Re-densification– that is building in a developed area – has been a further important feature of the development of housing in Freiburg. The objective is to exploit the full potential of existing infrastructure and to minimize the encroachment of the city into open areas on the edge of the city. This development can be described as "fresh cell therapy" as it rejuvenates the population in developed areas of the city with an aging population. In the development of city areas, close attention is paid to the objective of creating areas of mixed usage and particularly to closely linking green areas to guarantee close access to areas for leisure and recreation.

The design of public areas has always been regarded as a key task. It has been proven that such measures lead to social stabilization in developed areas.

Since the mid-80s an important feature has been minimizing the use of energy – thereby reducing the emission of CO_2. Photovoltaics; wind power; hydropower; biomass energy, and, as an important new aspect, research into and the application of geothermic energy are important factors to be considered in town development. An additional factor is the exclusive construction of low-energy housing and the increase in the building of passive housing. At the end of the 90th the city parliament enacted a law to reduce the energy consumption by about 10% of the total need.

Space-saving, low-resource building, a reduction in energy consumption; careful and cautious treatment of water as a resource, as well as promoting the use of local public transport should all be basic principles of urban development worldwide.

The new suburbs of Rieselfeld and Vauban

At the end of the 80s the city decided to plan two new residential areas, with construction commencing at the beginning of the 90s. These had become necessary due to the huge demand for housing and the increase in the living space required per person,

which is currently approx. 38 m². The areas in both projects belonged to the city of Freiburg or had been purchased by the city of Freiburg and the objective was to achieve "self-financing" – in other word, all measures undertaken within the planning area had to be refinanced through the sale of the plots of land.

Both projects were preceded by a town-planning and landscape-planning competition with clearly defined targets. In each case the prize-winning entry was implemented.

- **Rieselfeld**

  Town planning concept

  A town planning competition with clearly defined requirements was held. The project has been realized since 1994.

  The following were the key points of the town planning policy:

  - the building of a suburb with (for German conditions) high density – a floor space ratio of over 1.0 with mainly multi-storey residential buildings with maximum 5-storey construction;
  - parking in principal in garages below the houses;
  - town planning implementation in four part development plans to be implemented at intervals of two years in order to be able to react to any current developments (principle of learning from planning!);
  - particular consideration of the needs of women, families, the elderly and handicapped people;
  - mixed areas with residential buildings and places of employment (objective: approx. 1,000 jobs);
  - the creation of different types of residential property; a mixture of privately financed and subsidized housing; of owner-occupier and rental accommodation as well as initializing model projects;
  - consideration of small plots for a wide range of different types of buildings (small plots with high density!);
  - future-oriented traffic system with priority given to local public transport (ÖPNV), pedestrians and cyclists, as well as a speed limit of 30 km/h throughout the entire area;
  - objective for local public transport (ÖPNV) (tram): when the first resident moves in, the tram must be running to the area!

- public and private infrastructure based on need (shops, doctors´ practices, schools, kindergarten, religious buildings);
- implementation of a comprehensive concept for public participation from the planning stage to realization;
- implementation of ecological objectives
- the linking of green zones.

- **Ecological concept**
  - The energy concept

    Low-energy construction (65 KWh/m²) in the whole area, district heating with combined heat and power, by using regenerative energies (solar energy/heat pumps/wood pellet heating)
  - The water concept:

    it is a basic principle that rainwater falling on the planning area should not run into the water treatment works. Separate collection of surface water; biological channeling into an area of reeds to the west.
  - The ground concept:

    Minimization of sealed surfaces:
  - The green area concept:

    communal areas between blocks, high standard green areas interlinking suburbs; network of signposted paths.

- **Social and cultural life in the suburb**

  A comprehensive resident participation concept was carried out parallel to the town planning concept.

  Included in the social infrastructure are: grammar school, primary schools, play schools, a youth center and cultural center as well as an ecumenical church center (Catholic and Protestant in one building).

It should also be pointed out that, as a result of the new suburbs of Rieselfeld and Vauban, the exodus of young families to the surrounding countryside has been completely halted, thus making a further contribution to minimizing the movement of vehicles.

The new Vauban suburb

The "Vauban site"– a former area of barracks used by the French army – had an area of approx. 41 ha. In the early 90s Freiburg purchased this site from the Federal Republic of Germany. Here too – as in the case of Rieselfeld – a town planning competition was carried out with clear planning guidelines. The development scheme was planned on the basis of the prize-winning entry, which envisaged varied areas along a main axis with a tram and a junction with the city railway system. The core feature of this area is to create totally car-free sectors. Small plots with dense use and distinctly differing development schemes contribute to the unique appearance of this suburb. A solar garage for the car-free sector has been constructed on the through-road.

Business structures have been accommodated in small units in this area. A wide range of forms of residential accommodation are included, from joint property to part-owned property, as well as normal rental accommodation and subsidized housing. Student apartments have also been built in the area; and alternative forms of living have been integrated.

Development has been kept to a minimum. The proportion of public development in the total area is as low as 17%. Intelligent systems have been integrated for rainwater; surface water and rainwater from roofs is channeled through open paved gutters and fed back into the ground water.

Residential housing has been constructed according to low-energy standards (65 KW/h / m²). Heat is supplied by a power plant powered by wood chips and a district heating power station (DHKW). Passive houses (15 KW/h / m²) have also been constructed within this area.

A "solar settlement" has been developed within the planning area. "Energy plus houses" have been constructed by a Freiburg architect. These houses are built in such a way that, in conjunction with solar elements, they produce more energy than they consume. The surplus energy is fed into the net. The house owner sells the energy and receives corresponding financial remuneration from the energy company.

Due to the wide variety of architecture, the broad social mix and varied ecological objectives, the "Vauban site" is well-known far beyond the borders of Germany. The "Vauban site" with its multitude of striking features can be justifiably called a "colorful area".

Summary:

It is absolutely essential that town planning worldwide forges new paths. As well as the basic concepts, the entire ecological aspect must be looked at anew. A reduction in CO_2 emissions; a reduction in the usage of land and the intelligent use of water as a resource are the foremost objectives. Concepts in the areas of traffic, city planning and project planning must be resolutely followed. A whole range of totally new tasks present themselves. High savings in energy consumption are possible for new buildings and existing old building substance – with a consequent significant reduction in the emission of CO_2. This opens up a highly interesting range of tasks for architects and engineers worldwide.

The city of Freiburg has just approved a new land-use plan. This planning concept for the entire city reinforces the principle of internal development – preserving natural resources. The city of Freiburg is giving full support to ecological development in the future, too, and is following the objective of continuing to build a "compact" city – and by following this concept – you save energy and reduce the CO_2 emmissions.

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Enclosure:
Power-Point-Presentation