



Subtask 2 – Switzerland: The *2000 Watt Society*

Task 24 – Phase I

Closing the Loop – Behaviour Change in DSM:
From Theory to Practice

March 2015

*Giorgio Eberwein, Evelyn Lobsiger-Kägi, Ursula Eschenauer, Markéta
Jetel, Vicente Carabias*

(with thanks to Dr Sea Rotmann and Roland Stulz)

Contents

Introduction to the case story.....	4
The 2000 Watt Society Switzerland – an “Integrated Formula” for Sustainable Living	5
The Concept.....	5
Two goals: primary energy and CO ₂ emissions	5
Three Strategies: Efficiency, Consistency, Sufficiency	6
Switzerland's Roadmap to the 2000 Watt Society	6
Implementation	8
Context and History - an Overview.....	8
Historical overview:	8
The Swiss Population and their Fields of Activities.....	9
Housing:	9
Mobility:	10
Food:	10
Consumption:	10
Infrastructure:.....	10
The ‘Behaviour Changers’ - their Instruments, Activities and Approaches	11
Novatlantis	11
Public authorities: confederation, cantons, communes (cities/municipalities)	12
Lighthouse Projects	15
The 2000 Watt Site “Greencity”	15
City of Basel (Canton Basel-City).....	15
City of Zürich	16
Findings and conclusions, strengths and weaknesses of the case study	17
Findings and conclusions.....	17
Strengths and Weaknesses of the <i>2000 Watt Society</i>	17
Strengths:	17
Weaknesses:.....	17
The 2000 Watt Society Switzerland – a Short Fairy Tale	19
Key Lessons Learnt and their Discussion	20
Subsections for each Key Lesson Learnt – the Interview and Further Statements	20
Create awareness: Give it a name and a place and do lighthouse projects	21
Use an all-embracing vision as underlying model and driver - don't worry when practical details are vague in the beginning.....	21
Both approaches work: top-down and bottom-up	22
Active pioneers are crucial.....	22
A rather technical approach can make things easier at the start: Nobody is against better buildings and more efficient technology, really... ..	22
Promote a future oriented life style - don't look back to your grandparents.....	23
Address the public: What does it mean for your daily life and your life style? Give advice for concrete action and show examples of landmark persons and families.....	23
Address different groups of people in their own particular language	24
Not the efficiency of a single product (e.g. car) is the problem, but the question of the ever-increasing number of products used – the so-called rebound effect.....	24



Interventions for behaviour change are not easy to address and to finance 24

Construction sector is relatively easy: good knowledge exists, guidelines, regulations and recommendations work..... 25

Don't compare apples and oranges when doing a benchmark between different municipalities (rural vs urban) 25

The classic rational homo economicus is not the right approach to change habitual behaviour of energy consumption 26

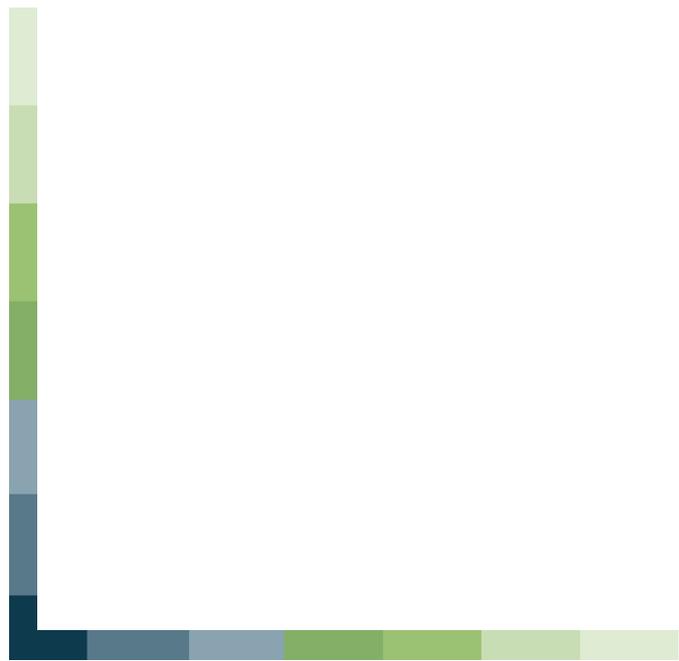
Conclusion – a Short Fairy Tale26

References.....27

 Primary Literature..... 27

 Weblinks..... 27

 Reports..... 28



Introduction to the case story

This document presents the general observations and lessons learnt based on the empirical analysis of the Swiss case study *2000 Watt Society*. The concept of 2000 Watt Society covers **energy policy, efficient housing, sustainable mobility, sustainable consumption and lifestyle**, i.e. all themes of relevancy for the IEA DSM Task 24 *Closing the loop - Behaviour change in DSM: From Theory to Practice*. This case study is part of its *Subtask 2 (In-Depth Case Studies)*. For Subtask 2, the in-depth interview that Dr Sea Rotmann conducted with the 2000 Watt Society expert Roland Stulz (*Novatlantis*) was analysed. The interview was supplemented with additional statements from persons with influence. Furthermore, a detailed description of the 2000 Watt Society concept was integrated as well as a stakeholder inventory for getting an overview about the most important institutions involved in the implementation of the 2000 Watt Society concept (based on online research and document analysis).

The 2000 Watt Society Switzerland is an important concept for moving forward to a sustainable energy future. Originally developed at the Swiss *Federal Institute of Technology* (ETH, 1998) and transferred with lighthouse projects in urban areas / agglomerations by Novatlantis (ETH sustainability programme) it has been established in the Swiss federal, cantonal and communal policies in the last years being nowadays a key element of the current *Energy Strategy 2050* of the Federal Council. As a vision of a society in which the world's raw materials are used in a sustainable and fair manner it focuses on increasing energy efficiency, increasing use of renewable energies and in changing the consumer and user behaviours. The two main goals are the reduction of the annual primary energy demand per Swiss person from the current average of 6,500 watts to 2,000 watts by the year 2100 and the reduction of the annual greenhouse gas emissions per Swiss person from a current average of 8.3 ton to 1.0 ton by the year 2100.

The implementation of the 2000 Watt Society is a great challenge and requires a tremendous commitment and effort of the entire society, especially of the Swiss population as private individuals. Nowadays, a lot of institutions orientate themselves to the 2000 Watt Society and help with their work and their exemplary function towards an implementation of the 2000 Watt Society. The most important institutions are the public authorities (confederation, cantons, cities / municipalities) and the private sector (economy, environmental and consumer organisations, agencies, etc.). The main question which comes up is: *Which kind of instruments, activities and approaches are useful to achieve the goals of the 2000 Watt Society?*

For the coordination and promotion of the activities around the 2000 Watt concept the competence center of the 2000 Watt Society ("Fachstelle 2000-Watt-Gesellschaft", Novatlantis) has been established in the year 2011.

The 2000 Watt Society Switzerland – an “Integrated Formula” for Sustainable Living

The Concept

At the end of the 1970's the “Physical Quality of Life Index” was introduced. It shows the relationship between energy consumption and quality of life. This index estimated that peoples' quality of life increases with the rise of energy consumption, but only up to the level of 2000 Watt per person constantly supplied. Above this level of energy consumption, the quality of life did not increase significantly anymore.

Based on this research and similar studies, researchers from the Swiss Federal Institute of Technology (ETH) in Zürich developed the concept of the 2000 Watt Society in the 1990's. They calculated what amount of energy can be sustainably delivered on a global level. The conclusion was that it is 2000 Watt per person, which was at that time approximately the global average energy consumption per capita. 2000 Watt is a continuous power which corresponds to the energy of 17500 kWh per year (respective to a power of twenty 100W bulbs or 1750 liters of mineral oil per capita per year). This amount of energy used should not be allowed to increase further.

Two goals: primary energy and CO₂ emissions

The two overall 2000 Watt Society goals, which should be achieved by the year 2100, are:

- the reduction of the primary energy¹ to a constant supply of 2000 Watt per person and year,
- the reduction of the emissions of CO₂ equivalent gases (greenhouse gas emissions) to 1 ton per capita and year.

Since 2000 Watt primary energy per person was the global average energy consumption per person in the 1990's, it means that the 2000 Watt Society doesn't demand a reduction of the global energy consumption, but a different distribution among the world population. Therefore, industrialised countries have to lower their consumption to 2000 Watt per person while developing countries should have access to 2000 Watt per person (cf. information on www.2000watt.ch, access: 20.2.2015).

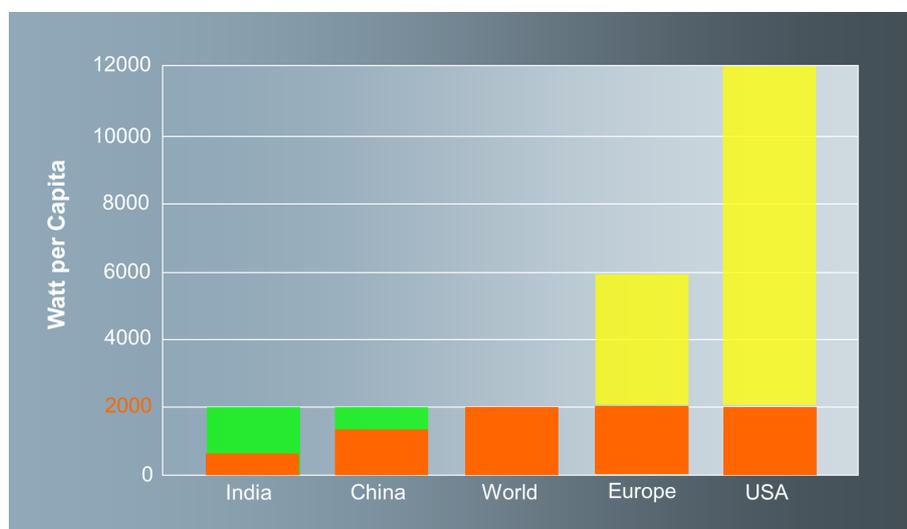


Fig. 1: Energy consumption over the world (Source: PSI, www.novatlantis.ch, access: 20.2.2015)

¹ Primary energy: The 2000 Watt Society specifies that when calculating our primary energy needs, we should also consider the energy consumed at upstream stages of the process, including the energy used to extract, convert and distribute the used energy sources.

² NOVATLANTIS 2010, FACHSTELLE 2000-WATT-GESELLSCHAFT (2014), <http://www.2000watt.ch/die-2000-watt-gesellschaft/weg/>, <http://www.novatlantis.ch/forschung/2000-watt-gesellschaft/die-vision/>, access: 20.2.2015

For Switzerland, the average energy consumption has an amount of 6500 Watt per person and is therefore roughly three times higher than the world average and slightly higher than the European average (cf. Figure 1). People in some Asian and African countries only need a fraction of that, on average. The vision of a 2000 Watt Society enables a balance between industrialised and developing countries and thus makes it possible for all people to enjoy a good standard of living.

The goal of reducing the global emissions of CO₂ equivalent gases (greenhouse gas emissions) to one tonne per person of the world population is, according to the IPCC (Intergovernmental Panel on Climate Change), necessary in order to limit the temperature increase which is caused by human beings and related to the greenhouse effect to +2°C. The +2°C limit of global warming was agreed to in December 2009 in the Copenhagen Accord².

The reduction of primary energy consumption targets the finite nature and the shortage of energy resources, whereas the rise of the greenhouse gases (CO₂ equivalent gases) in the atmosphere has to be limited in order to prevent disastrous climate change. There has been a debate amongst specialists in certain fields whether priority should be given to either energy consumption or CO₂. But on the overall society level, it is widely agreed that energy and CO₂ emissions are equally important goals and that they are interconnected and “happen together”. Interventions in either field overlap with each other and should therefore go hand in hand³.

In summary, the 2000 Watt Society is a concept for moving forward to a sustainable energy future. It is the vision of a society in which the world’s raw materials are used in a sustainable and fair manner.

Three Strategies: Efficiency, Consistency, Sufficiency

To achieve these goals, the entire society – these are mainly the private individuals, industry and the public authorities – needs to contribute according to the 3 main strategies:

- **Efficiency:** Less energy used for the same purpose!
- **Consistency:** Renewable energy resources instead of non-renewable resources!
- **Sufficiency:** The right quantity for a better quality of life!

It is important to understand that the 2000 Watt Society is a **vision and a model for sustainable development**. It is not an intervention like e.g. the Dutch case *PowerMatching City: power to the people?*, but an overall concept and a guideline for many different interventions. There are five main fields of activities as described below.

Switzerland's Roadmap to the 2000 Watt Society

For Switzerland, the goals of the 2000 Watt Society would mean returning to the same level of energy consumption that applied in 1960, i.e. when the country had just entered a sustained period of solid economic growth.

The reductions would be⁴:

- 3 times less primary energy
- 8 times less CO₂ equivalent gases

² NOVATLANTIS 2010, FACHSTELLE 2000-WATT-GESELLSCHAFT (2014), <http://www.2000watt.ch/die-2000-watt-gesellschaft/weg/>, <http://www.novatlantis.ch/forschung/2000-watt-gesellschaft/die-vision/>, access: 20.2.2015

³ ibid

⁴ ibid

These goals are to be achieved in 2100. The *Roadmap to the 2000 Watt Society* formulates intermediate goals and serves as a guideline for the cities and municipalities. To be ecologically viable, the energy mix had to be significantly changed in favour of renewable energies, as the 2000 Watt Path explains in Figure 2.

In 2050 e.g. every person will use 3500 Watt of total primary energy, of which there will be 2000 Watt of non-renewable primary energy and 2 tonnes of CO₂ equivalent at his/her disposal (from today 9 tons)⁵.

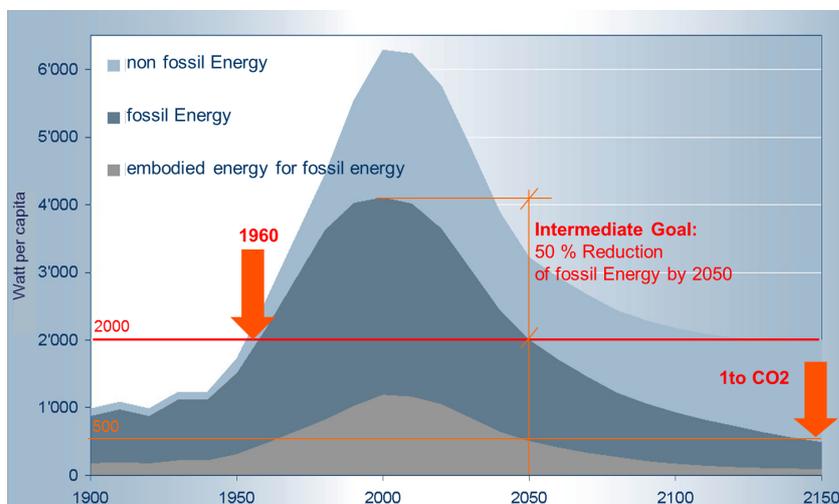


Fig. 2: Swiss Roadmap to the 2000 Watt Society (Source: www.2000watt.ch, access: 20.2.2015)

The primary energy consumption and the energy-related CO₂ equivalent emissions defined according to the 2000 Watt Society concept are caused by the end-use⁶ energy consumption of the Swiss society (industry, public authorities, private individuals). When the energy used for the production of imported goods and services is considered as well (embodied energy), the total average primary energy consumption in Switzerland is approximately 8300 Watt per person and the CO₂ equivalent emissions about 12.8 tonnes per persons. The goals for the total primary energy consumption and the corresponding CO₂ equivalent emissions are the same as for the 2000 Watt Society. However, these goals have to be reached 50 years later, in the year 2150.

⁵ ibid

⁶ End-use energy: energy that is directly available to users in private households, industry or transportation, for instance heating oil, electricity, gasoline)

Implementation

Context and History - an Overview

In the following section some country-specific contextual factors are described which have had an influence on this intervention:

- In Switzerland, industrialisation started relatively early (circa 1820). For a long time it has been a part of the culture and self-definition that the country had very few natural resources and therefore – as a small economy – had to generate wealth by the quality of its goods and services. Nowadays, Switzerland is among the richest and - political as well as economical - most stable countries. The need of belonging to the technological leading economies has played an important role in this development.
- Switzerland is also a small and densely populated country (except for some alpine regions). In the economic boom in the second half of the 20th century it became clear that limited space would be an important issue in the future as well.
- Within the Swiss federal political system municipalities possess a relatively large autonomy. In the past, cities like Zürich and Basel were pioneers in different policy areas in a comparable way as they are now pioneers with the 2000 Watt Society (see Lighthouse Projects Chapter).

Historical overview⁷:

1978: Introduction of the «Physical Quality of Life Index» that shows the relationship between energy consumption and quality of life: the quality of life increases only to a power of 2000 Watt per capita.

1994: Scientists laid the cornerstone for the idea of the 2000 Watt Society. They claimed a global average energy consumption of 2000 Watt per capita. Furthermore, energy should be distributed more fairly among the world's population.

1998: The Council of the Swiss Federal Institute of Technology (ETH) developed the project *2000 Watt Society - the Swiss Model* in its ETH-Strategy for Sustainable Development.

1999: Enactment of the federal energy law which focuses on energy efficiency and renewable energies.

2000: Enactment of the federal CO₂ law which focuses on reduction of the greenhouse gas emissions according to international reduction obligations.

2001: The ETH started the programme *Novatlantis* in order to pursue the ETH-Strategy for Sustainable Development. The head of this programme was Roland Stulz whilst the main project has been the 2000 Watt Society. Novatlantis applies insights of the ETH research with lighthouse projects in urban areas/agglomerations which are milestones of sustainable development.

2000 / 2001: The *Swiss Energy Programme* – an action programme with voluntary measures for the implementation of Switzerland's energy and climate policies – was launched by the Federal Council.

2002: The Federal Council enacted the goals of the 2000 Watt Society with its rapport *Strategy for Sustainable Development*.

⁷ <http://www.novatlantis.ch/forschung/2000-watt-gesellschaft/geschichte/>;
<http://www.bfe.admin.ch/energie/00458/index.html?lang=en>, access: 20.2.2015

2004: The report *Weißbuch*, realised by 10 Swiss scientists, concludes that the 2000 Watt Society is feasible for industrialised countries from a technical and natural scientific point of view.

2008: The City of Zürich was the first Swiss political body to write the objectives of the 2000 Watt Society into its constitution.

2010: The Competence Centre of the 2000 Watt Society (*Fachstelle 2000-Watt-Gesellschaft*) was funded by the *Swiss Federal Office of Energy* (SFOE). It coordinates and promotes activities around the 2000 Watt concept and is part of the *Swiss Energy Programme for Municipalities* – a subprogramme of the Swiss Energy Programme.

2011: The Federal Council and Parliament decided that Switzerland will withdraw from the use of nuclear energy on a step-by-step basis. According to this decision and other developments in the energy area the Federal Council developed a long-term energy policy (*Energy Strategy 2050*). The Federal Council decided that the SwissEnergy Programme will be an integral part of the initial package of measures for the implementation of the Energy Strategy 2050.

The Swiss Population and their Fields of Activities

The implementation of the 2000 Watt Society is a great challenge and requires a tremendous commitment and effort of the entire society. According to the Swiss Statistic of Total Energy Consumption (*Bundesamt für Energie* (BFE, 2014)) 29 percent of the energy is used in buildings (mainly heating), 35 percent for mobility (transportation by car, train, plane) and 36 percent in the sector industry and services (mainly process heat). This means that the Swiss population, as private individuals, is directly involved in using of almost two-thirds of the total energy consumption. Therefore, the success of reaching the goals of the 2000 Watt Society mainly depends on the behaviour of each individual person and their willingness to change their behaviour in a more energy-efficient manner.

How can the habits of people be changed from today's 6500 Watt to 2000 Watt and from today's 8.3 tonne of CO₂ gas emissions to 1.0 tonne? Model calculations show that the goals of the 2000 Watt Society can be reached, but it needs a big effort. The lifestyle we choose and our day-to-day behaviour play an important role in determining our energy footprint, and there are considerable individual choices we can make in the different fields of activities. In addition to making the appropriate changes in our consumption behaviour, we also need a range of products that can be manufactured and made available in an energy-efficient manner. How to lower our personal energy demand from 6500 Watt to 2000 Watt is shown below with the five fields of activities: **housing, mobility, food, consumption and infrastructure** corresponding to the guidelines of the 2000 Watt Society (NOVATLANTIS 2010).

Housing:

Current state: Three-quarters of all existing residential and office buildings are more than 30 years old and do not offer a sufficient degree of energy efficiency (so-called '20 Liter houses', meaning: 20 Liter heating oil per m²). Currently at around 50 m² per person, the size of the living area in new homes is also on the rise.

Options for action: Well-insulated low or zero-energy buildings (*Minergie-P, Minergie-P-ECO*) reduce heating needs to the equivalent of 2 Liter of heating oil per m². Moderate house size and energy-efficient appliances are important.

Note to building standards: *Minergie* building standards have been established in Switzerland for a long time. They are guidelines for regulations in the building sector and make an important contribution to a practically-orientated implementation of the 2000 Watt Society. However, they apply national weighting factors for calculating the energy consumption instead of using a 2000 Watt equilibration. The *Minergie* standards are based on the *SIA-norms*. In the year 2011, the Swiss Association of Engineers and Architects (SIA) integrated the goals of the 2000 Watt Society in its *Efficiency-Roadmap Energy* (*SIA Effizienzpfad Energie*, Merkblatt SIA 2040, 2011). Now these

goals can be applied to buildings with Minergie standards and can be checked against the *Efficiency-Roadmap Energy* if they are 2000 Watt compatible (www.minergie.ch), (Fachstelle der 2000-Watt-Gesellschaft, 2014).

For building sites there exists the possibility for a certification as a 2000 Watt Site. This certification includes standards for the creation, the service and the building induced mobility (www.2000watt.ch, Fachstelle der 2000-Watt-Gesellschaft, 2014). The applied methods are based on the *SIA Energy Efficiency-Roadmap* for buildings and on the label *Energy Cities* (see below). The certificate is awarded at two levels: «Site being developed» and «Operational site». The «Site being developed» certificate is valid until more than 50 percent of the building area can be used for the new designated purpose. The site is then considered «operational». The two levels differ in the proof required and the tolerance range established for progress towards objectives. There are already several (less than ten) 2000 Watt certified sites being developed. In September 2012, the site Areal Sihl-Manegg (*Greencity*) was awarded as the first 2000 Watt site in operation (see Chapter on Lighthouse Projects).

Mobility:

Current state: Long commuting distances, heavy shopping and recreation-related traffic and faraway holiday destinations are typical of our current standard of mobility. Air travel uses around twice as much energy per kilometer as car travel and five times as much as train travel.

Options for action: The use of a bicycle or public transportation for short and medium distances; less air travel; the use of an energy-efficient vehicle and limiting driving to less than 9000 kilometers a year.

Food:

Current state: A lot of energy is packed into the food we eat. Food production requires large amounts of energy through fertilizers, silage, water, storage and transportation. Meat production is especially energy-intensive: the production of 1 kg of beef requires 10 times more energy than the production of 1 kg of pasta.

Options for action: Placing an emphasis on products which are fresh, local, organic, and in season. Consuming less meat.

Consumption:

Current state: Products with short service lives (clothes, furniture, technical devices, etc.), non-basic services and events (concerts, hotel stays, etc.) are popular items that involve large amounts of embodied energy.

Options for action: An efficient consumer behaviour is also called for when it comes to clothing, accessories, health, culture and hotel stays. This means buying high-quality, long-life products and only to buy what is necessary. For example: clothing and shoes should be worn as long as possible; furniture and other household items should be replaced only when they are broken or cease to function as they should. Electronic devices should only be purchased if they are durable and energy-efficient.

Infrastructure:

Current state: Public infrastructure includes airports, train stations, streets, water and power supply, hospitals, schools, and security systems.

Options for action: The construction and operation of the public infrastructure is in the responsibility of the public authorities (confederation, cantons, cities / municipalities). Therefore, individuals are less able to influence the energy efficiency of public infrastructure (except by voting). They only can regulate the demand of public infrastructures by trying to keep their use constant, e.g. the amount of kilometers they drive annually.

Interested people can find out their ecological “footprint”, i.e. their primary energy consumption and CO₂ gas emissions by using appropriate calculators from the equilibration of the 2000 Watt Society. As mentioned above, the private individuals are responsible for almost two-thirds of the energy consumption in Switzerland, and Switzerland is still far removed to be a 2000 Watt Society. In their *White Book on the 2000 Watt Society*, researchers at the Swiss Federal Institute of Technology published data demonstrating the feasibility of dramatically increasing energy efficiency. In the case of passenger vehicles and buildings, the researchers outline the feasibility of reducing our energy needs by 50 to 90 percent (Novatlantis, 2010). A recent analysis of the potential of Switzerland to become a 2000 Watt Society concludes that this goal is only realistic “when assuming a pronounced technological increase in efficiency combined with a smart sufficiency strategy” (Notter et al., 2013, p. 4019).

So it comes up to the following questions:

- How familiar are the Swiss people with the concept of a 2000 Watt Society and its goals?
- How much do Swiss people know about their voluntary influence on the total energy consumption and CO₂ gas emissions of Switzerland according to the five fields of activities?
- Which institutions (stakeholders) support the Swiss people on their way?
- Which kind of instruments, activities and approaches are used and will be needed in the future?

The ‘Behaviour Changers’ - their Instruments, Activities and Approaches

The implementation of the 2000 Watt Society is a great challenge and requires a tremendous commitment and effort of the entire society. Involved institutions (‘Behaviour Changers’) are the **public authorities** (confederation, cantons, cities / municipalities) and the **private sector** (economy, environmental and consumer organisations, agencies, etc.). The main question which comes up is: “Which kind of instruments, activities and approaches are useful to achieve the goals of the 2000 Watt Society?”

In the following section the involved Behaviour Changers are described in detail:

Novatlantis

Novatlantis is a sustainability programme of the Swiss *Federal Institute of Technology* (ETH), and was launched in the year 2011. It applies insights of the ETH research with lighthouse projects in urban areas/agglomerations which are milestones of sustainable development. In a series of showcase projects, Novatlantis pilot and partner regions are testing the real-life feasibility of concepts and technologies that are compatible with the aims of the 2000 Watt Society. It is a question of pilot and demonstration projects that will play a particular role in the transfer of knowledge to the general public.

Examples include the expansion of Zürich’s *Triemli hospital*, the *Trotte nursing home* in Zürich and sustainable urban development in the *Erlenmatt* district of Basel. Furthermore, a tool for sustainable urban development (*Nachhaltige Quartierentwicklung* NaQu) is being tested in the four regions of Basel, Geneva, Neuchâtel and Zürich with the aim of facilitating comprehensive urban development and renewal. Further research and implementation projects have been initiated to address the issues of construction, mobility, energy supply, land development and resources. Novatlantis takes a push (enable knowledge and technologies developed at the various institutions in the ETH Domain to be transferred to the world of practical applications) – pull (promote research that directly corresponds to the needs of society and the public sector) approach to organising specific projects and coordinating the efforts of researchers and those interested in applying the results of research (Novatlantis 2010).

Public authorities: confederation, cantons, communes (cities/municipalities)

The Swiss federal, cantonal and communal energy and climate policy has been orientating itself to the 2000 Watt Society for a long time.

Confederation

As it is shown in the history overview the enactment of the federal *Energy Law* (Year 1999), the enactment of the federal *CO₂ Law* (Year 2000) and the launching of the *Federal Swiss Energy Programme* with voluntary measures (Year 2000/2001) were accompanied by the Federal Council enactment of the goals of the 2000 Watt Society with its rapport *Strategy for Sustainable Development* (Year 2002). For reasons of clarity, we will pass over a detailed description of the development in the last 15 years. In summary, the energy consumption per person has been reduced about 5 percent (BFE, 2013) and the greenhouse gas emissions per person about 18 percent in the period 1990 – 2012 (UVEK / BAFU, 2014) – mainly due to tightened building regulations.

The confederation supports the entire social process on the way to a sustainable future with legal frame conditions, incentive instruments, promotional programmes, advisory services and information. According to the allocation of competences between confederation, cantons and communes (so called “tripartite energy policy”) the confederation among others is responsible for⁸:

- The *Swiss Energy Programme* with voluntary measures encompassing the five themes buildings, renewable, energy mobility, electrical appliances, industry and services. The activities of the Swiss Energy Programme in these themes encompass the areas of sensitisation, information, advisory services, training and further education, quality assurance, networking and the promotion of progressive projects. The Swiss Energy Programme works together in partnership with cantons, cities/municipalities and the private sector (companies, environmental and consumer organisations, agencies, etc.
- Consumption standards for electrical appliances
- Incentives instruments, i.e. CO₂ dues on fossil fuels
- Responsibility for implementation of the national *Gebäudeprogramm* – a promotion programme for building retrofitting (together with the cantons)
- Exemplary function for the construction and operation of federal buildings and infrastructure (i.e. train stations, airports)

The decision by the Federal Council and Parliament (Year 2011) to withdraw from the use of nuclear energy on a step-by-step basis means that the objectives of the Swiss Energy Programme gain in importance. Therefore, the programme plays a significant role in the restructuring of Switzerland's energy supply in the coming decades. In consequence, the Federal Council decided that the programme will be an integral part of the initial package of measures for implementation of the *Energy Strategy 2050*. The *Energy Strategy 2050* focuses on the supporting of cities and municipalities since they have direct access to the Swiss population who, as individual persons, largely influence the energy consumption and the greenhouse gas emissions. The financial means for the Swiss Energy Programme for the sub programme *Swiss Energy for Municipalities* will be increased from 35 Mio CHF respectively 4.8 Mio CHF (Year 2013) to annual 55 Mio CHF respectively 7.6 Mio CHF starting in the Year 2015. The *Energy Strategy 2050* is currently in consultation and parliamentary debate (www.bfe.admin.ch, access: 20.2.2015). The Swiss Federal Office of Energy (SFOE) is responsible for the operational management of the programme (BFE, 2013).

⁸ Swiss Energy, European Energy Award, 2012

Cantons

The cantons make significant contributions to achieve the goals of the *2000 Watt Society*. Almost all cantons (23 of total 26 cantons) orientate themselves to the vision of a 2000 Watt Society. In their energy political strategy are appropriate goals and directions of impacts included (www.2000watt.ch).

The cantons support the entire social progress on the way to a sustainable future with legal frame conditions, incentive instruments, promotion programmes, advisory services and information. According to the allocation of competences between confederation, cantons and communes (so called “tripartite energy policy”) the cantons are responsible for⁹:

- Energy legislation in the building sector
- Cantonal promotion programmes focusing on energy efficiency and renewable energy
- Education and further training of the building industry (planners, architects, installers, etc.)
- Responsibility for implementation of the national *Gebäudeprogramm* – a promotional programme for building retrofitting (together with the confederation)
- Advisory services and information of the general public
- Exemplary function for the cantonal buildings (i.e. schools) and infrastructure (i.e. streets)

Communes (cities / municipalities)

Cities and municipalities have the most direct governmental access to the Swiss population. Cities and municipalities therefore make an important contribution to the implementation of the *2000 Watt Society* and are a cornerstone of the *Energy Strategy 2050*.

The communes support the entire social progress on the way to a sustainable future with legal frame conditions, incentive instruments, promotional programmes, advisory services and information. According to the allocation of competences between confederation, cantons and communes (so called “tripartite energy policy”) the communes are responsible for¹⁰:

- Room planning, amongst other decisions, for the construction of heat grids based on renewable energy
- Construction, operation and maintenance of the water and energy supply, streets including lightning
- Communal promotional programmes for energy efficiency and renewable energies
- Exemplary function for communal buildings (i.e. schools) and infrastructure

Cities and municipalities use their sphere of influence on energy policy very differently to the Confederation or Cantons. Some are exemplary – the so called *Energy cities* – others do less for energy efficiency. However, overall, the potential sphere of influence is not maxed out at all. Reasons for this are lack of information, coordination and education, lacking political willingness and financial means. This is particularly the case for small municipalities (less than 2000 inhabitants). The *Energy Strategy 2050* takes care of this by increasing the financial means for the *Swiss Energy for Municipalities* programme. It will focus on the propagation and implementation of

⁹ Konferenz kantonaler Energiedirektoren/EnergieSchweiz, Stand der Energiepolitik in den Kantonen, Jahresbericht 2013-2014, <http://www.bfe.admin.ch/themen/00526/00528/index.html?lang=en>, access: 20.2.2015

¹⁰ Swiss Energy, European Energy Award, 2012

the concept of the 2000 Watt Society, the inclusion of small municipalities and the propagation of the label *Energy City* (BFE, 2013).

The *Energy City* label has been awarded for more than 25 years to cities and municipalities, which have done exemplary efforts in their energy policy. It supports the communes on their way to a 2000 Watt Society, guarantees the integration into a comprehensive, progressive and targeted municipal energy strategy, as well as quality assurance in all areas. The label *Energy City* is awarded to a commune in case it realised 50 percent of the possible tasks in the fields of land use regulation, municipal buildings, supply and waste management/disposal, mobility, internal organisation and cooperation. Nowadays, there are around 360 “Energy Cities” in Switzerland which means that more than half of the Swiss population lives in “Energy cities” (Swiss Energy, European Energy Award, 2013).

In 2010, the energy use of six different cities within the 2000 Watt Society as a long term goal was compared with the average Swiss energy use. The outcome was that these cities used 20-45percent less energy¹¹.

Agencies, i.e. SIA (Schweizerischer Ingenieur- und Architektenverband)

The SIA is responsible for the development of building norms which are the base for regulations in the building sector. Beside the engagement of “2000 Watt Society pioneers”, architects like Roland Stulz and Novatlantis the orientation of the Swiss energy policy to the concept of the 2000 Watt Society led to an implementation of the 2000 Watt goals in the *SIA Efficiency-Roadmap Energy* in the Year 2011.

Environmental and consumer organisations, e.g. WWF

These organisations support the Swiss population on their way to a sustainable living with information and activities to energy efficiency and sufficiency measures, which can be handled by private individuals. They also take part in political consultations in order to influence the setting up of the Swiss energy and climate policy. Moreover, they work together in partnerships with companies and retailers (i.e. Ikea, Migros, COOP) to transition towards more sustainable lifestyles.

Companies

There is no method for 2000 Watt equilibration for companies, but they can take part in the so-called *Cleantech Organisations*. The term ‘cleantech’ is applied to technology, products, processes and services that are energy efficient and which use resources economically, thus helping reduce the impact on the environment and mitigate the effects of scarcity of resources. At the same time, cleantech products increase the efficiency and thus the competitiveness of the economy and make sustainable growth possible while conserving the environment (www.bfe.admin.ch).

Research and development groups

Studies conducted by researchers at the Swiss *Federal Institute of Technology* demonstrate the technological feasibility of the 2000 Watt Path. A lot of groups, i.e. the ETH Domain develop new technologies and products in respect to energy efficiency and renewable energies. In addition, research is done in the field of sufficiency, among others at the *ZHAW Institute of Sustainable Development* at the Zürich University of Applied Sciences.

¹¹ (www.2000watt.ch/fileadmin/user_upload/2000Watt-Gesellschaft/de/Dateien/weitereInformationen/Factsheets_Pionierstaedte.pdf)

Lighthouse Projects

Following are three examples for lighthouse projects closely explained, among them two cities (Zürich and Basel) that are pioneers on the way to the *2000 Watt Society*. The findings are based on the interview with Roland Stulz and on factsheets (www.2000watt.ch).

The 2000 Watt Site “Greencity”

The example of a 2000 Watt Site is the *Greencity* in Zürich on the former ground of Sihl-Manegg with the old papermill and an extent of 8 ha. It is the first neighbourhood in Zürich to have been consistently developed in line with the objectives of the 2000 Watt Society. In *Greencity*, home, work and sustainable, environmentally-aware behaviours are combined to form a new urban lifestyle. Apartments for singles, couples, families and seniors, plenty of shops, a school and attractive service buildings all together constitute an inspiring and future-oriented neighbourhood. All of the buildings were constructed by *Losinger Marazzi AG* to the very latest energy standards. The aim for residential buildings is the *Minergie-P-Eco* label, and for offices the *Lead Platinum* label. The site has a small hydroelectric station of its own to supply both sectors with carbon-neutral power. *Greencity* is very well developed with public transport and the energy supply derives 100% from renewable energy. With *Greencity* a vision becomes reality, and it is a showcase project for Switzerland¹².

City of Basel (Canton Basel-City)

The first projects started in 2001 with the City of Basel. The city authorities were ready to cooperate with *Novatlantis* but only for concrete implementations for buildings or transportation projects. They were not interested in purely academic theoretical studies. It all started with a *Future Transportation Lab*, with several (sub-) projects for new car technologies, organisational means and other questions. Step by step, there followed more projects in the fields of buildings and transportation. Basel's approach could be called bottom-up because it started with several smaller projects and only afterwards the vision 2000 Watt Society was really placed on the strategic level of the municipality (NOVATLANTIS, 2010).

The first 2000 Watt Site under construction is in the *Erlenmatt West* site of Basel on the scale of 25'000 m². 574 dwellings in total are to be built by 2016 on four sites. This figure will include family homes, small private and rental flats and terraced housing. There will also be a centre for senior citizens with 63 apartments, 56 care places and a public restaurant. This visionary and future oriented site will be constructed by the general contractor, *Losinger Marazzi AG*, in conjunction with the landowner, *Bricks Immobilien AG*. Work on the senior citizens centre began in May 2013. The whole of the Erlenmatt site is scheduled to be provided with site heating. Photovoltaic installations are also planned. Also the Erlenmatt West site will be relying 100 percent on renewable energy produced by IBW for heating and for preparing hot water. Grey Energy – i.e. the energy used for the production of building materials – will be kept to a minimum. The site has good connections with the public transport system and will be equipped with mobility facilities, as well as charging stations for electric cars and E-bikes.

In parallel, the Basel-City canton is building a primary school with a kindergarten and triple sports hall. Over the next two years, the canton will be completing the 40 000 m² *Erlenmatt Park*, an improvement which will considerably improve the quality of life in the site.

In March 2013, the *Energiestadt Label Commission* awarded the Erlenmatt project its *2000 Watt Site* certificate, a mark of recognition for the demonstrable and exemplary steps taken in the development of the site¹³.

¹² LENEL 3.9.2012, Intep Integrale Planung GmbH, Factsheet Greencity Zürich 2014, www.2000watt.ch, access: 20.2.2015

¹³ Factsheet Erlenmatt West Basel 2014, www.2000watt.ch, access: 20.2.2015

City of Zürich

The approach in Zürich was more top-down. The City had projects for sustainable development similar to those in Basel. They agreed with *Novatlantis* to put them under the name of *2000 Watt Society* to create more awareness. In November 2008, the people of Zürich 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 the municipal code (HÄNGGI, 2011).

Soon after that, the Zürich City Council moved to place the initiative *Sustainable City of Zürich – on the Way to the 2000 Watt Society* on its main agenda for the 2006-2010 legislative period, thereby underscoring its intention to begin the work of implementing suitable environmental, energy and climate policies. For the first four years, there was a *2000 Watt Commission* in which 4-5 of the 7 city councillors took part and met every other month with scientists of *Novatlantis* to coordinate the work.

As a complement to this resolve at the level of city government, the citizens of Zürich have also demonstrated their concern to secure an intact environment for future generations. In a referendum held in the fall of 2008, the citizens of Zürich voted in favour of writing the objective of the 2000 Watt Society into the city's constitution by over 75%. According to the provisions that have now been entered into the municipal code, per capita energy consumption is to be reduced by a factor of three and CO₂ emissions by a factor of four to six by the year 2050. The city has since established the *Minergie* standard as the minimum standard – both for new buildings and renovations.

A number of showcase projects are underway: the new *Triemli city hospital* and the *Trotte retirement home* are among the first projects in Switzerland that fulfil the comprehensive sustainability requirements of the 2000 Watt Society.

Further implementation measures relating to the 2000 Watt Path in the area of real estate development include: publicly funded consulting programmes for homeowners and an energy-coaching programme that is available free of charge to prospective homeowners and planners.

The establishment of an environmentally sustainable electricity power supply for the city of Zürich is also a major step along the 2000 Watt Path. This supply is to be secured without the use of nuclear power and is to be provided essentially by renewable sources of energy such as water, solar, geothermal heat, wind, and biomass (NOVATLANTIS 2010, S.23).

The city's public transportation network and infrastructure for 'slow traffic' are to be continuously developed. Planning and feasibility studies are being carried out in preparation for the implementation of a traffic plan that is compatible with the 2000 Watt agenda. The city is also intensifying its measures to inform and sensitise the public to the issue of sustainable mobility (NOVATLANTIS 2010, S.23). The city of Zürich has set itself ambitious targets regarding municipal buildings: almost all new constructions such as housing estates, school buildings and retirement homes, correspond to the *Minergie* standard (for low-energy housing). Among the model examples for this are the construction of a new city hospital which was built to *Minergie Passive* (zero energy building) standards. The energy consumption of all municipal buildings has also been made transparent thanks to the implementation of building certificates¹⁴.

¹⁴ www.stadt-zuerich.ch/2000watt, access: 20.2.2015, HÄNGGI 2011

Findings and conclusions, strengths and weaknesses of the case study

Findings and conclusions

Switzerland is prepared for the way towards the 2000 Watt Society:

- The necessary technical equipment mostly exists, further progress is expected.
- Efficiency potentials are very high.
- The Swiss population as private individuals is directly involved in using of almost two-thirds of the total energy (mainly for heating and mobility).
- There is a lack of information about the goals and the field of activities of the 2000 Watt Society – especially in small municipalities.

But:

- The energy consumption is too high and Switzerland is far from being a 2000 Watt Society.
- The success of reaching the goals of the 2000 Watt Society mainly depends on the behaviour of each individual person and its willingness to change behaviour in a more energy-efficient manner.
- The concept of the 2000 Watt Society has to be propagated much more to the Swiss population, as it is planned with the *Energy Strategy 2050*.

Strengths and Weaknesses of the 2000 Watt Society

Strengths:

- The 2000 Watt Society concept is a widely applicable concept (cities, municipalities, regions), covers all types of energy consumption and greenhouse gas emissions.
- One strength of the global formula of the 2000 Watt Society lies in its ability to include nearly all ideas and activities that strive for more sustainability and better quality of live.
- Furthermore, the ethical foundation seems to be appealing. People can identify themselves with it and may see themselves as a part of a great global change and as pioneers or role models (see interview with Roland Stulz).

Weaknesses:

It needs a lot of work to break down the general concept to binding and clear, locally-adapted measures. For example:

- Since the concept of the 2000 Watt Society is not well known in the Swiss population, it needs strong propagation. Once it is universally known it will be more easily accepted: Most of the referendum about issues of the 2000 Watt Society resulted in exceptionally high majorities (75-80 percent, normally it is 45-54 percent) in favour of the concept or concrete implementations according to 2000 Watt standards (see interview with Roland Stulz).

- 
- The implementation has to be done in a step-by-step and very pragmatic approach. It needs pioneers and lighthouse projects. A rather technical approach can make things easier at the start: Nobody is against better buildings and more efficient technology. The first lighthouse projects were in the field of housing and mobility (two of the main fields of high energy consumption; see interview with Roland Stulz).
 - Although the vision of the 2000 Watt Society is widely accepted, people in Switzerland have a rather vague notion of what that would mean for their lifestyle and concrete everyday behaviours. By giving people advice for concrete action and by showing them role models and landmark persons, positive effects on their behaviour of energy consumption can be expected. Examples and advice should be tailored to particular groups of people and expressed in their particular language. Rebound effects should be avoided (see interview with Roland Stulz).
 - It needs the support of a community standing behind the vision 2000 Watt Society from different fields of the society – especially from the public authorities. With voluntary action programmes, incentives instrument and regulations they have an important influence on the behaviour of people. Overall, they can provide the financial means for the implementation of the 2000 Watt Society.

The 2000 Watt Society Switzerland – a Short Fairy Tale¹⁵

Once upon a time... Swiss researchers and forethinkers had a vision for a world in which energy resources are not depleted, but used in a sustainable way. This is possible if every human being only has a constant demand of energy of 2000 Watt. At the moment, some countries – mostly industrialised ones - have a much higher demand for energy.

Every day... Swiss people used a lot of energy for food, housing, mobility and public infrastructure.

But, one day... Politicians, researchers and the public realised that there are already a lot of available technologies which would make their lives more energy efficient, e.g. energy efficient lighting, buildings, washing machines, fridges and cars. But despite their efficiency and many co-benefits, these devices don't have a huge market yet.

Because of that... Politicians decided to set goals and draw a picture of Switzerland with an overall energy demand of less than one third of the current one. A lot of cities, including all the big ones, held winning and binding referenda which meant that the 2000 Watt Society became part of the constitution. One has to have visions, even if they are quite far away – 2150 is a long way to go after all!

But now... Switzerland has a target, which unites everybody: people, companies, local and central government, politicians, teachers... This is at least a start, which will help to create a market for all these technologies.

Until... Switzerland will be able to reach the target, there is a hell of a lot of work to do. Everybody has to think about their contribution to the target! And it is not only about energy-efficient technologies but also about sufficiency and systems: do I really need all these electronic devices, do I really have to drive with my own car by myself to the recycling site?

And, ever since then... Politicians, government authorities, SMEs and the Swiss people are developing creative and exciting concepts and measures to reduce the overall energy demand in Switzerland.

The end.

¹⁵ For a description of the use of storytelling as a methodology see Mourik, R.M. and Rotmann (2013), S.2. Most of the time what we do is what we do most of the time. And sometimes we do something new. Analysis of case studies IEA DSM Task 24 Closing the Loop -Behaviour Change in DSM: From Theory to Practice. Deliverable 2 for IEA Implementing Agreement DSM Task 24

Key Lessons Learnt and their Discussion

In this section we will present the key findings extracted from the interview conducted by Dr Sea Rotmann in October 2013 with Roland Stulz, an expert for the 2000 Watt Society:

- **Create awareness:** Give it a name and a place and do lighthouse projects
- **Use an all-embracing vision as underlying model and driver** – don't worry when practical details are vague in the beginning
- **Both approaches work:** top-down and bottom-up
- **Active pioneers are crucial**
- **A rather technical approach can make things easier at the start:** Nobody is against better buildings and more efficient technology, really...
- **Promote a future-oriented life style** - don't look back to your grandparents (but learn from them, they often were great conservationists)
- **Address the public with tailored information:** What does it mean for your daily life and your lifestyle? Give tailored advice for concrete action and show examples of landmark persons and families
- **Address different groups of people in their own particular language**
- Not the efficiency of a single product (e.g. car) is the problem, but the question of the ever increasing number of products used – **rebound effect**
- Interventions for behaviour change are **not easy to address and to finance**
- **Construction sector is relatively easy:** good knowledge exists, guidelines, regulations and recommendations work
- **Don't compare apples and oranges** when doing a benchmark between different municipalities (rural vs urban)
- The classic rational *Homo economicus* is **not the right approach** to change habitual behaviour of energy consumption

Subsections for each Key Lesson Learnt – the Interview and Further Statements

In the following subsections, we describe each key lesson in 2-3 phrases and cite the relevant sequences of the interview conducted with Roland Stulz (dipl. Architect ETH, former Executive Director of Novatlantis).

Novatlantis – a sustainability programme in the ETH domain – is the interface between ETH research on one hand and industry, commerce, and public authority on the other hand. Its aim is to foster the transfer of research results for a sustainable development of cities, municipalities and regions with pilot projects. The basis is built by initiations of transdisciplinary projects that are broadly supported and in cooperation of scientists, public authorities and enterprises.

The explanations were – if possible – supplemented with some additional statements from persons with influence (indicated in the text below).

Create awareness: Give it a name and a place and do lighthouse projects

It is important to create awareness outside of the academic community and to realise showcase projects in order to start and implement the change process towards the 2000 Watt Society, to keep the process going and to engage the public more and more in it.

Basel has initiated various showcase projects in the area of sustainable construction. These include the customer center – a *Minergie-P* office building – of the local power company (IWB). Also built according to the *Minergie-P* standard, the apartment building *Cosy Place* in the city's Bruderholz district is similarly a first of its kind in Basel. The aim of such pilot and demonstration projects is to demonstrate the marketability of new technologies and forms of construction (Dr. Guy Morin, President of the Cantonal Government of Basel City, NOVATLANTIS 2010, S.20).

In the city of Basel, lighthouse projects had to illustrate exemplary solutions that were suitable for similar problems and objectives. Impulses arose for innovative and sustainable buildings that address interested stakeholders and potential imitators (Franco Fregnan, Division Manager Advanced Technical College). Examples are the *Dreispitzareal Basel und Münchenstein* (2010-2012) or the exemplary vehicle fleet of the cantonal administration of the canton Basel-Stadt.

Stulz: "A vision, a name, a place, and then immediately I started with landmark projects, with beacon projects. And of course, there was a synergy effect: projects that were already under construction or that were going on. Then, I asked them: "Do you agree that we call this project a 2000 Watt project?", because it was according to the 2000 Watt guidelines, or benchmarks. And so, this was a step-by-step approach, very pragmatic, very down to earth."

Stulz: "... the City of Basel was planning the extension and renovation of a large hospital – a 500 million dollar investment over 10-15 years. They planned it according to 2000 Watt Society very efficiently. And there was another referendum [...], and it was accepted with about 80% of the votes. And of course, it's a hospital, nobody is against a hospital."

Stulz: "And then I went to Zürich and told my friends there: "Listen, you do as much as Basel in the field of sustainable development. Why don't you put it under the name '2000 Watt Society'?" So, you create awareness."

Use an all-embracing vision as underlying model and driver - don't worry when practical details are vague in the beginning

One strength of the global formula of the 2000 Watt Society lies in its ability to include nearly all ideas and activities that strive for greater sustainability and quality of life. Furthermore, the ethical foundation seems to be appealing. People can identify themselves with it and may see themselves as part of a great global change and as pioneers or role models.

Stulz: "So, I think one of the advantages, or one thing that made it easier to accept is that the 2000 Watt Society nobody knew what it is, really, firstly. And secondly, somehow the people could agree with that vision. They said: "Ok, it is a good idea. It is wise to do that."

It is important to have a community standing behind the vision 2000 Watt Society from different fields of the society, not only scientists.

Stulz: "I think it [the ethical vision of the 2000 Watt Society] was a good choice. And somehow I made this choice because I thought I would need something ... Well, my thoughts were, when I started Novatlantis, because my predecessor was a well-known professor at ETH - now he is retired - and he was doing this Novatlantis programme pretty much in an academic way. He started with the 2000 Watt Society already. [...]"

Most of the referendum about issues of the 2000 Watt Society resulted in exceptionally high majorities (75-80 percent, normally it is 45-54 percent) in favour of the concept or concrete implementations according to 2000 Watt standards.

Both approaches work: top-down and bottom-up

In Switzerland pioneer cities have started their way to a 2000 Watt Society with different approaches, bottom-up as well as top-down. Both approaches have proven to be successful in the Swiss context.

Stulz: "And then, Basel was a bottom-up approach, you know. We started with a project here and there, buildings, transportation and so on. This went quite well step-by-step for about 4 years."

Stulz: "And they [Zürich] really organised this 2000 Watt Society top-down. The whole administration was involved, and it was very strictly organised. They also put some money in this project. They had a 2000 Watt master plan. And what was interesting and still is interesting is that the lead of the 2000 Watt Society programme in Zürich is with the Department for Health and Environment. It is not with the Building Construction Department. Although the Building Construction Department is the part of the city administration that invests most. The Department for Health and Environment doesn't have as much money. They have very limited financial means but they work together and they have the lead. The behavioural part and the social part were involved from the first day on somehow."

Active pioneers are crucial

Independently of a top-down or bottom-up approach, for the vision to be implemented in pilot projects, there are people needed who commit themselves to the vision and dare to be pioneers. This was the case in the Cities of Basel and Zürich with the municipalities and with executing companies and organisations. There also seems to be such a phenomenon as "the time was ripe" and "the right constellation of personalities met each other".

Stulz: "So, when I adopted this vision of the 2000 Watt Society as an architect and urban planner, of course, I am more on the pragmatic side, you know. [...] So, in 2001 I started with the City of Basel. I went to them and asked if they would contribute to this idea or cooperate. And they said: "Well, there was this guy five years ago, coming and talking about this, but it was too academic for us. If we want to do something, if we want to join, then want to some concrete implementation, some buildings or transportation projects, or things like that. But no theories, no studies. So, we started in 2001 in Basel. And there we started with a mobility programme. We called it the "Future Transportation Lab" or "Sustainable Transportation Lab" with several various projects for new car technologies and organisational means and things like that."

Stulz: "Well, [in Zürich] I started with my friend and former partner at the office who was in charge at that time of sustainable development in the City of Zürich, Heiri Gugerli."

Stulz: "That's fortunate. And he went to his boss who was the head of the building department. And he said: "Great, that's a good idea. Why don't we start this together?" And he went to his head who was a City Councillor. [...] It was an excellent constellation in Zürich to start such a project. And in Zürich it just lit the fire with this idea. The whole City Council decided unanimously that they want to have the 2000 Watt Society as one of five legislative goals for the next four years. Zürich was a strong signal for the other towns in Switzerland and for the entire political community in Switzerland. Because Zürich is always a little bit ahead, you know."

Stulz: "[...] The first four years, we had the so called 2000 Watt Commission. And the City Council which are seven people – four or five of these seven people met with us every other month to coordinate the work. This is really exceptional. They are the highest political institution. [...] I was absolutely amazed to see how they talked to each other. Really, it was an absolutely positive experience to work with them."

A rather technical approach can make things easier at the start: Nobody is against better buildings and more efficient technology, really...

The first lighthouse projects were in the field of housing and mobility (two of the main fields of high energy consumption). Based on scientific studies that showed the technical feasibility of the 2000 Watt Society the approach was also a rather technical one. This approach had a lot of success.

There was nearly no opposition neither from the population nor from any political or economic organisation.

Stulz: "Yes, we always sold this vision, from the first day on, with lighthouse projects or landmark projects, showing [buildings as examples for a] 2000 Watt building, [with arguments like:] it looks good, it is comfortable, it is wonderful. You can get image for the firm, for the institution for everything. And with transportation, Volvo was our partner for 100 environmental taxies in Basel. [...]"

Promote a future oriented life style - don't look back to your grandparents

For some people it may be tempting to look back to their grandparents and the life they led, which was often a lot more conservation-based. For the majority though, a future-oriented lifestyle that combines efficiency, quality of live and the possibility of a "simpler life than my grandparents" seems to be much more appealing.

Stulz: [...] we showed that 2000 Watt means maintaining or even improving quality of life, becoming smarter and more efficient. And our brochure was called or is still called "2000 Watt Society – smarter living". And in German it is "leichter leben" [lighter living].

Stulz: "It is getting rid of all this heavy stuff, all this resource based stuff. [...] I think this helped a lot."

Concerning the energy savings and the nuclear phase-out the opponents come up with the hint to the Stone Age man or the Amish people. Such comparisons are a simple insinuation (Thomas Feurer, mayor of the city Schaffhausen, the first "Energjestadt", in: BLANCK 2014, Schaffhauser Nachrichten, 29.10.2014).

Address the public: What does it mean for your daily life and your life style? Give advice for concrete action and show examples of landmark persons and families

Although the vision of the 2000 Watt Society is widely accepted, people in Switzerland have a rather vague notion of what that would mean for their lifestyle and concrete every-day behaviour. By giving people advice for concrete action and by showing them role models and landmark persons, positive effects on their behaviour of energy consumption can be expected.

Stulz: "What we urgently need now is advice for concrete action on our Website of the 2000 Watt Society. And for three years I have been trying to find financing for what I called "2000 Watt Lebensmodelle", 2000 Watt Lifestyle Models and Storytelling. Because what I see is that somehow since 25 years we know what we should do. Sometimes we do it, sometimes we don't - very often we don't tell the right stories. And when we do it, we neutralise it with this rebound effect, because we have more of everything. [...] Four months ago, I got the money for four examples financed by the Swiss Federal Office for Energy [BFE, Bundesamt für Energie], which is a good start, of course. And it is now on the internet, [...].

My intension was to start something like building a community interactively and having a platform for ideas, for collecting ideas and things like that."

Stulz: "[...] So, it's the decisionmakers who work with it. [...] So the big field of activity we have to touch now is the public: storytelling, giving tailored information for the people what it means. [...] And I would say based on the experience I made with these landmark projects or beacon projects in building construction and transportation I would say this was so successful, that's the basis of the success of the 2000 Watt Society. [...] I would like to continue this approach of motivation through landmark families, landmark people, stars, champions saying "I am 2000 Watt, it's good to be 2000 Watt."

[...] So, we started with four examples: one of a family, one of a single person, one of a commune kind of people living on a farmhouse. These are on the website now of Swiss Energy. [...] But what is important is these people are not 2000 Watt people. Some are 4000 Watt people, some 3500 Watt, some 3000 Watt. One single is 5000 Watt. But they are below 6500 Watt which is the average in Switzerland."

A city can contribute to a change in culture that is needed to reach the goals of the 2000 Watt Society. It must succeed in including the people in this change. This calls for public initiatives like for example, car drivers who give up their car keys for a month will receive a trendy bicycle and a public transport ticket in exchange (Rahel Gessler, head of the Energy and Sustainability division of Zürich's Office for Environmental and Health Protection, in: HÄNGGI 2011, S.18).

People in Zürich are very environmentally aware. However, a huge gap exists between awareness and actual behaviour. Information and incentives alone are unlikely to be sufficient to change the behaviour. In other words: it must be "hip" to live in an energy-saving way (Bruno Bébié, economist, Energy Officer, in: HÄNGGI 2011, S.19).

Stulz: "[...] another possibility [is] that you take one family or a group of people and you follow them. This is done by another group the so called "2000 Watt Cities" in the Lake of Constance region. There are a dozen or fifteen cities around the Lake of Constance who are now really starting in an EU programme 2000 Watt Society mainly on behavioural questions. With a website "We live the 2000 Watt Society" – "2000 Watt Gesellschaft leben".

Stulz: "There are several initiatives starting. The City of Basel asked me now to make 4 or 5 examples for them in the region of Basel. The City of Zürich asked me to make a couple of them. So, it starts slowly with little steps, and I think we have to work intensively on that." [...] And the City of Zürich has now started a ten year project - one million CHF per year - for research on the 2000 Watt Society in two fields: one field is behaviour in buildings, and the other field is building construction renovation – fostering renovation, making it more professional, more efficient and so on. [...] They have some studies on the internet already."

Address different groups of people in their own particular language

Advice for action, role models or landmark persons have to be meaningful for people. There has to be an immediate link to their own lifestyle and behaviour in order to create behaviour change. Examples and advices should be tailored to particular groups of people and expressed in their particular language.

Stulz: "That is important to speak to a certain group of people in their language."

Stulz: "You need to translate into different languages. You cannot only tell one story for everybody."

Not the efficiency of a single product (e.g. car) is the problem, but the question of the ever-increasing number of products used – the so-called rebound effect

People don't seem to be very aware of the rebound effect caused by their own behaviour in sustainability issues in general and energy consumption issues in particular.

Stulz: "Because what I see is that somehow for 25 years we have known what we should do. Sometimes we do it, sometimes we don't - very often we don't. And when we do it, we neutralise it with this rebound effect, because we have more of everything. We have it more efficiently, but we have more square meters [per] person, we have heavier cars, more toys, more this and more that."

Interventions for behaviour change are not easy to address and to finance

The importance and the potential of interventions for behaviour change seem to be underestimated among decisionmakers. Budgets for technical interventions are easier to find. The reason might be that the 2000 Watt Society has been a mainly technical programme until recently.

Stulz: "[...] and that [referring to the IEA DSM Task 24 expert platform, films, drawings, cartoons, storytelling] costs money. And so far people were quite interested. They said: "Yes, we should do that." But they didn't have the budget for it. As long as there is no budget - the administrations and the politicians are not aware that this might be the point in the budget - you cannot start. And private industry is not interested in this kind of stories, so far."

Energy efficiency and comfort are not incompatible, the best example are the *Minergie* buildings. It is essential to encourage the people in their choice of energy efficient appliances, vehicles and buildings. Financial incentives in the form of startup financing can also help. Many decisionmakers are not in favour of savings programmes with behavioural guidelines and prohibitions (Peter C. Beyeler, governing council of the Canton of Aargau, Department for Building, Transport and the Environment, in: BAUER 2007).

Policies must create clear, forward-looking frameworks, so that saving energy and the use of renewable energy will pay off. The populace does not itself wish to waste energy or burden the climate with CO₂ emissions. Our energy policies until now have been strongly influenced by the interests of the energy and electricity companies, i.e. towards ever more sales and not savings. New systems of incentives are needed here, e.g. revenue neutral fees and/or an ecological tax reform (Dr. Hans-Peter Fricker, Director of WWF from January 2004-2011, in: BAUER 2007).

Construction sector is relatively easy: good knowledge exists, guidelines, regulations and recommendations work

From the beginning, the construction sector was a main field of activity in the 2000 Watt Society programme. Scientific studies showed a big efficiency potential in building construction. The efficiency has further improved during the last years. For new buildings the 2000 Watt goals are in reach. For existing buildings the investment cycles are long.

Stulz: “[...] So, we are still in an early phase. This makes it clear that the 2000 Watt Society has been led or active as mainly technical programme for the first 10 years in the field of buildings and a little bit of transportation. In the building sector we have all we need. We have labels, we have norms, standards, products. For new buildings we are fine.

[...] And everybody now knows the 2000 Watt Society. The market asked for 2000 Watt labels. We have a labelling scheme for 2000 Watt Neighbourhoods. Not for single buildings, because we say, there are enough building labels. But we have a guideline and standards for 2000 Watt buildings which means including transportation.”

[...] We even asked for mixed-use neighbourhoods, not purely apartment buildings. It gives an additional point when you have a mixed usage of these buildings, and good public transportation, of course, and things like that. So, now we are there that on the technical side we are quite well positioned.”

Don't compare apples and oranges when doing a benchmark between different municipalities (rural vs urban)

Doing benchmarks between municipalities is a difficult and delicate matter. Simply comparing figures of energy consumption per capita is not correct. These figures need to be interpreted. Obviously, a city that is the economic and cultural centre of an entire region would have a higher energy consumption than a quite, rural village.

Stulz: “First of all, you cannot compare the cities amongst each other because they have totally different services to provide, they have totally different roles. When you compare a village of 2000 people with the City of Zürich, it's not comparable, you know. I know they do it. And it's a big mistake because we need to interpret these figures. We had an experience a couple of years ago when they presented [...] 10 towns just selected by accident. [...] And there were small towns or villages and [...] a city like Zürich.

Zürich was at - let's say 5'300 watt per capita, and others were at 7'000, and some at 3'500. One village called Erstfeld - that's near the Gotthard Pass - it's a village of maximum 2000 people. Everybody moves out to work in Luzern or somewhere, or even in Zürich. They have hydro electricity because they are in the mountains. They had an absolutely positive good initiative with solar energy: photovoltaics and things like that. So, they are at 3500 Watts primary energy - non-renewable. It's wonderful.

[...] Zürich is investing millions and doing so much to get down with the energy consumption. And in the media the header was: "Erstfeld top – Zürich flop" because they compared apples and oranges. You cannot do that. And therefore I would say we don't know enough. And that's a little bit the danger I see now, that everybody is trying to communicate figures. The arguments are figures now and doing as if these figures are accurate. They are not accurate, you know."

The classic rational homo economicus is not the right approach to change habitual behaviour of energy consumption

When using energy people usually don't calculate cost. It is most of the time a habitual behaviour. Often people use a service and are not aware of the energy that makes it possible.

The approach of the *Homo economicus* neoclassical economic models acts on the assumption of the rational human being who will make utilities at all costs and is selfishly motivated. Stulz agrees that this model is almost entirely wrong because most of our energy use is habitual. Energy is invisible, the people don't regard as being energy using. The policies and campaigns must first refer to this unconsciousness.

Conclusion – a Short Fairy Tale

Once upon a time ... a study investigated the success factors for moving towards a 2000-Watt Society in Switzerland. They focused less on technological factors but more on sociological, psychological, socio-economic, political and cultural factors.

Every day ... the Swiss population was basically in favour of the 2000-Watt vision and did some efforts to move towards the goals of that vision. But, the progress was still slower than the already existing technology would have allowed. In every-day life a lot of peoples' behaviour is habitual, and people are often more busy with other things than their energy consumption. Furthermore, most of the people did not know what living with 2000 Watts would mean for their daily life and their lifestyle.

But, one day ... the above mentioned study was finished and came to the conclusion that interventions for behaviour change were underestimated. They had really great potential. And they were necessary: firstly, to apply more of the existing technology and secondly, to give people a guideline and advice for concrete actions and for changing their lifestyles.

Because of that ... the 2000-Watt vision was kept short and all-embracing and was communicated more intensively to the entire society - experts, public, municipalities, schools, enterprises and all kind of organisations. Greater financial means and more priority were given to interventions for behaviour change. Additional to the technical lighthouse projects (mainly buildings and neighbourhoods), examples of landmark persons and families were promoted. Advice for action was tailored to different groups of people and their lifestyle. The service and consultancy activities for private persons, enterprises, municipalities and other organisations were intensified.

However ... social and cultural changes take time, and, in the case of behaviour change towards the 2000 Watt Society, it is a lot of effort, too.

And, ever since then ... the Swiss population increased their efforts to move towards the 2000Watt Society in all aspects of their life and all fields of the society. To live a 2000 Watt life style gained a lot of positive image among large parts of the population. A promising trend of reducing the energy consumption could be started!

The End.

References

Primary Literature

BAUER, Christian (2007): *Facts for the Energy Decisions of Tomorrow*. In: Energie-Spiegel. Mirror On Energy. Newsletter of PSI, No.18, April 2007. Villigen.

BUNDESAMT FÜR ENERGIE (BFE,2014): *Schweizerische Gesamtenergiestatistik 2013*

BUNDESAMT FÜR ENERGIE (BFE,2013): *EnergieSchweiz2013-2020 Detailkonzept*

BLANCK, Robin (2014): *2000-Watt-Gesellschaft ist ein Richtwert*. In: Schaffhauser Nachrichten, 29.10.2014.

FACHSTELLE 2000-WATT-GESELLSCHAFT (2014): *Bilanzierungskonzept 2000-Watt-Gesellschaft*. September 2014. EnergieSchweiz für Gemeinden, Stadt Zürich, SIA Schweizer Ingenieure- und Architektenverein. Redaktion: Rolf Frischknecht, Franziska Wyss.

HÄNGGI, Marcel (2011): *On the Way to the 2000 Watt Society. Zürich's path to sustainable energy use*. Hrsg.: City of Zürich. Office for Environmental and Health Protection Zürich (UGZ). Zürich, April 2011.

LENEL, Severin (2012): *Arealentwicklung für die 2000-Watt-Gesellschaft. Leitfaden und Rechenhilfe*. Intep Integrale Planung GmbH, St. Gallen. In: Simposium "2000-Watt-Areale" konkret, 3.9.2012, Stadt Zürich, Hochbaudepartement.

MOURIK, Ruth, ROTMANN, Sea (2013): DSM (Demand Side Management) Energy Efficiency. Task 24: Closing the Loop – Behaviour Change in DSM: From Theory to Practice. Netherlands, New Zealand, November 2013.

NOTTER, D. A., MEYER, R., & ALTHAUS, H.-J. (2013): *The Western lifestyle and its long way to sustainability*. Environmental Science & Technology, 47(9), 4014-4021.

NOVATLANTIS (2010): *Smarter Living. Moving Forward to a Sustainable Energy Future with the 2000 Watt Society*. Novatlantis – Nachhaltigkeit im ETH-Bereich, mit Unterstützung Bundesamt für Energie BFE und SIA, Schweizerischer Ingenieur- und Architekturverein. Zürich, Juli 2010.

UVEK, BAFU (2014) : *Kenngrossen zur Entwicklung der Treibhausgasemissionen in der Schweiz 1990 – 2012*

Weblinks

www.2000watt.ch: Greencity.Zürich, Factsheet, Fachstelle 2000-Watt-Gesellschaft. 20.2.2014.
Erlenmatt West Basel, Factsheet, Fachstelle 2000-Watt-Gesellschaft. 20.2.2014.

www.2000watt.ch/fileadmin/user_upload/2000Watt-Gesellschaft/de/Dateien/weitereInformationen/Factsheets_Pionierstaedte.pdf, access: 20.2.2015: *Energiestädte auf dem Weg zur 2000-Watt-Gesellschaft*.

Factsheets der sechs Pionierstädte Buchs, Erstfeld, Illnau-Effretikon, Planken FL, Vevey und Zürich.

www.stadt-zuerich.ch/2000-watt-society: 2000 Watt Society: Together Towards a Balance. Zürich's approach to a sustainable global development. On the Way to the 2000 Watt Society. Zürich's path to sustainable energy use. April 2011.

www.leadsm.org, Task 24: Closing the Loop – Behaviour Change in DSM: From Theory to Practice.

www.bfe.admin.ch (2014): Botschaft zum ersten Massnahmenpaket der Energiestrategie 2050
<http://www.bfe.admin.ch/themen/00526/00527/>

<http://www.bfe.admin.ch/energie/00458/index.html?lang=en>: *SwissEnergy Programme*

<http://www.novatlantis.ch/forschung/2000-watt-gesellschaft/geschichte/>: *Die 2000 Watt Gesellschaft – Historisches*, access: 20.2.2015

http://www.energiestadt.ch/files_all/PK-23-Feb-2011/Energiestadt-Medienmitteilung_PK_23-Feb-2011.pdf: media notices to the energy consumption of energy cities, 2011

www.minergie.ch

Reports

City of Zürich / Swiss Federal Office of Energy SFOE / SwissEnergy / Novatlantis (2009): *Grundlagen für ein Umsetzungskonzept der 2000-Watt-Gesellschaft am Beispiel der Stadt Zürich*. (May 2009) URL: http://www.novatlantis.ch/wp-content/uploads/2014/10/PRZH_2kW_Methodikpapier_20090528.pdf [May 2009]

City of Zürich (2001): *On the way to the 2000-watt society. Zürich's path to sustainable energy use*. Zürich: City of Zürich, Office for Environmental and Health Protection (UGZ) (April 2011)
URL: <https://www.stadt-zuerich.ch/gud/de/index/umwelt/2000-watt-gesellschaft.html> [April 2011]

Fachstelle der 2000-Watt-Gesellschaft (2012): *Bilanzierungskonzept*. (March 2012)
URL: <http://www.2000watt.ch/die-2000-watt-gesellschaft/methodisches/> [March 2012]

Novatlantis / sia / SwissEnergy (2011): *Smarter Living. Moving Forward to a Sustainable Energy Future with the 2000 Watt Society*. Bern: Swiss Federal Office for Buildings and Logistics (BBL)
URL: http://www.bfe.admin.ch/dokumentation/publikationen/index.html?start=0&lang=en&marker_suche=1&ps_text=Smarter+Living&ps_nr=&ps_date_day=Tag&ps_date_month=Monat&ps_date_year=Jahr&ps_autor=&ps_date2_day=Tag&ps_date2_month=Monat&ps_date2_year=Jahr&ps_show_typ=no&ps_show_kat=no [March 2011]

SwissEnergy / European Energy Award (2012): *2000-Watt-Gesellschaft: Ein Konzept mit zwei gleichwertigen Zielen. Synthesepapier mit Argumentationshilfen für Energiestadtberater/innen und angehende 2000-Watt-Berater/innen*. (April 2012) URL: <http://www.2000watt.ch/die-2000-watt-gesellschaft/faqs/> [April 2012]

SwissEnergy / European Energy Award (2013): *Das Label Energiestadt - Eine Einführung*
Robert Horbaty, Geschäftsführer Trägerverein Energiestadt

Auf dem Weg zur 2000-Watt-Gesellschaft: Kongress „2000 Watt Start“ in Basel:
http://www.mobilservice.ch/mobilservice/akten/mobilitaet/news-datenbank.html?fa_view_generalfolder_module_2001 (in German)

Amt für Umwelt und Energie. Departement für Wirtschaft, Soziales und Umwelt des Kantons Basel-Stadt, Novatlantis (no date): *2000-Watt-Gesellschaft. 10 Jahre Pilotregion Basel. Diese Projekte machen Basel zur Pilotregion*. <http://www.2000-watt.bs.ch/pilotregion-basel/ziele-der-pilotregion.html>

Konferenz kantonaler Energiedirektoren/EnergieSchweiz (2015): *Stand der Energiepolitik in den Kantonen, Jahresbericht 2013-2014*,
<http://www.bfe.admin.ch/themen/00526/00528/index.html?lang=en>