



On the way to the 2000-watt society

Zurich's path to sustainable energy use



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www.stadt-zuerich.ch/2000watt

April 2011



Dear readers,

In November 2008, the people of Zurich voted, with a large majority, in favour of sustainable development of their city. In concrete terms: the goal of the 2000-watt society is now in our municipal code. The 2000-watt society: an ambitious goal that

calls for enthusiasm and conviction, a far-reaching perspective and a lot of patience. The idea behind it, is that a “lighter” life, which has less impact on the environment, can also be a better life. It means that we all consume considerably less energy and only cause CO₂ emissions at a fraction of today’s level. It also means that with efficient energy use and renewable energies, we can abandon nuclear power, making Zurich environmentally friendly, climate-friendly and very well prepared for a future in which the scarcity of resources will play an increasingly major role. In order to achieve the 2000-watt society, we must act on various levels: alongside the political will and appropriate guidelines, it also requires, for example, more renewable energies, energy-efficient buildings (both old and new), and a city in which people get around very well on foot, by bicycle or with public transport. And it requires everyone to get involved. This booklet gives an insight into how far the City of Zurich is along the path to the 2000-watt society. I look forward to going some of the way down this path together with you.

Claudia Nielsen, City Councillor

A handwritten signature in black ink, appearing to read 'Nielsen'.

Head of the Department of Health and Environment



Dear readers,

The 2000-watt society is a huge, ambitious, long-term goal – a project for many generations. That makes it all the more important to pursue this goal with dedication and persistence, and not to lose sight of it. You, I and all of us have the opportunity

to bring the 2000-watt society a bit closer – for instance with the little decisions we make every day: putting seasonal fruit and vegetables in the shopping basket, cycling to work, or heating our home with moderation in winter and thus wearing a pullover instead of a T-shirt. But we can also set the course for 2000 watts on a bigger scale: with an energy-efficient renovation of our house, we invest in the climate while saving energy and money on the long term. Buying a somewhat more expensive, but long-lasting and efficient appliance pays off. We must make political, strategic and planning decisions in harmony with our 2000-watt vision, because they have long-term effects and can be decisive factors in aiding, or indeed hindering, the achievement of this goal. I would like to encourage you to take the 2000-watt vision on board. You will find fascinating solutions. Start today – coming generations will thank you.

Bruno Hohl

A handwritten signature in black ink, appearing to read 'Bruno Hohl'.

Director of the Office for Environmental and Health Protection Zurich



Summary

On 30 November 2008, the City of Zurich made a groundbreaking decision. Over three quarters of the electoral roll voted in favour of Zurich doing the following:

- Committing to sustainable development.
- Reducing its energy consumption to 2000 watts per person.
- Reducing its annual CO₂ emissions to one tonne per person by 2050.
- Promoting renewable energies and energy efficiency.
- Not renewing its investments in nuclear power plants.

With this strategy, Zurich wants to contribute to combating human-induced climate change, but there are also social, economic and ethical arguments which speak in favour of lower energy consumption. As a 2000-watt society, Zurich is better equipped for times of scarce and expensive energy resources, but the fact that the goals are set in the municipal code does not mean that they have yet been achieved. This requires effort on the part of the city administration, the residents and the local economy, but also good cooperation with political bodies at higher levels, namely the canton and the Federal Government.

Structure of the booklet

The purpose of this booklet is to provide an overview of the City of Zurich's path to the 2000-watt society, for interested laypeople and experts alike. The **first section** (pages 6 to 10) provides background information: Where does the 2000-watt idea come from? What is behind it? How much is 2000 watts anyway? How much is a tonne of CO₂? Why were these goals chosen? The glossary on page 6 is intended to explain the most important terminology to readers who are less familiar with the topic of energy.

The **second section** (pages 11 to 26) explains how Zurich intends to reach its goals. The measures range from the provision of a methodological basis, through to the construction of a retirement home which is exemplary in terms of energy, from raising the public's awareness, through to energy consulting, from efficiency incentives, through to a mobility strategy, and from everyday procurement in city administration, through to future scenarios for the city-owned energy companies. In an interview (pages 18 to 19), Rahel Gessler from the Office for Environmental and Health Protection Zurich and Bruno Bébié, Energy Deputy for the City of Zurich, talk about the plans, their implementation and the associated opportunities and difficulties.

Finally, the **third section** on pages 28 to 30 asks what the resulting costs are likely to be, where the City of Zurich stands with its energy strategy with regard to its surroundings, and whom it is cooperating with.

For many, the 2000-watt society is a new concept that raises questions. Scattered throughout the text, you will find frequently asked questions – and possible answers to them.

For a lighter life

The idea behind the 2000-watt society is that a “lighter” life, which requires less energy instead of always consuming more, is not only an ecological necessity, but can also be a better life. The city administration and city-owned companies are taking the mandate assigned to them by the voters seriously. However, in order to achieve the goal, it will also be necessary for residents, house owners and the business world to all pull together.

Zurich cannot solve the climate crisis, nor the expected scarcity of oil, nor the uneven distribution of resources worldwide, but it can make its contribution – and in doing so, it will also benefit in its own right.

Glossary

Energy Energy is defined as “the ability to do work”, whereby producing heat or light is also considered to be “doing work”. Motion, heat, light and electricity are different forms of energy. Energy is measured in joules (J) or kilowatt hours (kWh).

Power The conversion (production or consumption) of energy per unit of time, measured in watts (W). One watt is equal to the conversion of one joule of energy per second. Horsepower (HP) is also a unit of power: 1 HP equals 735 watts, the output of a workhorse

Primary energy, final energy and effective energy The 2000-watt methodology defines primary energy as the total energy present in the original energy source, plus its grey energy. The energy that reaches the customer, after all conversion and transmission losses, is called final energy. In turn, only a part of this is actually used: the effective energy. The rest is lost as waste heat.

Grey energy / grey emissions The energy required for the manufacture, transport, storage, sale and disposal of a product is called grey energy. The term “grey emissions” is used analogously. Taking grey energy into account gives a more realistic picture of the consumption caused worldwide by one’s own consumption.

Renewable energy Petroleum is only available to us until the deposits are exhausted. On the other hand, solar energy never runs out and firewood grows back: these are referred to as forms of renewable energy. However, there is no clear defining line: in some cases, if forests are over-exploited, the tree population can no longer recover over the centuries.

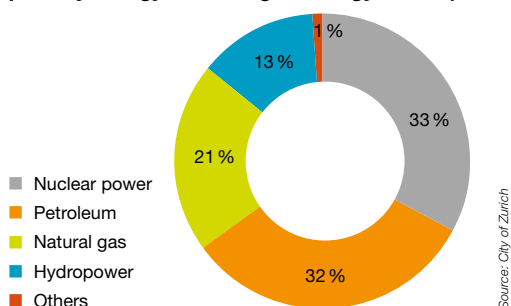
Therefore, the use of renewable energy is not necessarily sustainable.

Energy efficiency Whenever energy is used, part of the consumed primary energy is lost. An energy service, like heating, lighting or transport, is efficient if the largest possible share of the energy used is converted into effective energy.

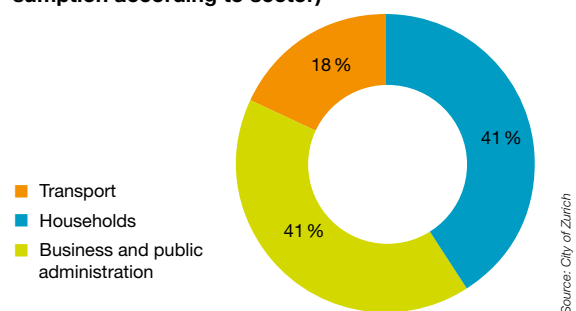
Greenhouse gases / carbon dioxide (CO₂) Part of the solar radiation which reaches the Earth heats it up and part is reflected back. The so-called “greenhouse gases” retain the reflected radiation, thus causing additional warming. Human activities are increasing the concentration of greenhouse gases in the atmosphere. Carbon dioxide (CO₂) is the most significant of these. CO₂ is intrinsically harmless – we breathe it out ourselves. What is dangerous, is that the concentration of CO₂ in the atmosphere is rising because of the combustion of petroleum, coal and gas, as well as the destruction of forests, thus causing the Earth to become warmer and warmer. In order to enable other climate-relevant gases to be taken into account alongside CO₂, these are converted into so-called “CO₂ equivalents” according to their greenhouse effect. The City of Zurich’s goal of reducing its annual greenhouse gas emissions to one tonne per person refers to the sum of all greenhouse gases, measured in CO₂ equivalents. In this booklet, we have only written CO₂ in each instance, so as to improve legibility.

Sustainable development Any form of budgeting which does not have a negative impact on future generations is referred to as sustainable. The main goals of sustainable development are social solidarity, ecological responsibility and economic performance.

Where does Zurich’s energy come from? (Proportions of primary energy according to energy source)



What does Zurich need energy for? (Final energy consumption according to sector)



Zurich and the 2000-watt society

Sustainability concerns everybody: if the human race continues to consume natural resources, and particularly energy, at the same rate as it does today, we are headed towards drastic climate change. Action must be taken – on all levels. For the 2006 to 2010 legislative period, the Zurich City Council bundled its key objectives in five so-called legislative focal points. One such focal point was called “Sustainable City of Zurich – on the Way to the 2000-Watt Society”. The initial basis was the fact that the emissions of climate-damaging CO₂ from the combustion of energy sources (petroleum, natural gas and coal) and the overall energy consumption in Zurich are too high to be described as sustainable.

Parliament and voters went along with the City Council: at the ballot box, on 30 November 2008, three quarters of the electoral roll voted in favour of a new article in the municipal code (for the wording of this article, see page 30). This provides for reduction of the primary energy consumption per person to around one third of today's level on the long term. By 2050, the annual greenhouse gas emissions are to amount to just one tonne of CO₂ per person. Furthermore, the city's maturing investments in nuclear power plants are not to be renewed.

Zurich and its energy companies

In implementing its goals, the city can use its own energy companies as a basis:

- Zurich's power company ewz is one of the city's service departments. It began building hydropower plants in

Grisons and on the River Limmat over a hundred years ago. Since then, ewz has acquired stakes in hydropower and nuclear power plants in Switzerland and France, and today it also invests in wind power, solar energy, geothermal energy and biomass. It provides energy services and telecommunication services, as well as advice for energy consumers.

- Erdgas Zürich is a limited company and 96.12 percent of it is owned by the city. It sells natural gas, biogas and wood pellets, and as of late, it also provides energy services.
- The District Heating business unit within Disposal and Recycling Zurich (ERZ) operates the city's district heating network. It feeds heat into this network from the waste incineration plants and from the Aubrugg combined heat and power plant.

www.ewz.ch

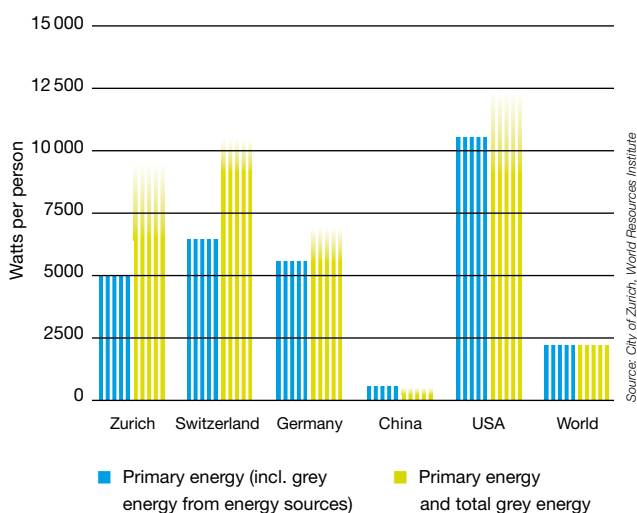
www.erdgaszuerich.ch

www.erz.ch

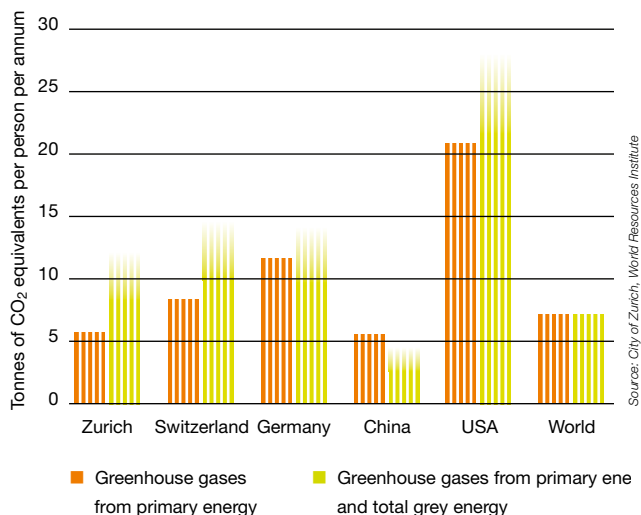
“Do the voters actually know the meaning of 2000 watts?”

Energy and power are difficult concepts. Nevertheless, a large majority of voters decided in favour of an ambitious vision that looks far into the future: namely, the significant reduction of energy consumption and greenhouse gas emissions. This will affect their lives, and they have thus laid down a marker for others to see.

How much energy does Zurich use in comparison?



How high is Zurich's greenhouse gas production in comparison?



Enough for a good life: the idea of the 2000-watt society

For a long time, it was taken for granted that higher energy consumption brings more prosperity. From around 1970 onward, an increasing number of people came to realise that energy consumption causes ecological and political problems. However, this insight was seldom linked to the notion that, also for societal reasons, there could be such a thing as “enough”.

“If we completely switch over to clean energy, will it still matter how much we consume?”

Yes – because “renewable” does not mean “unproblematic”. The renewable energy sources wood, biogas and hydropower cannot be used without limits. Even though the potential of the sun, wind and geothermal energy is inexhaustible, utilising them calls for systems which in turn require a lot of non-renewable resources, take up land, and have an impact on the landscape.

How much energy do people need?

In 1985, the Brazilian scientist José Goldemberg asked how much energy is necessary for a good life. He found out that below a threshold of 1000 watts per person, people are indeed better off if they can increase their energy consumption. However, once this threshold is reached, more energy does not improve the quality of life.

At the start of the 1990s, a number of researchers associated with the Swiss Federal Institute of Technology Zurich picked up on Goldemberg’s idea. In order to adapt it to local conditions, the target consumption per capita that they set was 2000 instead of 1000 watts. Their calculations showed that this would allow our current living standard to be maintained. Furthermore, if the energy mix is simultane-

ously changed in favour of renewable energies, this consumption is also ecologically viable. In addition, 2000 watts was the global average consumption at the time (today: 2300 watts).

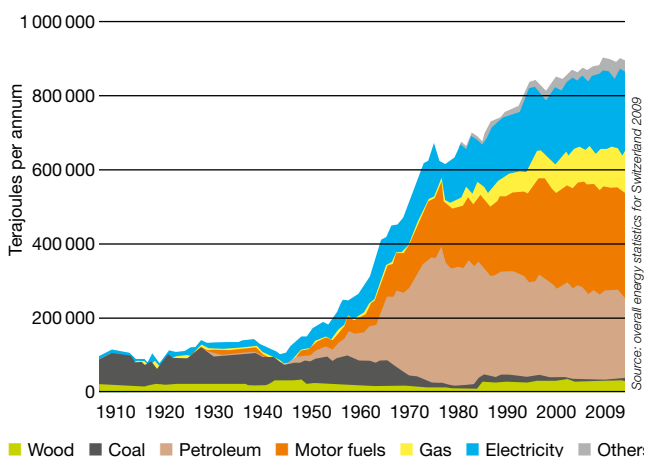
Since then, numerous authorities in Switzerland, from the local level to the Federal Council, have committed to the goal of the 2000-watt society. Zurich is the first body to lay this down in its municipal code as a binding goal.

The right amount

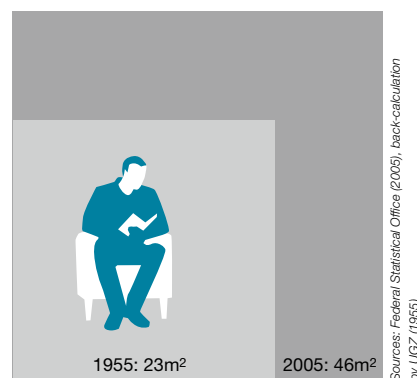
One of the core concepts of the 2000-watt society is that there is such a thing as sufficient energy consumption. Consuming more would be undesirable, even if the energy could be provided in a completely “clean” way. In the professional jargon, this is referred to as the concept of sufficiency. As Goldemberg’s work showed, sufficiency does not by any means have to equate to asceticism, it is just that consuming an ever-increasing amount of energy does not make people happier.

Ultimately, global justice demands sufficiency: in a world that offers fair opportunities for all, everyone must also have access to a similar amount of energy. However, it is neither possible, nor does it make sense, for the countries that consume little today to raise their consumption to the level of countries that currently consume a lot. If all people consumed as much energy as the rich countries, the worldwide energy consumption would be more than three times as high as it is today.

Development of final energy consumption in Switzerland since 1910



The material demands are increasing: the living space per person in Switzerland has doubled in fifty years.





How much is 2000 watts?

Today, Zurich consumes around 5000 watts of primary energy per resident. If the total grey energy is also taken into account, the consumption is considerably higher.

The work performed by twenty workers, or three horses, working around the clock, amounts to 2000 watts. Anyone who burns one litre of petrol every six hours consumes 2000 watts.

How much is a tonne of CO₂?

One tonne of CO₂ is produced upon combustion of 300 litres of petrol. This is enough to drive a car (8 l/100 km) 4000 kilometres, e.g. from Zurich to Stockholm and back. On average, Zurich residents cause 5.5 tonnes of CO₂ emissions each year. Once again, this is considerably more if the grey emissions are also taken into account (see chart on page 7).

Why 2000 watts?

Today's material living standard in Switzerland could be maintained with 2000 watts per person if the energy were used more effectively. Furthermore, with consumption of 2000 watts per person, a reduction of the annual CO₂ emissions caused by energy use to one tonne or less per person is realistic. And finally: 2000 watts roughly corresponds to the average energy consumption worldwide.

Why one tonne of CO₂?

According to the latest report from the Intergovernmental Panel on Climate Change, worldwide annual greenhouse gas emissions must drop to one tonne per person by 2050, so that climate warming can be limited to two degrees.

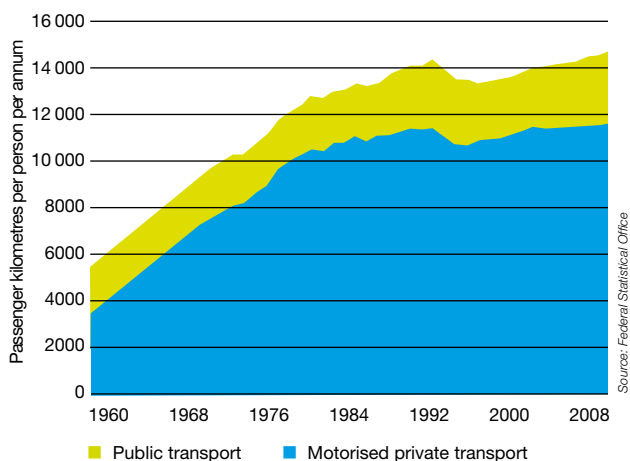
Why abandon nuclear energy?

Splitting atomic nuclei does not directly contribute to climate change. Nevertheless, it is not sustainable: it consumes the finite raw material uranium, the extraction of which severely harms the local environment. Furthermore, it leaves behind highly dangerous waste, for the disposal of which, no satisfactory solution has been found. Any accident like those seen in Chernobyl in 1986 or Fukushima in 2011 is a tragedy for the people affected and renders large areas uninhabitable for long periods of time.

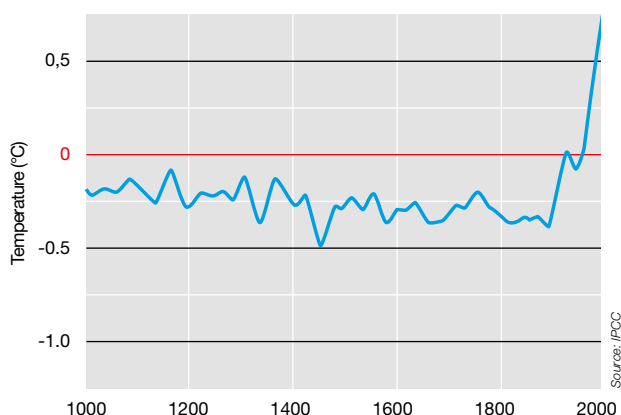
Why by 2050?

The municipal code provides for reduction of the city's CO₂ emissions to 1 tonne per person by 2050. This is ambitious: buildings and infrastructures which essentially determine a society's energy consumption are built for decades and cannot be changed overnight. However, in view of climate change and dwindling energy reserves, ambitious goals are necessary. – The municipal code does not set a target year for the reduction of energy consumption to 2000 watts per person. However, calculations show that the required reduction of CO₂ emissions is only realistic in parallel with a significant reduction of energy consumption.

Development of transport performance in Switzerland



Global average temperature since the year 1000: comparison with average temperature 1961 – 1990



Getting specific: measuring, testing, adjusting

Energy consumption of 2000 watts per person, one tonne of CO₂ per person per annum: the targets have been set. However, when it comes to implementation, there are many details to be clarified: What exactly does “energy consumption” mean? Is it the energy consumed by Zurich residents – including the energy they consume outside the city? Or should the energy consumption in the city area be definitive – including the energy consumed in Zurich by non-residents? Should grey energy also be taken into account or not? How is the energy consumption measured or calculated? What intermediate goals are to be met? How quickly should (and can) how much energy be saved in which areas? Similar questions arise for CO₂ emissions.



Solar energy, the growth industry: installation of a photovoltaic system.

Methodological foundations

To date, the 2000-watt idea has primarily been pursued by the research platform Novatlantis, a platform run by the institutes in the domain of the Federal Institutes of Technology. Together with Novatlantis, the Swiss Federal Office of Energy, SwissEnergy for Municipalities, the Swiss Society of Engineers and Architects (SIA) and other specialists, the City of Zurich has now developed methodological foundations which can also be used by other municipalities or cantons. In order to make the methodology broadly accessible and to develop it further, a specialist division was set up for the 2000-Watt Society.

With regard to implementation, the City of Zurich can draw on a strategy that was already developed earlier: the 2002 Energy Master Plan (as revised in 2008). This includes, for instance, intermediate goals which are now to be adapted

to the goal of the 2000-watt society. The Master Plan also specifies which service departments and city-owned companies take on which roles and how the implementation of the energy strategy is to be monitored. Currently, seventeen of the city's service departments implement around 350 measures per annum within the framework of this Master Plan.

Effectiveness analysis

In 2008, the first effectiveness analysis showed where the energy strategy is taking effect and where there is need for further action. For instance, energy consumption and CO₂ emissions associated with building heating are declining. However, more could be achieved if the buildings were to be renovated more frequently and thoroughly. Electricity consumption is rising as comfort requirements are increasing and people's use of electric appliances is continually growing.

In the conclusion of this analysis, the results are described as “encouraging”. However, with regard to the building stock and electricity consumption, it is stated that “in the future, clear progress must be made” and that unless the rate of building renovations is greatly increased, “it will not be possible to meet the targets of the 2000-watt society”.

Territorial principle

Now, what exactly do the 2000 watts and the one tonne of CO₂ refer to? They refer to the energy consumed in the city area and the emissions which occur here. The energy sources' grey energy and grey emissions are also taken into account. The grey energy of net imported other goods and services is not included in the 2000 watts, but should be separately calculated and indicated if possible.

The Energy Master Plan, the methodology paper and the effectiveness analysis can be downloaded as PDF documents from the website of the City of Zurich's Energy Officer.

www.stadt-zuerich.ch/dib > [Energieversorgung](#) > [Energiebeauftragter](#)

www.stadt-zuerich.ch/energiestadt

www.2000watt.ch

Building standard: to the 2000-watt society in seven steps

Four fifths of Zurich's primary energy consumption occurs in buildings. Buildings stand for decades, even for centuries. The way in which construction or renovation is realised today has a lasting impact on energy consumption. With regard to buildings, Zurich is not yet on track for 2000 watts. The regulations for new buildings, renovations, the billing of heating costs etc. are largely enacted by the canton. Nevertheless, the city's hands are not tied: firstly, it can set itself the highest standards for its own buildings. Flagship projects like the new Trotte Retirement Home building (see page 14) and the renovation of the Dorflinde Retirement Home should also influence private construction projects. Secondly, the city implements the cantonal building regulations. In so doing, it can advise the contractors and motivate them to voluntarily adhere to higher standards

than those prescribed. Finally, it can enable its experience to be incorporated into the legislative process in the canton.

Seven milestones

Zurich owns numerous structures, including 9000 flats, 960 business premises, 165 administrative buildings, ten car park buildings, over a hundred school buildings, two hospitals, sports facilities, cultural buildings, tram shelters, public lavatories etc. Every year, the city realises around one hundred construction projects. The guideline "Seven milestones for environmentally sound and energy-efficient construction" has been applied to the city's construction projects since 2001. Since 2008, it has also been necessary to assess enhanced specifications, which are oriented towards the 2000-watt society.

Compulsory specifications for city buildings and specifications to be assessed

Seven milestones		Enhanced specifications
1.	New buildings comply with the Minergie-ECO standard.	New buildings comply with the Minergie-P-ECO standard.
2.	The renovation of existing buildings complies with the Minergie modernisation standard.	Minergie new buildings standard.
3.	New buildings and renovations meet the additional Minergie requirements regarding lighting; the most efficient electrical devices are purchased.	The renovation of existing buildings complies with the Minergie new buildings standard or Minergie-P.
4.	At least 40 percent of the heating requirements of new buildings are covered by renewable sources.	100 percent of the heating requirements of new buildings are covered by renewable sources.
5.	The construction materials selected are ecologically friendly and pose no health risks. The indoor air quality is well clear of the limits or reference values.	Grey energy is also optimised.
6.	Ecological sustainability is a decisive criterion in architectural competitions.	Arrangements for energy-efficient and environmentally friendly mobility are also made.
7.	Management of buildings is continually optimised; energy is purchased according to ecological criteria.	

Role model for 44 municipalities

The building standard has proven itself in practice. Based on this experience, SwissEnergy for Municipalities, the federal agency for support of Energiestadt (“energy town”) activities, recommended that all “energy towns” adopt the City of Zurich’s specifications as the “2008 Building Standard”. Already by the end of 2010, 44 municipalities, with a combined population of over one million, had accepted the recommendation.

However, a town or city is more than the sum of individual buildings: transport to and from the buildings also affects their environmental balance. For this reason, a mobility concept is being drawn up for new buildings.

Know-how transfer for private individuals

Zurich is constantly in contact with construction specialists. At the end of 2009, under the title “Building for the 2000-Watt Society – The State of Affairs”, the city organised an exhibition and an international conference. In addition, the city is advising private contractors about the legal requirements and more, within the framework of energy coaching. This pilot project, approved in 2009, is initially to run for four years (see page 17).

www.stadt-zuerich.ch/energie-coaching

www.stadt-zuerich.ch/nachhaltiges-bauen

www.energiestadt.ch > Gebäudestandard

www.minergie.ch

www.energiesdienstleistungen.ch



Living in compliance with the guidelines of the 2000-watt society: the Zurlinden society's residential complex on Badenerstrasse.



Advice for contractors wanting to renovate their houses in an energy-efficient way: energy coaching.

A building for the future: Trotte Retirement Home

The Trotte Retirement Home between Nordstrasse and Trottenstrasse dates back to 1960 and no longer meets the contemporary requirements of a retirement home operation. For this reason, the City Council opted for a new building, for which an architectural competition was held.

The new Trotte Retirement Home, which should be inaugurated in 2014, is to be realised according to the city's enhanced ecological and energy-related specifications for the 2000-watt society (see page 12). Therefore, for the first time in a city architectural competition, the Minergie-P-ECO standard was part of the call for tenders.



Compact building envelope, sun-facing windows, wood pellet heating: the Trotte Retirement Home

Urban planning requirements

The new Trotte Retirement Home, just like the new ward of Triemli Hospital, is to be a “flagship project” for the 2000-watt society. Environmentally friendly and energy-efficient construction is not the only criterion that will contribute to its appeal. The new building will comply with the specifications of two of the City Council's legislative focal points for the 2006 to 2010 legislative period: “On the way to the 2000-watt society” and “Planning and building for tomorrow”.

The new retirement home will have 95 flats with recessed balconies. It will be possible to combine flats to form

two-room flats and to equip them with cooking facilities as required. The two lower floors will serve for shared use. The parking facility and a public cafeteria with garden seating will incorporate the retirement home into neighbourhood life.

Compact and facing the sun

The following factors in particular will contribute to the new retirement home building's low energy consumption and low environmental impact:

- The building is compact and has a very well-insulated envelope.
- The construction materials are selected so that their manufacture requires as little energy as possible.
- The windows are aligned for optimal utilisation of solar irradiation.
- Heating occurs in a CO₂-neutral manner with wood pellets.

Describing the competition's winning project, from the Zurich architectural office Enzmann + Fischer AG, the jury wrote that “the compact volume has clear advantages, which simultaneously have a positive effect on the cost side”.





Consulting: for companies, private individuals and contractors

Putting the City of Zurich on track towards 2000 watts is not something that the city administration and city-owned companies can do by themselves. The goal can only be met if private parties (companies and individuals alike) pull together as well.

Experience has shown that there is generally no lack of goodwill, but a lack of knowledge – and of willingness to try anything new which is seen as a risk.

For this reason, the City of Zurich provides various forms of consulting.

Energy coaching for contractors

Cost efficiency and energy efficiency are central themes in renovation, conversion and new construction projects. They call for holistic consideration of the building envelope, building services equipment and energy sources – as well as the corresponding know-how.

In energy coaching, independent specialists provide contractors and planning teams with low-cost advice on all issues involved with the energy optimisation of buildings. Energy coaching is available to all owners of real estate and land in the Zurich city area. The prerequisite is a project that goes beyond the minimum legal requirements regarding energy. An initial method-oriented consultation, in which a building's current state in terms of energy and its potential for increased energy efficiency are assessed, is provided free of charge.

Eco-Compass for SMBs

Saving energy also means saving money. However, small and medium-sized businesses (SMBs) do not usually have the capacity and knowledge required for energy optimisation of their own operations.

For this reason, the City of Zurich has set up another pilot project for environmental consultation: Eco-Compass (Öko-Kompass). This is geared towards the city's small and medium-sized businesses. The goal of the four-year pilot phase is to reach ten percent of Zurich's 25,000 SMBs. Eco-Compass helps the SMB to find suitable company-internal environmental protection measures and allocates the funding which is available for this purpose. A telephone consultation on all themes relating to energy and the environment is free of charge. On-site consultations, intended to demonstrate profitable energy-saving and material-saving measures, are also cost-free if the respective business

implements at least one of the arranged measures within half a year.

Eco-Compass is backed by a wide range of funding bodies, including the city administration, trade associations and companies. Fifty professional associations and industry associations support it in its efforts.

ewz energy consultancy

As a city-owned energy service provider, Zurich's power company ewz offers consultations to its customers. These consultations are individually adapted to suit the needs of large customers, SMBs or households.

The goal of the consultations is to increase the energy efficiency of systems and equipment. They are also intended to contribute to general awareness regarding rational, economical and safe use of energy. At no cost, ewz lets its customers borrow measuring devices which make it possible to detect electricity guzzlers.

www.stadt-zuerich.ch/energie-coaching

www.stadt-zuerich.ch/oeko-kompass

www.ewz.ch/energieberatung



How is residual material correctly disposed of or recycled? An on-site consultation provided by Eco-Compass at a Zurich SMB.

“With technology alone, we won’t make it.”

How will Zurich look in forty years?

Rahel Gessler: I believe it will be more quiet. There will be fewer vehicles with combustion engines on the road, but more pedestrians, more bicycles and electric cars. Traffic will not dominate the cityscape as much.

Bruno Bébié: We cannot predict the future, but we can develop scenarios. These are relatively approximate pictures of the future, that show the direction in which the journey has to go. To be more specific: the proportion of renewable energies in the city’s energy supply must be much higher and we must use energy more efficiently. Whether everyone can be persuaded to get involved is another question.

The child’s anxious question before a visit to the doctor is: Will it hurt?

Gessler: It will not happen without lifestyle changes. Take the accommodation sector. Halting the trend towards an ever-increasing amount of living space per person does not have to mean that we have less room. It can also mean using more spaces together – and that can be beneficial.

Bébié: Many older people stay in their flat for decades, even when their children move out. Perhaps they would really like to move into a smaller flat where they have less cleaning to do, but the smaller flats are often newer and therefore more expensive. The fact that we are consuming more and more is in fact not just an expression of increasing prosperity, but also of certain constraints. Added to this, humans are creatures of habit. Many refuse to change their behaviour. But if they then ride by train after all, instead of taking the car, and during the journey they can read, they realise that it’s not a loss. This is why there is also a need for a cultural shift: with the right technology alone, we won’t reach our goal.

Can a city change a culture?

Bébié: It can contribute to a change in culture. For example, today we live in mediaeval houses. If we want to put solar energy systems on the roofs of these houses, we end up in a conflict of interests with regard to the preservation of historic buildings. These are socio-political issues which a society must, and can, repeatedly renegotiate. Perhaps people will come to see solar cells as a contemporary way of using old structures – like the way in which we now have modern sanitary installations in old houses.

Gessler: We must succeed in including the people in this change. This calls for public initiatives – in which, for example, car drivers give up their car keys for a month and



Environmental scientist Rahel Gessler, 39, heads the Energy and Sustainability division of Zurich’s Office for Environmental and Health Protection. Reducing the demand for energy is a key activity.

receive a trendy bicycle and a public transport ticket in exchange.

How is it possible to reach commuters who travel into the city from outside?

Bébié: With the parking space policy and the provision of public transport, we can definitely influence this traffic – for instance with the new tram line in Zurich West.

But many of the framework conditions are set by the canton or the Federal Government. It is no secret, for example, that the canton does not believe in the 2000-watt society.

Gessler: Primarily, the available scope has to be put to good use. But we also exert an influence when laws are amended. The Federal Government is very interested in cities’ ideas and new tools: it has noticed that cities are often more innovative than the cantons, because they are under the most strain.

Bébié: We work together with the relevant bodies at all levels. The canton is not a 2000-watt fan, but it has an



As Energy Officer, the economist Bruno Bébié, 54, is responsible for the formulation and assessment of the City of Zurich's energy policy, and particularly for its goals and supply-side aspects.

energy concept which envisages reducing CO₂ emissions to 2.2 tonnes per person by 2050. So it is not as if it were just doing nothing. Naturally, the political circumstances in the canton and the Federal Government are different to those in the City of Zurich. But Zurich is not alone: together with other cities, we are trying to exert pressure on the higher levels. This sometimes leads to success – for instance, at the federal level, there is currently a debate on whether an efficiency bonus, like the one which the ewz has known since 2006, should be introduced Switzerland-wide. And the Swiss Federal Office of Energy has also taken up the cause of 2000 watts. Moreover, I do not believe that the current positions apply to the next forty years. When petroleum prices rise as quickly as they did in 2008/09, more conservative groups also start to rethink.

How important are city-owned energy companies to the city's energy policy?

Bébié: Very. Many cities have outsourced their energy and transport operations and now they are no longer able to exert much influence on them at all. We can. And parliament

is also helping. For example, ewz wanted to invest 100 million CHF in wind energy. Parliament increased the loan to 200 million and the voters followed with a large majority – in the middle of the financial crisis! That has a major legitimising effect.

Compared across Switzerland, ewz has very low electricity prices. Doesn't cheap energy contradict the 2000-watt idea?

Bébié: On the occasion of the last price adjustment, the federal price supervisor called ewz to reduce prices further than we wanted. But for small customers, the effect of the electricity price is limited anyway; many do not even know how much their electricity costs. For large customers who calculate professionally, the efficiency bonus provides incentives for lower consumption.

What is the decisive factor with regard to whether or not Zurich reaches its goal?

Gessler: Whether or not everyone pulls together. In other words, the goals of the 2000-watt society must also manifest themselves in policy areas outside energy policy itself, for example in the implementation of the spatial development strategy.

Bébié: The people of Zurich are very environmentally aware. But there is a huge gap between awareness and actual behaviour. Information and incentives alone are unlikely to be enough to change this. It must be "hip" to live in an energy-saving way.

Gessler: By means of a new key research area, we are trying to gain a better understanding of people's energy behaviour (see page 22).

And if it succeeds, what do we get out of it, apart from the feeling of being model pupils?

Gessler: Zurich will profit from having been a pioneer. And the quality of life will improve. There will be less noise, better air, advantages for tourism...

Bébié: ...the better quality of life will make Zurich more appealing, for example to qualified workers, whom our economy needs. And the 2000-watt society creates local added value. To put it simply: if less money goes to the Middle East for petroleum, more stays here with us.

Interview: Marcel Hänggi

Scenarios and plans: shaping the future

Pursuing a goal for the year 2050 takes a lot of patience. However, the development of a city calls for long-term planning anyway, because the effects of investment decisions last for decades. But as nobody knows what the future will bring, scenarios are needed. These demonstrate how a development could look if certain assumptions are correct.

The future of heat

The city is currently drawing up a rough concept for the heat supply in the year 2050. In order to be able to get an estimate of the future which is as sophisticated as possible with the goal of the 2000-watt society in mind, 23 areas of the city are being examined with regard to their local potential for renewable energies and the probable development of the demand for energy. The results should show how the political measures relating to the future energy supply must be oriented on the long term. In general, a shift from fossil fuels to renewable energies and to electricity is to be expected. Therefore, this area is to become particularly significant.

“Should we go back to the past?”

The last time the Swiss consumed 2000 watts per person was in 1960. However, implementation of the 2000-watt society does not mean a return to that era. History does not move along a track with only two directions, forwards and backwards. A society that gets by with 2000 watts in the near future is a different society to the one that consumed the same amount fifty years ago. Furthermore, thanks to more efficient technologies, a lot more can now be achieved with 2000 watts.

The future of electricity

The city's power company ewz supplies over 200,000 households and 340,000 workplaces. For the next twenty years, the electricity supply is ensured by means of city-owned hydropower plants and investments in other power plants. The licences to use hydropower begin to expire in 2035. The city is striving to renew them. The nuclear power plants will begin to disappear from the grid in 2025 and the largest investment is expected to come to an end upon expiry of the operating permit for the Gösgen nuclear power plant in 2038. The city does not want any new investment in nuclear power plants.

In the City of Zurich's Future of Electricity project, ewz has drawn up scenarios for the next fifty years. It has analysed the situation on the production side, the situation on the consumption side, the economic framework conditions and the technical possibilities, as well as modelling future developments in four consumption scenarios and three

production scenarios. In order to cover the entire demand for electricity in 2060 with energy from renewable sources, around 100 million CHF would have to be invested in new plants each year over the next fifty years. By 2018, as an intermediate goal, 200 gigawatt hours (GWh) of electricity are to be produced from wind energy, 100 GWh from biomass and 10 GWh from solar power.

Large renewable energy projects

In 2009, with a large majority, voters approved 200 million CHF for wind energy projects. Since then, among other things, ewz has purchased five wind farms in Germany with thirty turbines. Together with municipalities in the canton Vaud, ewz is planning the Mollendruz wind farm in the Swiss Jura Mountains. In order to ascertain the City of Zurich's geothermal energy potential, ewz drilled to a depth of 2708 metres in the Triemli district in the winter of 2009/10.



Producing green electricity from lake water in the middle of the city: the Letten power plant.

Hopes that the drilling would discover water-bearing layers from which heat could be extracted very efficiently were not fulfilled. However, the borehole is now being utilised by means of a deep borehole heat exchanger.

Energy Contracting

Both ewz and Erdgas Zürich offer energy contracting, in which the energy service provider develops, finances, realises and operates energy supply systems for the customers. The customer is not just provided with energy, but a complete energy service (for example the heating of real estate properties). In contracting, the energy company strives to provide the required service in an economically efficient way, with as little primary energy as possible.

Transport outlines

The Civil Engineering Office has also ventured to look into the future. It has commissioned teams of experts to draw up three “outlines” of how Zurich’s transport could look in

2050 under certain framework conditions: if society moves towards more individualism and the economy flourishes, if resources become scarce and mobility becomes expensive, or if life is characterised by “unlimited technologisation”. Interestingly, the conditions which are the most precarious economically lead to low environmental impact and high quality of life, while total technologisation results in the doomsday scenario of a surveillance state.

www.ewz.ch > Energiedienstleistung > Energie-Contracting

www.stadt-zuerich.ch/mobilitaet > Mobilitätsstrategie > Zukunft Verkehr



Feeding hot water into the district heating networks: heat condensers in the new Aubrugg wood-fired cogeneration plant.



Continually being expanded: public transport is very present in Zurich

Efficiency: creating incentives

We live in a culture of wastefulness. This is particularly evident with regard to energy, for example. We only use a tiny fraction of the energy we consume – the rest disappears as waste heat. The retired Federal Institute of Technology professor Eberhard Jochem writes that just by using energy more efficiently, “the energy required for each energy service could be reduced by over 80 to 85 percent on average”.

Reasons for waste

People, and especially companies, should actually strive to use energy as efficiently as possible of their own accord, because wasting energy also means wasting money, and anything that is inefficient in terms of energy is also economically inefficient. When people do not do this, there are two main reasons: firstly, there is often a lack of the necessary knowledge about where energy gets lost. In order to improve this, the city and its energy companies offer consulting for companies and individuals (see page 17). Economic incentives which are either wrong or too weak constitute a second reason. Energy is very cheap, as this example demonstrates: the energy that a professional cyclist applies to their pedals in the Tour de France during the forty-minute climb up Alpe d'Huez would cost just 0.04 CHF as electricity (at a low-priced off-peak rate)!

ewz efficiency bonus

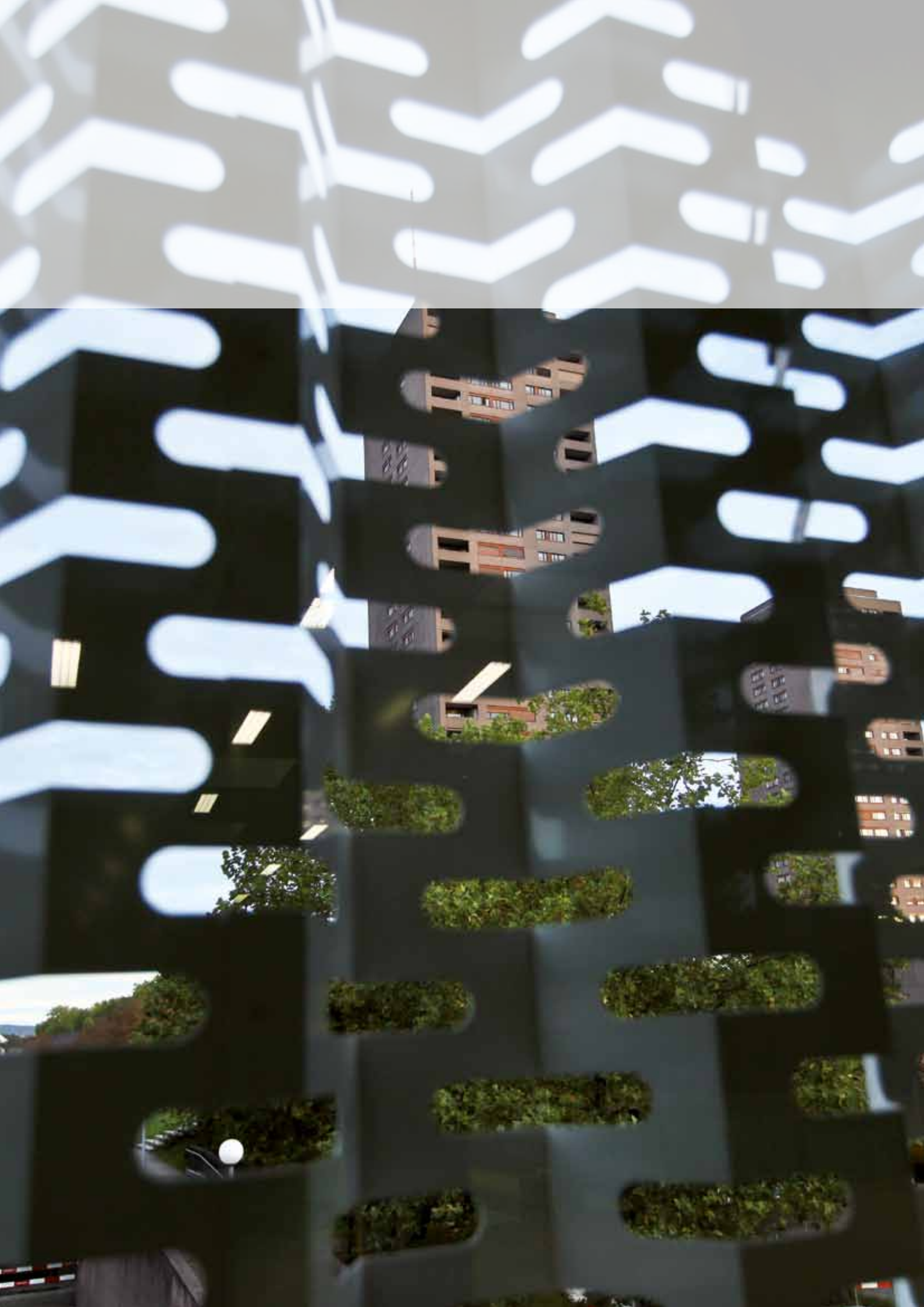
Nevertheless, for large consumers, the electricity bill does carry weight. In order to increase the economic incentive to save, ewz introduced the efficiency bonus for large customers in 2006. This is a kind of reverse bulk discount: anyone who can prove that they have increased their energy efficiency is granted a ten percent price reduction on their electricity bill. In order to benefit from the efficiency bonus, a company must enter into a target agreement with Canton Zurich or the Energy Agency for the Economy (EnAW), which also check that the agreement is adhered to. In 2009, around 200 companies, which account for a third of the city area's electricity consumption, profited from the efficiency bonus. This enabled 9.6 million kilowatt hours of electricity and 12.7 million kilowatt hours of heat to be saved. The bonus sum amounted to 11.9 million CHF.

Establishing a socio-scientific basis

For small customers, the price of electricity carries less weight, so little can be achieved with economic incentives. There has not been much scientific research conducted to determine which factors influence energy-related behaviour. For this reason, the City Council has launched the socio-scientific key research area “More Energy Efficiency in Everyday Zurich Life”. This key research area is being implemented by several environmental and advisory offices, as well as institutes at the University of Zurich and at the Swiss Federal Institute of Technology Zurich.

“Won't technological progress solve the energy problems by itself?”

Technology does indeed keep providing new solutions. Ever since people have been building technical devices that use hydropower, wind, oil or electricity, these devices have been getting more efficient – but energy consumption has continually increased, because an ever-increasing number of devices are being used with ever-increasing frequency for ever-increasing lengths of time, and because we are consuming more and more. Technological progress alone will not necessarily lead to the desired results: political, cultural and social factors determine how technology is used. Technological progress is useful, but it is not enough – and the wait for progress must not be allowed to cause us to oversleep and neglect the need for social change.



Information and awareness raising: explaining playfully

The 2000-watt idea will not become a 2000-watt society unless society changes. Anyone who wants advice on energy issues can obtain it – as an individual, or as a company. But how is it possible to reach the people who do not seek information of their own accord – and what should be said to them? Handing them a brochure entitled “To the 2000-Watt Society in Six Steps” is not the approach to take, because it is not as simple as that. Ultimately, this is about a cultural shift. No matter how plausible the “2000-watt society” concept may be, it poses a real challenge with regard to communication.



Inauguration of the 2000-watt scales: mayor Corine Mauch with Norbert Ender from IBM and Anne Keller from Swiss Re.

Zurich Environment Days, Multimobil & co.

The City of Zurich draws attention to the 2000-watt society and other sustainability issues by means of events, activities and poster campaigns. In this way, it reaches a large number of people and combines the message with enjoyable experiences.

Since 2004, the Zurich Environment Days have taken place each year at the start of summer. At various locations in the city, as well as in the wilderness park in Sihlwald, city agencies, environmental organisations, companies and researchers provide information about their work and ecological interrelationships in everyday life. For instance, at the 2010 Environment Days, the water police presented things that they would have preferred not to have found in the lake. Lungenliga offered a lung check. With the energy calculator, it was possible to calculate one's own consumption profile. Bioterra demonstrated correct composting. Researchers

from the university and from the agricultural research institute ART in Reckenholz put their cards on the table. And in Sihlwald, it was possible to go on a wilderness safari. The Multimobil events are completely focused on mobility issues. These activity days, with film screenings, city tours, an orienteering race, a literature quiz and much more, take place as part of the European Mobility Week in September. They reach around 100,000 people each time. Sunday is the highlight, when the historic city centre transforms into a car-free festive zone. Around fifty organisations and companies get involved in Multimobil.

Energy calculator and 2000-watt scales

In front of an audience who probably had never heard of the 2000-watt society, Zurich presented a set of 2000-watt scales at World Expo 2010 in Shanghai. In this game, several people must position themselves on a four-metre-long seesaw in such a way that it balances. A screen illustrates the achieved balance or imbalance with an animated underwater world. Neither too much nor too little energy consumption is desirable. The 2000-watt scales can be hired. The same applies to the energy calculator.

Never at an end

The task of raising awareness and informing the public is as far from being fulfilled, as the 2000-watt society is from ever being “finished”: activities and campaigns in the public, in companies and in schools will always accompany the implementation of the 2000-watt society.

www.stadt-zuerich.ch/umwelttage

www.stadt-zuerich.ch/multimobil

www.stadt-zuerich.ch/energierechner

www.stadt-zuerich.ch/2000-watt-waage

Transport: mobility is culture

Mobility is responsible for 18 percent of energy consumption and 37 percent of CO₂ emissions in the City of Zurich. However, without mobility, there is no urban life.

In fact, what is mobility? Mobility is often equated with transport, to be measured in passenger kilometres, but mobility is something else. Mobility is the ability to cover practical units of distance safely and with a reasonable outlay: to the workplace, to school, or to a place of leisure. Or in the words of a slogan adopted by the City of Zurich: mobility is culture. Transport can enable mobility – and transport can hinder mobility: this becomes apparent to everyone stuck in a traffic jam and to every child who is not allowed on the street unaccompanied.

Mobility strategy

Mobility is a key aspect of urban policy. In order to influence its development, Zurich updated its mobility strategy in 2001. In nineteen sub-strategies, it addresses subjects such as pedestrian and bicycle traffic, the design of public spaces, commercial transport and goods transport. Sustainability is the overriding principle.

The mobility strategy takes a holistic approach to mobility: the modes of transport should complement each other. The only reason why public transport, for instance, is so good in Zurich, is because it is embedded within an overall concept. Instead of division, there are increasing efforts towards coexistence – causing motorised traffic to be slowed down in many locations. Issues which are not primarily transport planning issues, such as attractive design of outdoor areas, are also part of mobility. If mobility is understood in this way, it should, in particular, also accommodate the needs of the weakest participants in traffic – children, the elderly and the disabled – more effectively.

City of short distances

Mobility planning is also housing development planning: short distances to the most important destinations (shopping, culture, workplace, school...) allow high mobility with little traffic. The proportion of public transport, pedestrian traffic and bicycle traffic is to be increased further. For this purpose, neighbourhoods are to be designed in such a way as to ensure that they are attractive and permeable. A key role is performed by the company Zurich Public Transport (VBZ) which, like ewz, is owned by the city. In addition to the extension of tram line 4 to the Altstetten railway station, other new tram lines are also planned. Furthermore, a new



rail connection is being built: a cross-city line from Zurich Central Station to Oerlikon.

Experience gathered

Over the past years, the city has gathered some important experience: For the Sihl City shopping centre, a traffic model was drawn up which limits the additional traffic. After the opening of the motorway tunnel through Uetliberg (western bypass), a new traffic regime prevented the city from being flooded with additional car traffic and the quality of life around the formerly infamous Weststrasse was improved significantly. And it is now almost impossible to imagine that the touristically attractive Limmatquai was a busy transit route until 2004

www.stadt-zuerich.ch/mobilitaet-ist-kultur

“Will I have to sacrifice in the 2000-watt society?”

Sacrifice what? Every social change entails sacrifices and benefits. For instance, a policy aiming at less motorised transport may require some to make sacrifices, but for others it creates spaces for living, for playing and for chatting. Intelligent land use planning ensures that a neighbourhood's important establishments are within walking distance. This enables more mobility with less traffic: sufficiency, but not sacrifice!

Procurement: organic shirts and green IT

When a city sets itself a goal like the 2000-watt society, it stands to reason that it also adheres to the highest ecological (and social) standards when it comes to making its own purchases. The city's procurement behaviour has a twofold effect. Firstly, a direct effect: as it spends two billion CHF each year on goods and services, the City of Zurich has considerable market power. Thus, it can promote sensible, high-quality production and support environmentally friendly innovation. Secondly, the city's procurement has an indirect effect, in that it is a role model for others.

Procurement model

The City of Zurich purchases a very wide range of products: tables, chairs, uniforms, official vehicles, foodstuffs, cleaning agents, computers, lavatory paper and a multitude of services. Since 2007, Zurich has had a procurement policy entitled "Our Engagement to Sustainability".

This policy was drawn up within the framework of the legislative focal point "Healthy Finances", because procurement should also pay off financially. However, this is not just a matter of watching out for the lowest purchase price, but also for the costs which arise throughout the product's whole lifespan.



Made from organic cotton since 2009: the city police uniform shirts.

Ecologically and socially sustainable

The products should have the lowest possible impact on the environment – also throughout the entire life cycle, from manufacture to disposal. To complement the procurement policy, the City Council passed the "Social Sustainability Directive" in 2010. In this directive, the city undertakes to purchase only those goods and services which are produced fairly.

For instance, the Zurich city police uniform shirts are made from organic cotton. The city's care centres purchase new work clothes made from organic and fair trade cotton. Coffins are built with FSC-certified wood from sustainable forestry. Computers should have as little environmental impact as possible, from their manufacture through to disposal ("green IT"). The electricity delivered to the city administration from the city's own power company is certified as green electricity. And lavatory paper consists of recycled paper which causes 75 percent less CO₂ than fresh-fibre paper.

Cooperation

In procurement, Zurich works together with other cities. Within the framework of the global network of cities ICLEI – Local Governments for Sustainability, to which Zurich belongs, the campaign Procura Plus was launched in 2004 for sustainable procurement in the public sector. In 2006, Zurich obtained the Procura Plus certificate for achievements in the product groups "organic food" and "buildings with the highest standards for heating and ventilation". Thus, compared with the rest of Europe, Zurich is playing a leading role. In 2009, Zurich organised the international Procura Plus Seminar. At national level, Zurich is involved in the Interest Group for Ecological Purchasing, Switzerland.

www.stadt-zuerich.ch/umweltpolitik > Ökologische Beschaffung



Zurich in its surroundings: cooperation and persuasion

Zurich is the first city which has set itself the goal of the 2000-watt society in such a binding way. However, Zurich is of course not the only community seeking intelligent solutions in the fields of urban planning, construction, building maintenance, mobility or procurement. Thus, in order to learn from the experiences of others, and to enable others to benefit from its own experiences, Zurich is involved in several international networks, for example ICLEI – Local Governments for Sustainability, Eurocities, the Covenant of Mayors and Climate Alliance. At national level, Zurich is a member of the association Trägerverein Energiestadt (and bearer of the label “Energiestadt Gold”), and is also a member of the association ecobau, the platform for sustainability in public-sector construction.

Zurich, Basel and Geneva are the 2000-watt pioneers, but other cities and smaller municipalities are now orienting themselves towards the same goal. On the federal level, the newly established 2000-Watt specialist division is carrying the idea onwards and acts as the contact point for interested municipalities.

The federal offices for energy (SFOE), the environment (FOEN) and spatial development (ARE) are working in a similar direction to the City of Zurich. Politically, however, the preferences of the canton and the Federal Government are different. Today, many political bodies are committing to the saving of energy, but the speeds with which the goals are being pursued differ greatly.

The city as a driving force

The City of Zurich and its partner cities are setting an example and systematically bringing their wishes and experience into the legislative process. So is it any use? In the 1990s, Zurich was a pioneer in a very different field: the policy on drugs. The concept with which the city fought against the squalor of the open drug scenes in Platzspitz and Letten met with fierce hostility at the time – today it is the nationwide norm. A similar change in Zurich's surroundings is also taking place within energy policy and climate policy: today, without causing much of a stir, municipalities in which 30 km/h speed zones would have been unthinkable just a few years ago are setting up such zones themselves.

“Can a small city like Zurich solve a global problem?”

No. A problem like climate change can only be solved globally. This is why Zurich is also involved at the national and international levels – and, as a 2000-watt society, can be a role model for others. However, this is not just about playing the role of the model pupil: if Zurich manages to make the changeover, it will be better equipped for future situations in which energy is scarce. The local economy benefits from the money that no longer goes abroad for energy imports. Furthermore, by taking a pioneering role, Zurich becomes more appealing to people and companies.

www.iclei.org
www.eurocities.eu
www.eumayors.eu
www.klimabuendnis.ch
www.energiestadt.ch
www.novatlantis.ch
www.eco-bau.ch

Different interests

However, cooperation does not just mean an exchange with like-minded people. Anyone strolling along Stadthausquai who wants to reach the lake must hurry in order to cross the road in one go during the signal's green phase. This sort of traffic situation at a touristically attractive location does not suit a city aiming to be a 2000-watt city. But General-Guisan-Quai is a cantonal road. Here, the city must comply with the canton's specifications regarding the number of cars that can drive along this road each hour.

Cooperation also means pursuing a goal in an environment that sometimes represents other interests. The city can steer with regulations and ordinances, but the laws are made by the Federal Government and the cantons. They do not always correspond to the city's requirements.

How much does the 2000-watt society cost?

Here, we would like to be able to write: “Implementation of the 2000-watt society costs 427 million CHF, spread over forty years.” Or better still: “On balance, the 2000-watt society costs nothing, because all the measures pay for themselves.” But we cannot. Nobody can know the answer. So is it a good idea to buy the pig in a poke? The future is always a pig in a poke. And when it comes to estimating the long-term financial consequences of an action, it is largely a matter of groping in the dark, even with regard to construction of a simple road.

Investing despite uncertainties

As a very rough estimate, ewz expects the required investment to amount to 100 million CHF each year for the next fifty years (see page 20). However, this is not simply the cost of the 2000-watt society: investment is necessary anyway. It is not possible to work out whether, and by how much, the selected strategy is more expensive than, for instance, investing in coal-fired power plants. Too many factors are uncertain: How will the energy sources’ market prices develop? How will climate policy and thus the cost of CO₂ emissions develop? How will technologies for producing energy from the sun, wind or geothermal heat develop? How will the demand for electricity develop? How will the economy as a whole develop? Every investor has to live with these uncertainties.

Long-term perspective

In many cases, ecologically sustainable economic activity also pays off in a business sense. Anyone investing in a better building envelope must first spend more money, but then saves on heating costs. Experience gathered by the Energy Agency for the Economy has shown that there is considerable potential for energy savings that pay off – what managers refer to as “win-win” situations. A study conducted by the Swiss Federal Institute of Technology Zurich in 2010 shows that all of Switzerland could aim for the 2000-watt society without hindering economic growth. There will be shifts though: certain sectors will profit, others will lose out. However, the informative value of such studies based on model calculations is debatable.

Strengthening local industry

An individual city cannot influence whether or not the economy grows, but it can attempt to put itself in the best possible position for the future. Today, a great deal of

money goes abroad for energy: for petroleum and natural gas alone, the people of Zurich spend over half a billion CHF per annum. If Zurich were to consume less energy and to produce its own, more added value would remain in the region. Furthermore, it is certainly the case that preparing oneself for an increasing scarcity of energy resources by consuming less is always better than heading for shortages unprepared. As Fatih Birol, Chief Economist of the International Energy Agency, says: we should leave oil before it leaves us.

“Does the 2000-watt society harm the economy?”

There is no such thing as the economy – there are different sectors with different interests. For instance, model calculations show that the engineering industry profits from the 2000-watt society, while the transport sector will have to expect losses. New economic niches are likely to arise. This is not at all unusual: structural change occurs in the economy on an ongoing basis. The 2000-watt society merely influences its direction.

Shaping the future

However, it is important to avoid deceiving oneself: not everything in life is “win-win”. Anyone who wants to change their life must risk something. After all, this is about more than just cost optimisation.



Renewable energy from the North: ewz wind turbines in Dörnte (Lower Saxony).

Excerpt from the City of Zurich's municipal code

Art. 2 (inserted via community decision of 30 November 2008, in effect as of 1 January 2010)

- 1** The community shall actively support the protection and preservation of the natural foundations of life and the sparing use of natural resources. It shall undertake to implement sustainable development.

- 2** In particular, within the scope of its responsibility for reaching the goals of the 2000-watt society, it shall support the following:
 - a) A reduction of energy consumption to a continuous rating of 2000 watts per resident.
 - b) A reduction of CO₂ emissions to one tonne per resident per annum.
 - c) The promotion of energy efficiency and renewable energy sources.

- 3** It shall forgo new investments in nuclear power plants and new options on nuclear power plants.

Transitional provision:

Art. 122

For reduction of CO₂ emissions to one tonne per resident per annum, the municipality sets the year 2050 as its target.



