

1-1-2013

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## Recommended Citation

Kämpfen, Beat (2013) "Less Is More: A Vision Rethought for the 21st Century," *Oz*: Vol. 35. <https://doi.org/10.4148/2378-5853.1518>

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## Less Is More

### A Vision Rethought for the 21st Century

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#### **Beauty and Economy**

“Less is more”—Ludwig Mies van der Rohe’s famous statement—defined the paradigm with the largest influence on design of our cities and architecture over the second half of the last century. During this period, the main public interest in architecture was to be found in rapidly increasing the speed of production while at the same time lowering construction costs. Economy was the driving force; realizing more with less labor and less material was the goal. This was helped by a simplified and purified aesthetic code that prescribed what was beautiful. Architectural design became universal and a new search for the secrets of beauty in architecture began. This universality also led to more democratic, more cost-efficient aesthetics, resulting in simple, beautiful buildings designed with large amounts of glass. Large spans, open spaces, and light became essential elements of architecture. However, as the design of these buildings often neglected their specific local environmental and climatic conditions, they required an enormous amount of technical support and energy to make their indoor environment comfortable for the users. These buildings have also aged poorly due to a lack of understanding of building physics at the time of their construction. Of all the different aspects, this architecture only considered economic sustainability. Traditional architecture, on the other hand, has always respected all aspects of sustainability. For

centuries, architecture was adapted to local climate conditions and was built by local craftsmen using local materials. Sustainability was a must; otherwise a building would not last long. Decisions made disregarding sustainability in the past have had repercussions that are still visible today. A well-documented example of this is the heating system used in ancient Rome. In order to heat villas and baths using hypocaust air, wood had to be burned in non-sustainable quantities. By the time all the trees in the adjacent hills had been felled for this purpose, soil erosion had turned a previously wooded, mountainous region into a treeless landscape. The over-consumption of a few centuries meant that later generations inherited unusable land.

In the years since Mies van der Rohe made his famous statement, greater wealth and better and faster construction methods have allowed our towns and cities to grow exponentially. Over the past 50 years, the population of the world has doubled and energy consumption has increased fourfold. Thanks to rapid progress in medicine and longer life expectancy, the growth of humankind will continue, yet we are still planning our cities and houses as if space and energy will always be available in abundance. Some countries are now running out of land on which to build, natural landscapes are being destroyed, and fossil fuels are coming to an end. After a period of rapid growth seemingly without limits, values will have to shift if humankind wants to survive.

#### **Energy and Ecology**

Nowadays the statement “less is more” is still valid, but can be given a new meaning and understood in a much broader sense. On our shrinking planet it has become a key public interest to create buildings using less resources and materials that can be easily produced locally and that can be recycled or reused, making the most of their embodied energy. It is also in the public’s interest to design houses that consume less energy for their operation. These are now the main goals of ecological and social sustainability. In a political sense, they may also guide the way to a more peaceful and equal world. After the age of “more” in developed countries we should now enter the age of “less” in order to give third world countries the chance to achieve the same quality of life that is available to us.

In developed countries, buildings are responsible for at least 50% of overall energy consumption. Architects and engineers are therefore key agents of change and contribute a great deal to creating a more sustainable world. Three main strategies can be used to reduce energy consumption and the CO<sub>2</sub> content of the atmosphere. These strategies can be applied to every planning or building project and, if adapted thoughtfully and carefully, will lead to a more sustainable future.

#### *Substitution*

Climate change is probably the greatest threat to the survival of humankind and minimizing global warming is, at the moment, perhaps the most

important public interest of all tasks to achieve. As the warming of the climate is a very slow process, and a very difficult one to stop, all forms of energy harmful to the environment have to be replaced as soon as possible by less carbon-intensive sources. It took millions of years to produce the fossil fuels that have now been burnt within a few centuries. It is likely that existing fossil fuel reserves will only last a few decades or a few centuries at the very most. We can no longer rely on these energy sources; but for this very reason there is hope that global warming can be controlled. The fossil fuel age only represents a very short period in the whole span of human history. The age of solar power is inevitable and has already begun.

#### *Efficiency*

Greater efficiency is essential for all our buildings and technical systems. With regards to efficiency, a traditional interpretation of the idea of “less is more” is a simple but crucial driving factor. Human beings have always tried to invent strategies and tools for a more comfortable life. As a direct illustration of Mies van der Rohe’s idea, humankind has always sought to optimize objects and processes to gain as much as possible from as little as possible. As we now want to consume more and more, it has become not only an economic, but also an ecological necessity to produce everything with less: less energy for the production of building materials, less toxic material, less waste, less impact on the environ-



*SunnyWatt Condominiums, Watt, Zürich*

ment as a whole. With increasingly limited resources, recycling or so-called “cradle to cradle” processes will become the norm in the future. The buildings that we demolish will become our quarries for the houses of the next generation.

### Sufficiency

Ultimately, we must ask ourselves the most crucial question of all: How much does a person really need to have a good life? How much space? Are 30 square meters enough or do we need 50 for our place to live? How much comfort is really necessary for a sufficient standard of living? Is an indoor temperature of 68° Fahrenheit

enough or do we need 72°? Is cooling a necessity or can we simply accept that indoor temperature is higher in summer than in winter? Wonderful Japanese traditional houses had paper walls—a limited shelter, but one of great beauty. The goal of houses such as these was not ensuring a constant indoor climate all year round, but rather creating a beautiful living environment that also provided a sufficient, but not unnecessarily high level of comfort. This was the purpose of all traditional architecture: to use passive means to provide a sufficient standard of living and sufficient comfort. We defined the architectural form and design of

our buildings and cities, as well as the organization of our lives, to this end. Over the past 50 years, the principle of sufficiency has often been forgotten. It is now imperative that we ask ourselves these questions again and redefine our answers.

### What We Need to Achieve

If architects and planners are to successfully use the strategies of substitution, efficiency, and sufficiency, how do they apply them to building design and what specific challenges do these strategies involve? What are the questions we must ask with relation to different scales of projects? In the following section, a few examples of the work of our firm are presented. These projects, while differing in terms of use and scale, and in terms of annual end use energy and form, are all linked by a new holistic understanding of sustainability. They also are all entirely light-weight timber constructions, they all have a very good balance concerning the embodied energy, and are net zero buildings regarding the energy for operation.

### Paradigm Shift

In Switzerland and Northern Europe, a paradigm shift is perceptible: it is becoming more and more attractive to use less energy. At the moment, Switzerland is 80% dependent on imported fossil fuels. Taken as an average across Switzerland, each person consumes around 55,000 kilowatt hours per year, equivalent to 6,000 watts per person of constant power: the energy equivalent of running one-hundred 60-watt light bulbs all day long, for the whole year. This is the amount of energy we require to provide us with all the amenities we wish to have. In the United States consumption is around 12,000 watts per person, while in Bangladesh each person has to make it with 300 watts. The global average at this point in time is 2000 watts per person. Seen from a social perspective, everyone

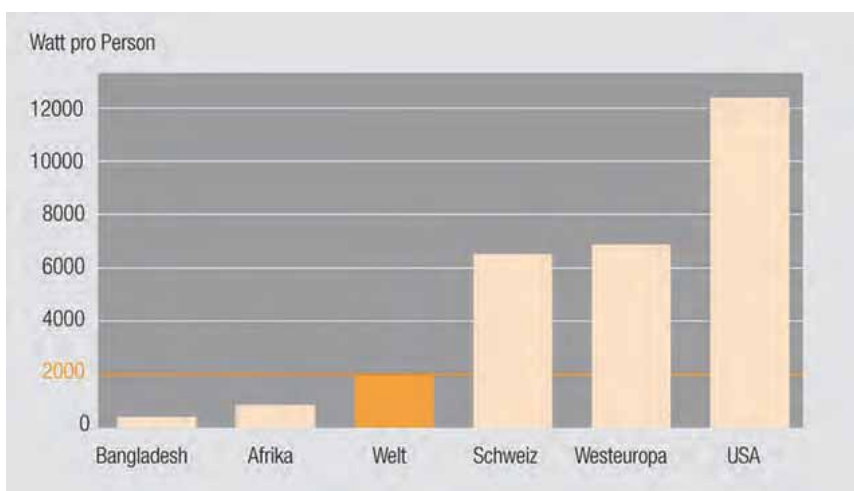
on Earth should be able to live a good, comfortable life within this energy budget. The Swiss Institute of Technology (ETH) developed the model for this “2000-Watt Society” over ten years ago. Four years ago the city of Zürich decided by public referendum that politicians should try and achieve this goal by 2050. Until the 1950s Switzerland was, in fact, a 2000-watt society. Buildings designed according to the principles of the 2000-Watt Society are only allowed to use half this amount. Our buildings, as well as those of other architects, show that it is possible to sustain or even increase our living standards within this restriction.

### Revival of the City

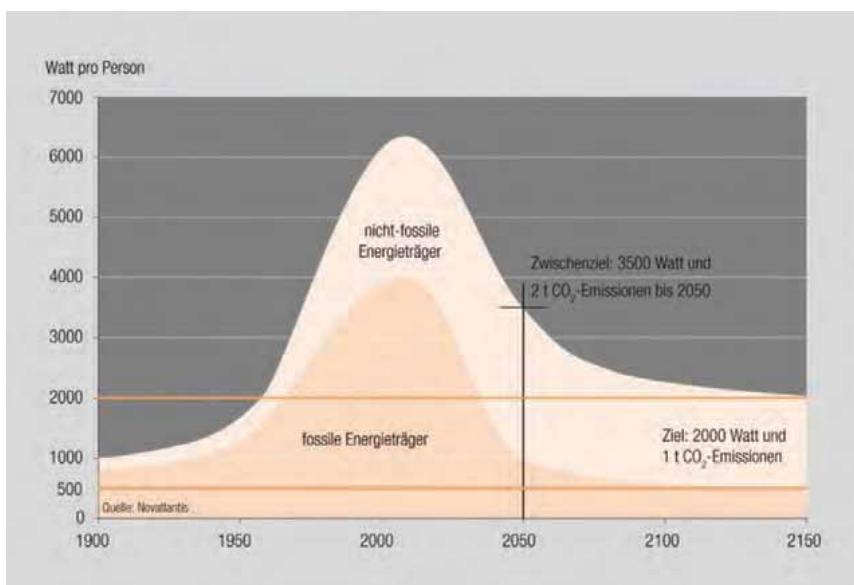
Old towns in Europe had a high population density; people had to live together for reasons of communication, safety, and sometimes also shelter. In the past only farmers lived in the countryside. The invention of the automobile changed all this, suddenly making the countryside accessible to people working in offices in the city and allowing them to take advantage of the opportunity to live in their own houses in the suburbs. In densely populated countries like Switzerland, however, the trend has reversed. As owning your own house in the suburbs is no longer easily affordable, and as traffic jams increasingly become the norm, people are deciding to move back into the cities. Many now prefer an apartment in the city to a detached house in the suburbs.

For centuries, buildings in cities and towns were mixed-use units. On the first floor there would be a store, and in the basement a workshop to produce the goods for sale. The upper floors housed living quarters. Traffic and transportation were minimal.

Zoning and city planning should encourage mixed-use developments. Structurally, individual buildings



Energy consumption of different countries



Model of the 2000-Watt Society

should also be able to accommodate different uses: a range of apartment sizes, offices, shops, and restaurants.

The Mühlebach project is located in downtown Zürich. This six-story timber building has a structure that is designed to allow a high degree of

flexibility and adaptability. The lower three stories are now being used as office spaces, the upper three as apartments. This could easily change over time, however, as all interior walls can be moved to allow different spatial configurations.

*Mühlebach project, Zurich, 2010*

*Mixed-use development*

*Prefabricated timber structure (not externally exposed)*

*Energy and ecology label: Minergie-P-Eco*

*Annual energy consumption balance: 20kWh/a*



*South façade produces energy by solar collectors*



*North façade integrates in the urban fabric*

### *Lively Neighborhoods*

On the broad spectrum of human habitation, there is the urban scale at one extreme and the scale of the individual apartment at the other. In between are key gradients of scale and community. Apartments or houses should be organized as parts of larger entities, so that neighborhoods and places can develop where people can

meet. Architecture helps children and grown-ups find friends while a sense of a larger community evolves and people feel safe. The SunnyWatt project with 20 condominiums respects all scales of community and all dimensions of sustainability. A variety of differing housing units for residents with different budgets are assembled around a courtyard. Terraced houses

with private gardens are built adjacent to apartments. At the center is a plaza where neighbors meet, as well as special spaces for children to play. All buildings are prefabricated lightweight timber constructions.

### *Ecology via High-Tech*

Traditional houses were always designed to adapt to the local cli-

mate. The discovery of fossil fuels made heating and cooling easy and cheap. They allowed the problems of poorly constructed architecture not designed to the local climate to be corrected by technical systems. The movement away from using fossil fuels means that energy efficiency and working with the climate have again become priorities.



48 *SunnyWatt Condominiums, Watt, Switzerland, 2010, timber-clad, prefabricated timber structure, energy and ecology label: Minergie-P-Eco, annual energy consumption balance: 0 kWh/a*

To design an energy-efficient building, a few key measures are necessary.

Firstly, energy losses through the building envelope have to be minimized. The cheapest way of doing this is by using a thick layer of insulation. Insulation is also the best way of stabilizing interior climate and ensuring thermal comfort. Secondly, in a northern climate passive solar energy should be allowed into the building in winter, but should be kept out in the summertime. In the Kürberg house, loggias on the west façade prevent overheating while also creating a pleasant outdoor space for the building's residents. Thirdly, technical equipment must be adapted and appropriate to the specific design of the building. In this case, active solar components become part of the architecture itself. Solar thermal collector tubes define the space of the loggia while also producing hot water. This solar component works together with a geothermal system. The roof is clad entirely in photovoltaics, so that electricity can also be produced in-house. As batteries are currently still too expensive, the local power grid is used for electricity storage. Over the course of a year this building, housing three families, has a net zero energy balance.

Energetic and technical measures are, however, only there to enhance the architecture and to support the primary goal of making beautiful and comfortable spaces for a building's users. At the end of the day, it is still all about architecture, the art of creating spaces, which are useful and enjoyable as well.

#### *Simply and Ecologically Built*

For as long as there have been buildings in Central Europe, timber has been a traditional building material; 20 years ago, it had been almost forgotten. Now, however, we are experiencing a "timber revival," in

which new construction methods have been developed using cross-laminated panels. Computer-aided design and production have made standardization superfluous: prefabrication of large timber elements is now possible in the workshop. Elements can be built indoors, unaffected by the weather. Speed of construction and quality of detail have increased and improved accordingly. The ecological footprint and the embodied energy of wood are also very low. Intelligent, simple detailing and well thought-out solutions help us rediscover the beauty and clarity of the buildings of Mies van der Rohe in the projects of today.

The headquarters building of the Marché restaurant company has a simple structure that not only allowed a very rapid planning and construction process, but also creates flexible office spaces. Balconies shading the south façade prevent overheating and give workers an outdoor space where they can take their breaks. Technical systems are also designed to be as simple as possible and to act as part of the architecture itself. Half of the south façade is made of a translucent phase-change material that stores solar energy during the day and releases it at night. This simple architectural element helps stabilize the interior climate.

#### **Conclusions**

The 20th century was the time of the architecture of light, air, and space. It was also a period of growth and increasing wealth. "Less is more," originally defined as an aesthetic paradigm of formal reduction, simplicity of details, and repetition of elements, had a huge influence on the higher speed and lower cost of construction. These factors had an enormous influence on the architectural design and can be seen in any business district around the world.



*Kürberg House, Zürich, Switzerland, 2011, prefabricated timber structure (not externally exposed), energy and ecology label: Minergie-P-Eco, PV on the roof, energy consumption balance: 0 kWh/a*



*Comfortable loggia shaped by high tech elements in Kürberg House*

Unfortunately, this paradigm also opened the doors to speculative and less well-designed buildings.

In the 21st century, “less is more” can be given a new additional meaning of high actuality and importance. In addition to fewer and simpler details, it means less energy for operating a building, materials with less embodied energy, and, generally, less impact on the natural environment. Today, there is a strong public interest de-

manding that architects, designers, and engineers conceive buildings that do not affect the environment and natural cycles negatively. Already, as shown in the examples, it is possible to develop, at comparably little extra expense, buildings that no longer consume external energy and no longer do harm to nature. In the near future, a majority of buildings will become power plants, producing all the energy they need for themselves. In a further step, buildings

will also produce the energy required for transportation. Houses and office buildings will provide plugs to charge E-cars with solar power to allow commuting from home to office. Buildings will become self-regulating, controlled by the weather forecast. Intelligent materials will adapt to the weather, the cycle of day and night, and the seasons. Buildings will not be considered as a sum of assembled, but somehow independent elements, but as an intelligent system that is

able to work more efficiently in order to consume less of everything. Architects and engineers will need to study natural and biological processes and try to introduce these into their architectural design. Humankind will not be able to survive if the principles of nature are further neglected. Can there be any greater public interest than this?



50 *Exposed wood interior space*





*Marché Headquarters, Kempthal, Switzerland, 2007, office building, prefabricated timber structure, energy and ecology label: Minergie-P-Eco, net zero energy building: 20 kWh/a*