

Rolf Disch, Solar Architect
Green Roofs and Renewable Energy



Problems and Solutions

Half of our energy consumption comes from our constructing our buildings and from living in them. Fossil fuels are running out. The green house gas, produced by burning these resources, heatens up the climate – with enormous follow-up costs for global economy. Energy prices are rising, so that the side costs for a flat have become a crucial financial factor.

There are solutions to this problem. A faint-hearted aim like prescribing a 30 % reduction of CO₂-emission within 30 years – this is not a solution. We must be far more ambitious, and we can! The aim must be: 100 percent regenerative energy supply and zero emission. For new buildings – but also in other fields – this is possible, and it can be achieved at competitive prices.

The Plusenergy House

In 1994, my architect's office designed the first building world wide to generate more energy than it consumes: the Heliotrope. The whole building turns with the sun, and it produces several times its ener-



The Heliotrope in Freiburg

gy consumption. The experiences gained with this pioneering and experimental project was then translated into a Plusenergy House which can be built everywhere, for residential, commercial and other purposes. Today, it has been developed to the point that it does not only produce a surplus in energy, but also in money: The additional investment compared to a conventional building – which today is defined by the Federal Energy Saving Act (EnEV) – might be 10 to 15 percent higher, but this pays off from the beginning because of the immense reduction of energy consumption and because of the solar electric power fed into the public grid.

The technology is there to build Plusenergy Houses everywhere: The roof becomes a solar power plant. Insulation, ventilation and glazing technology lower the energy demand to 15 kWh/m²a. This concept was first realized with the Solar Settlement in Freiburg: 50 homes, the commercial and office building “Sun Ship” and another nine penthouses on its roof save a yearly 200,000 litres of oil and generate 420,000 kWh of solar electricity. The housing estate is run completely CO₂-neutral and



Plusenergy Houses



Solar Settlement in Freiburg - in the background: Sun Ship with penthouses

does not burden future generations with any environmental damage.

Light flooded, cozy rooms for living and working, this generates a quality of life which is meant to prove that ecology is far from being ascetic, but inspiring and – in a good sense – even luxurious. The Solar Settlement was financed, built and marketed by a developer company that was specially founded for this project. The refinancing by means of selling shares of four “Freiburg Solar Funds” and two “Sun Ship Funds” is now successfully finished. Against all odds, a solar model housing estate was not only built, but also found a solid financing and turned out to be an economic success. Now, the next step must be to spread the concept world wide.

New concepts for homes and housing estates

For that purpose, a Plusenergy House modular system was designed. Part of this system is a prefabricated “core cell” called the “Power Box” that integrates all functions. In a campaign of our office, all German mayors received a letter and information material, in order to get local politics on board.

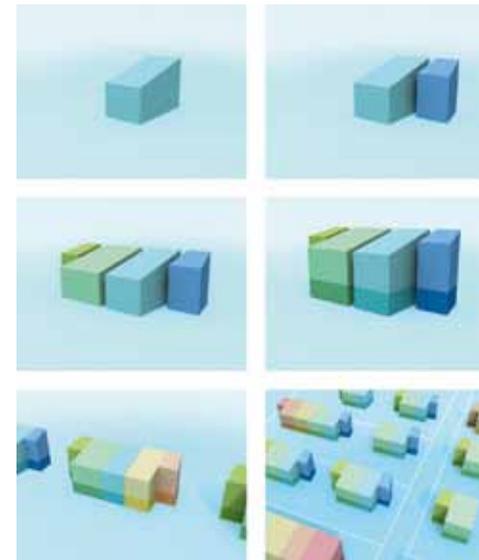


The office and commercial building „Sun Ship“ – with nine penthouses on its roof top

What we offer is a highly variable Plusenergy concept for single, double, terraced houses and for complete housing estates – with different floor plan sizes, different roof forms and variable numbers of storeys. Moreover, we offer services and consultancy in energy concepts, financing and marketing. We have been in contact with over 300 municipalities. A number of master plans have been designed, and a number of projects will soon be realised. With the further development of the Plusenergy House, there has been considerable progress in the energy balances. A monitoring study of Wuppertal University shows that the Solar Settlement houses generate an average surplus in primary energy of 36 kWh/m²a. With our newest projects we would now be able to reach an energy balance of 120 kWh/m²a or more.

Green Roof Landscape

The Plusenergy House reduces the energy demand and gains energy through active systems. The pent or saddle roofs of the residential buildings, which are orientated towards the south, become large PV installations, which can be supplemented by solar thermal collectors. But there is more to sustainabi-



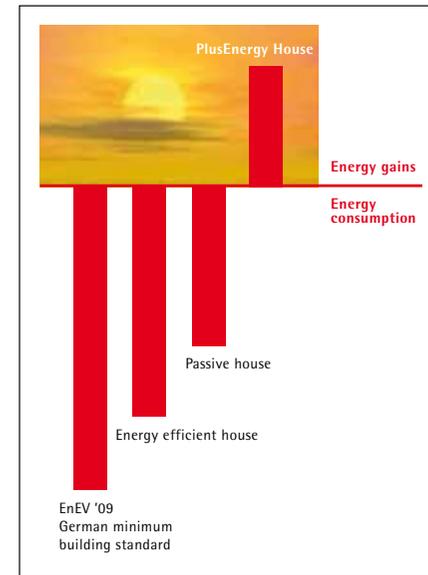
Modular elements



„The Plusenergy House in Every Community“ - a campaign

lity in building than just the energy issue. Ecological buildings need not be ascetic. On the contrary, the idea is to create attractive living spaces. And for that, traffic, water, free and green space management must be optimized. We need generous free space between the houses – for technical reasons, since no house must cast a shadow on its neighbour, because we need the light to fall freely on the PV systems and deep into the rooms. And these free zones become especially attractive when they have a “green” design. For these reasons, the roof top of the Sun Ship – the office and commercial building of the Freiburg Solar Settlement – became a green roof garden landscape, in which four rows of penthouses are embedded.

As its name suggests, the Sun Ship plays with the formal idea of a ship, a Rhine steamboat - gathering way into a solar future. This idea is repeated in many details of the garden and landscape planner Klaus Scheuber’s design: The gardens’ lines ascend in the direction of the neighbouring houses, so that you can have plants with deeper roots on those sides. The garden landscape thus seems to undulate



Comparison of primary energy consumption / generation (room heating, hot water, electricity)



A walk in the clouds - a Plusenergy penthouse on the Sun Ship

with its changes from troughs and crests. At the same time, the higher segments screen of the gardens from the neighbours' view. And the benches have the form of little dinghies.

The living rooms of the houses face south, and their façades are glazed from the ceiling to the floor. The transition from the rooms to the terraces and balconies and further on into the gardens seems blurred and fluent. The view from the Sun ship roof top then is drawn further onto the Black Forest mountains or into the Rhine Valley. In the middle of an urban setting, the roof architecture creates a living space with an intimate connection to nature. And the ecological and energy concept finds its perfect match in a green roof.



Please find further information here:

www.rolfdisch.de

www.solarsiedlung.de

www.plusenergiehaus.de

