Energy Strategy City of Zurich

The 2000-Watt Society

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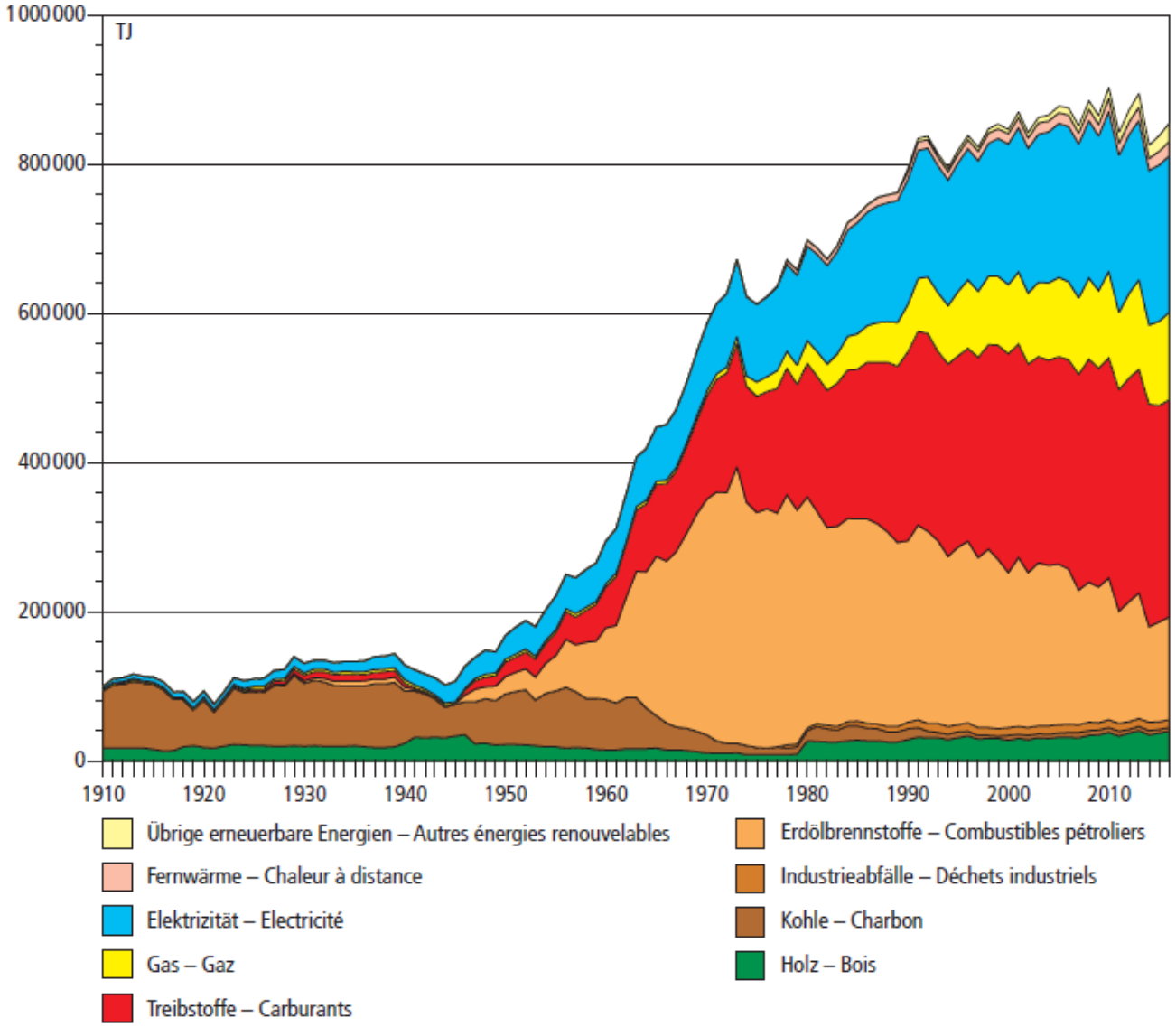
Stadt Zürich
Energy Commissioner

Energiestadt GOLD
european energy award

Content

- The ambition – Becoming a 2000-Watt Society
- How to become a 2000-Watt society
- Conclusion

Energy Consumption Switzerland



25% electricity

14% natural gas

34% motor fuel

16% heating oil

Who regulates?

Federal Government

- energy consumption of appliances and vehicles
- CO_2-levy on fossil fuels (heating only)
- subsidising renewable electricity production

Cantons

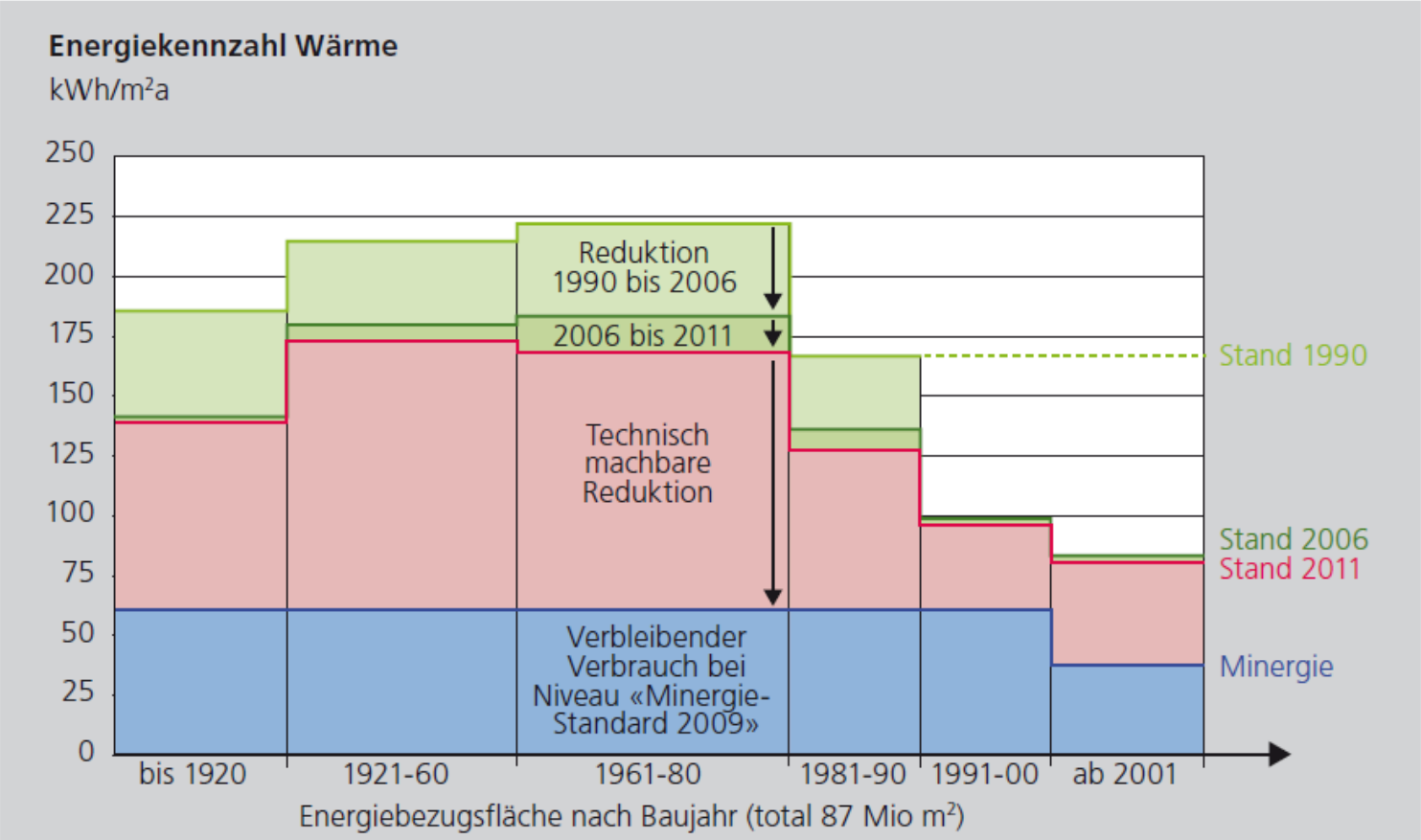
- building standards
- subsidising building renovations

Beyond those regulations cities have a high level of autonomy

Example regulation: building standards

heating energy

renovations: 1.3% reduction per year
new buildings (substitution): factor 4 reduction



source: Energieplanungsbericht, Kanton Zürich

Zurich is an early mover of energy politics

1979	Energy officer, energy savings in city buildings
1989	Energy counseling, energy tariffs with saving incentive, energy saving fund
1993	Additional energy specifications for buildings
1996	Solar exchange for photovoltaics installations, energy services for companies
2000	Label „Energy City“
2001	„7-Mile-steps“ for low impact/energy efficient buildings
2001	Label „naturemade“ for green power
2002	Energy Master Plan
2004	European Energy Award Gold
2006	energy tarif revision (e.g. default renewable energy, efficiency bonus)
2010	wood-fired cogeneration plant Aubrugg
2014	natural power company → Energy 360^0
2015	100% renewable electricity

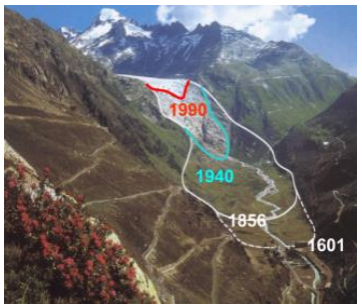
Global challenges

1. Limited resources

life-style Switzerland average: 3 planets
life-style world average: 1.6 planets

2. Climate change

Paris Agreement to limit global warming to well below 2°



3. Fairness

intra- and intergenerational sustainability

pictures: Living Planet Report, unric, djouv.ca

pictures: Living Planet Report, Wikipedia, unric, djouv.ca

Referendum of 30 November 2008

30 November 2008

Reliable power supply
Flourishing economy

YES TO SUSTAINABILITY

76.4 % Yes

2000-Watt-Society

goal becomes part of city's constitution

A Groundbreaking Decision 2008



By voting „yes“ to sustainability and a 2000-Watt society the electorate voted in favour of Zurich doing the following:

- Reducing its energy consumption to 2000 watts per person
- Reducing its annual CO_2 emissions to one tonne per person by 2050
- Promoting renewable energies and energy efficiency
- Not renewing its investments in nuclear power plants

new since 2016: end nuclear power production by 2034

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How much are 2000 Watt and 1 tonne CO_2?

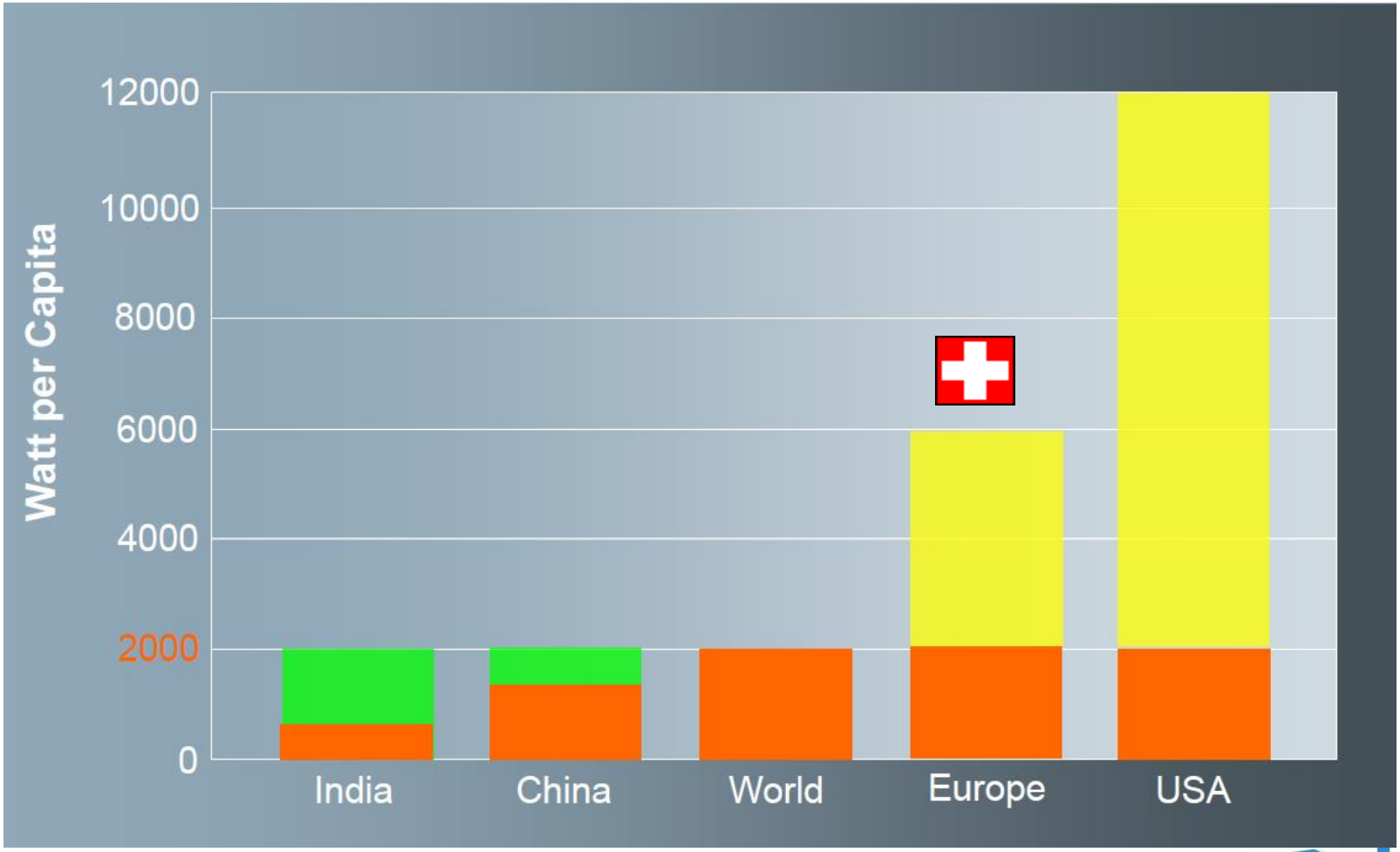
2000 W per person means that you can use 2kWh each hour on average for all your energy needs (transport, building, infrastructure, consumption etc).

1 tonne CO_2 is your personal budget for **one year**!

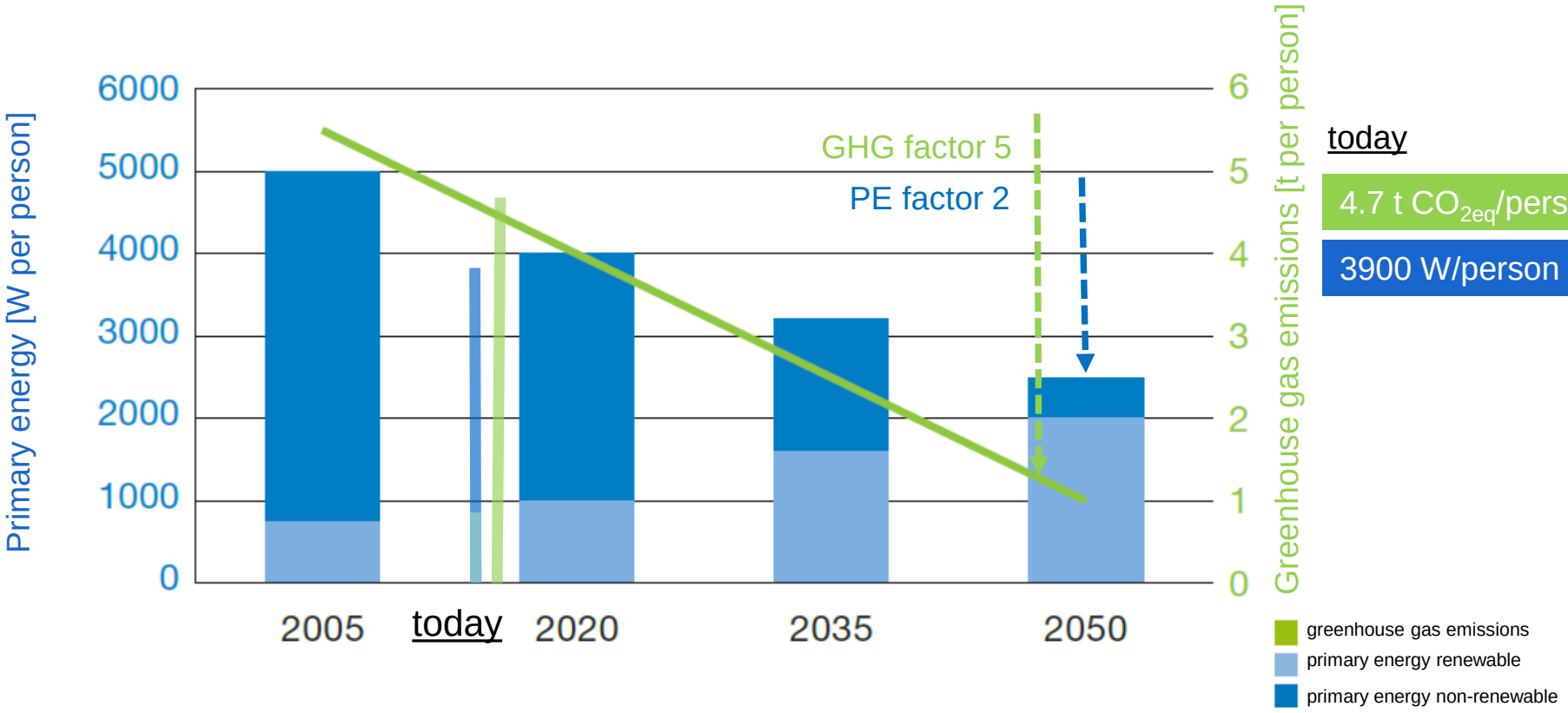
2 kWh = 2 washing cycles

1 tonne CO_2 = flying Zurich - New York (one-way!)

Where are we today?
Global perspective



2000-Watt targets City of Zurich
according to Energy Masterplan



- ☑ Two long-term goals: PE (primary energy) and GHG (greenhouse gas emissions)
- ☑ all energy sources incl. grey energy part of the balance

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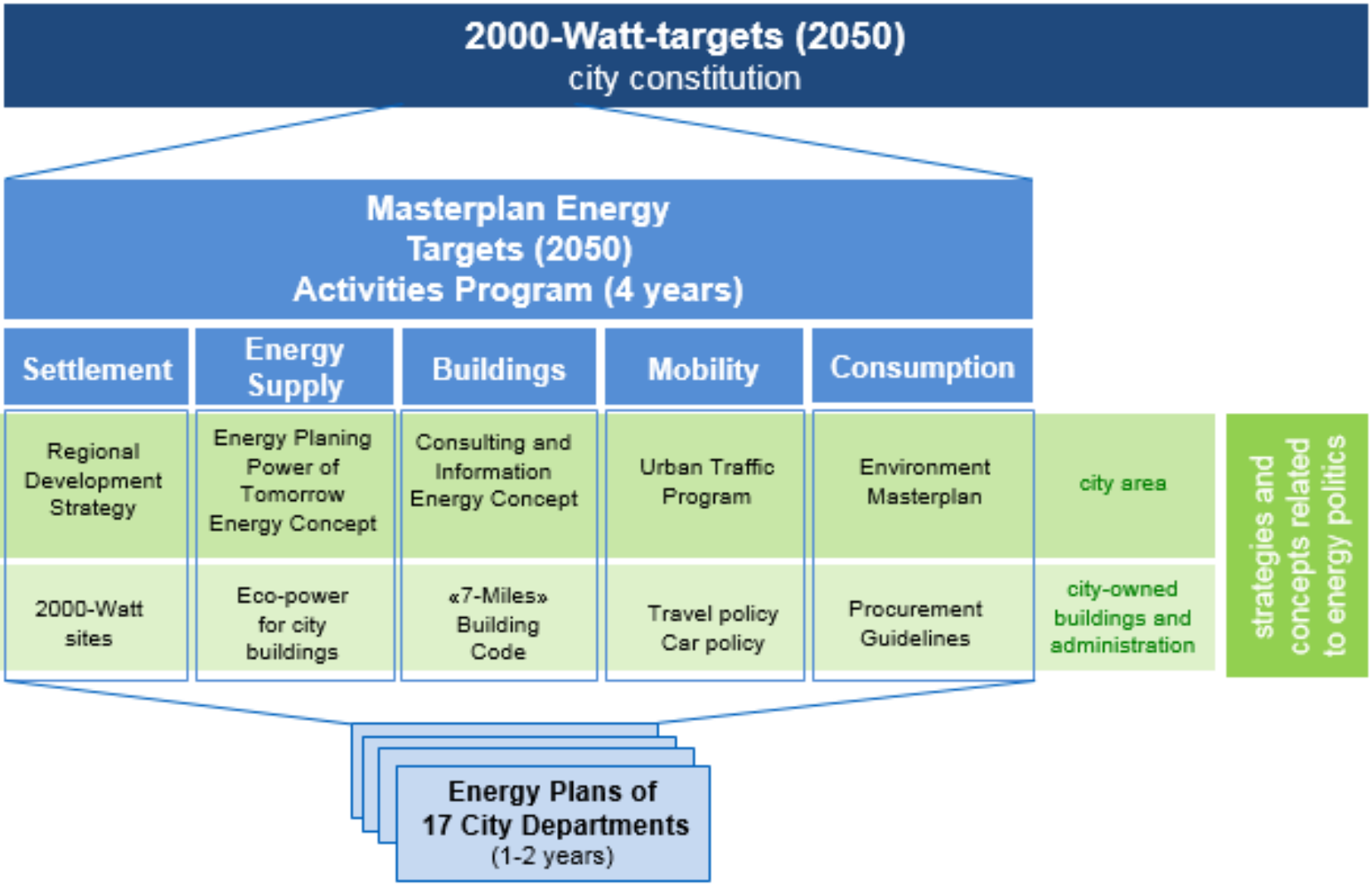
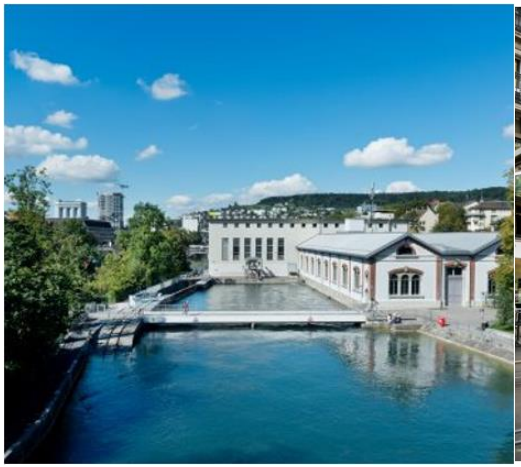
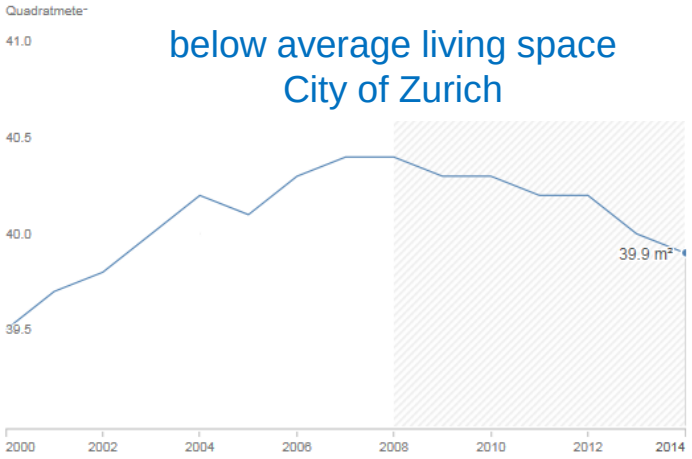
Energy Masterplan City of Zurich



Local factors influencing 2000-Watt achievement





below average living space
City of Zurich

- energy regulation federal and state governments
- energy companies in city's ownership
- high volume of mobility / well-established public transport (53% of households don't own a car)
- below average living space (39 m^2/person, CH: 45 m^2/person)
- growing city (2030: + 20% inhabitants, +15% workplaces, tourism)

How to become a 2000-watt society



Substitution – using renewable energy sources and waste heat (low-carbon and low-primary energy energy supply)

Efficiency - using less energy to serve the same purpose

regarding living, working and mobility

Sufficiency – reduce volume of energy-consuming activities and services

Improving efficiency - avoiding conversion losses

primary energy → energy used

Uranium

100 %

Nuclear power

25 %

Halogen-lamp

3 %

Crude oil

100 %

fuel

78 %

new car Switzerland

14 %

reducing conversion losses by using
- efficient energy sources and technologies
- efficient appliances and vehicles

Substitution - Challenges

TODAY

2050

electricity

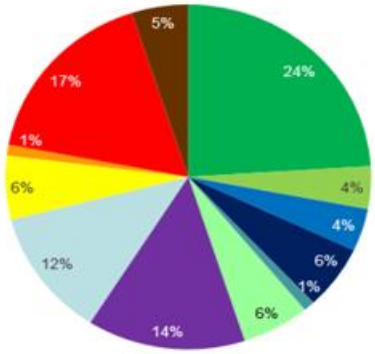
50% nuclear

50% wind, solar

heat

80% non-renewable

80% renewable



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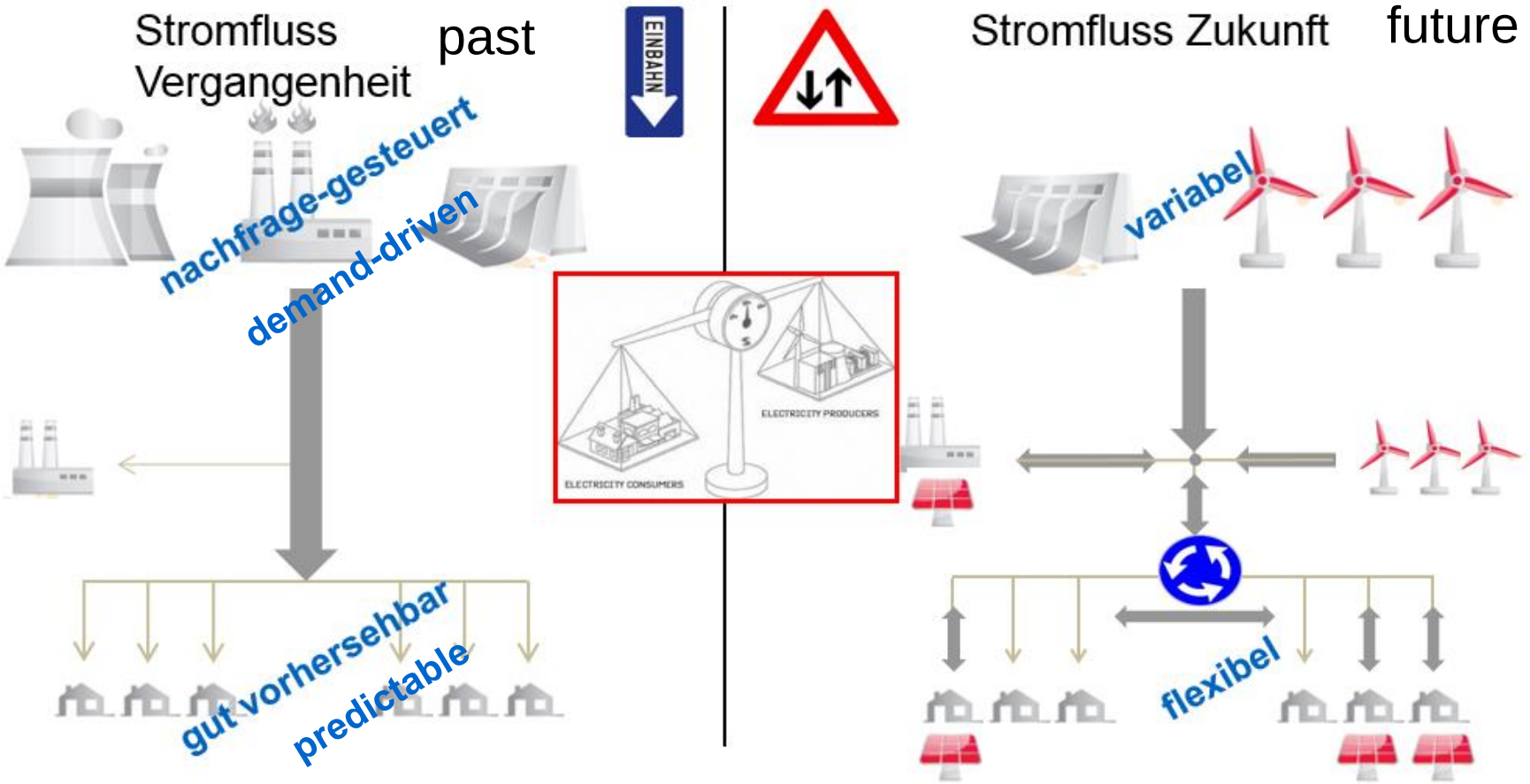
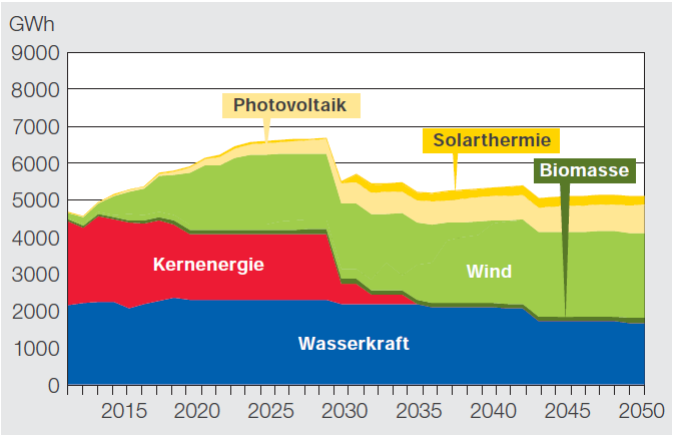
From central production and predictable demand to variable production and flexible demand



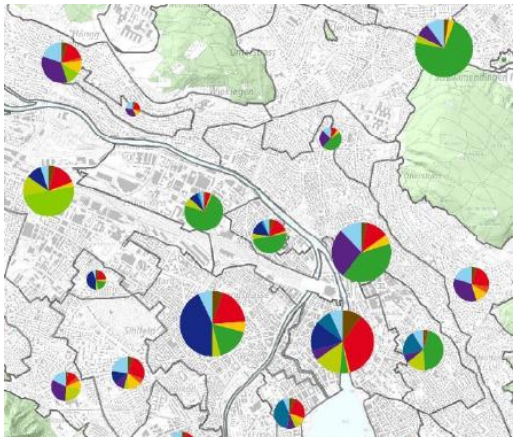
from «Nachhaltigkeits- und Innovationsprojekte ewz», presentation by Benedikt Loepfe, «VIP-Anlass zur Eröffnung des Unterwerks Zürich-Oerlikon», August 24th, 2015

Important strategies on the way to a 2000-Watt society

electricity strategy 2012-2050



energy concept 2050



urban traffic 2025

Quelle Pictogramme: Novatlantis, Smarter Living

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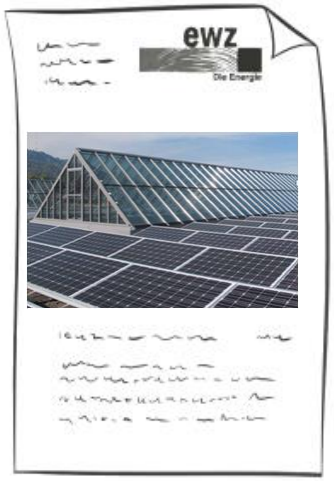
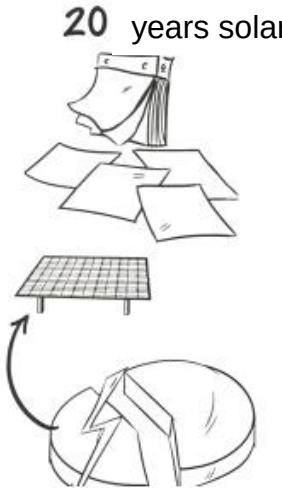
Improving the city's electricity mix

participation product «ewz.solarzüri» for tenants, launch 2015





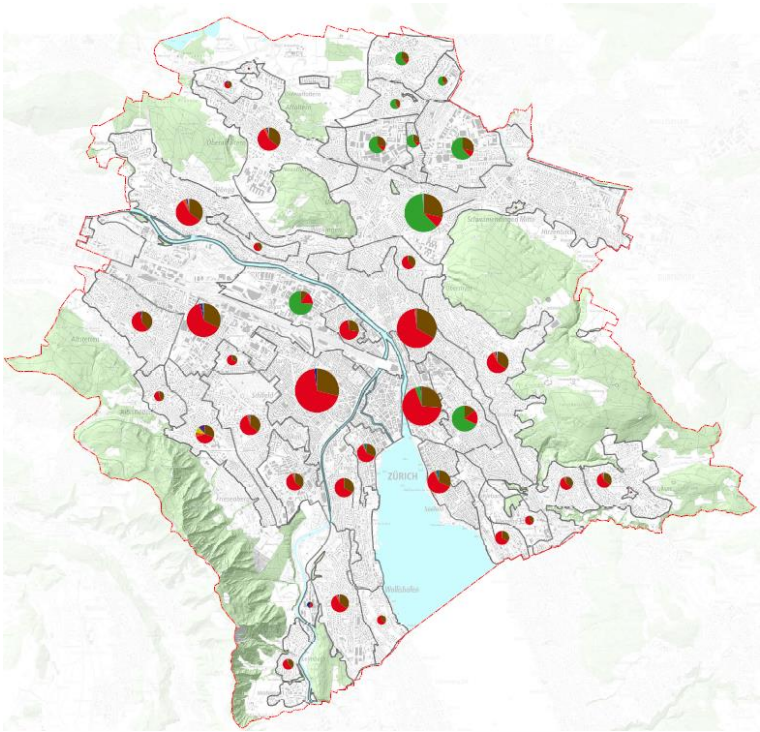
- 2015: all products 100% renewable
- 220 Mio. CHF investments in wind power

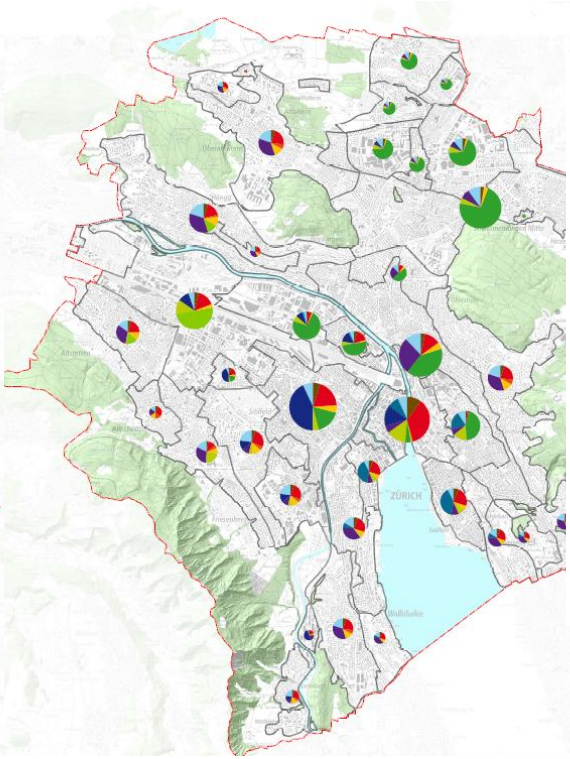
example energy concept

heating

today
80% oil and gas, non-renewable energy

future
> 80% renewable, diverse: waste heat and energy from local renewable ressources or incineration



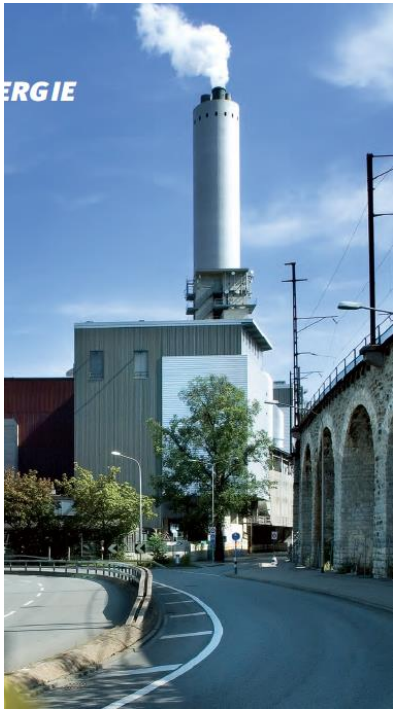


see energy planning and «energy concept 2050»

Quelle: Räumliche Differenzierung des Energiesystem-Mixes 2015 und 2050 (Effizienzszenario), Konzept Energieversorgung 2050, Stadt Zürich

Heating and Cooling with energy networks using locally available ressources

lake water networks

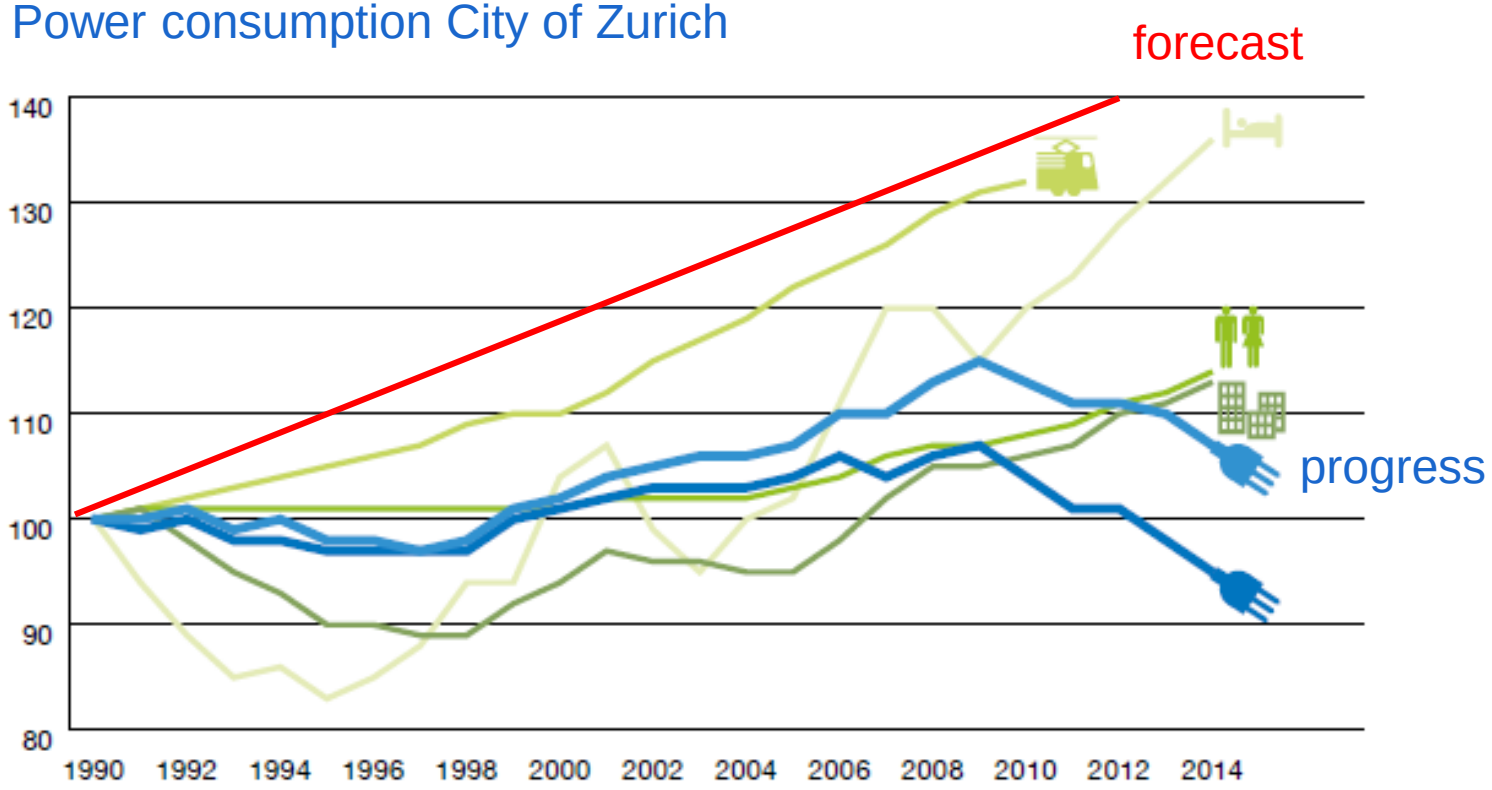


waste incineration network

waste heat from waste water plant (in planning)

Efficiency

Power consumption City of Zurich



- growing city
- shifting towards non-fossil fuels

→ reduction by 5% per inhabitant compared to 1990

Efficiency - a city's contribution

«2000-watt» city hospital opened 2016

- Set example: energy efficient buildings and infrastructure building code and energy management for city buildings, Energy Masterplan, supporting 2000-Watt Sites, e.g. Greencity, «mehr als wohnen»
- Promoting energy efficient appliances in households and businesses («energy saving fund»)
- Bonus on electricity tarif for energy efficient companies
- Energy consulting and information for households, companies and schools

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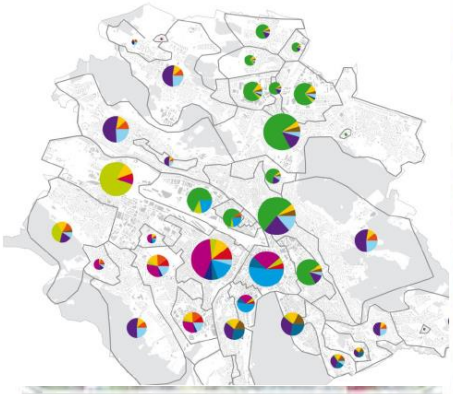
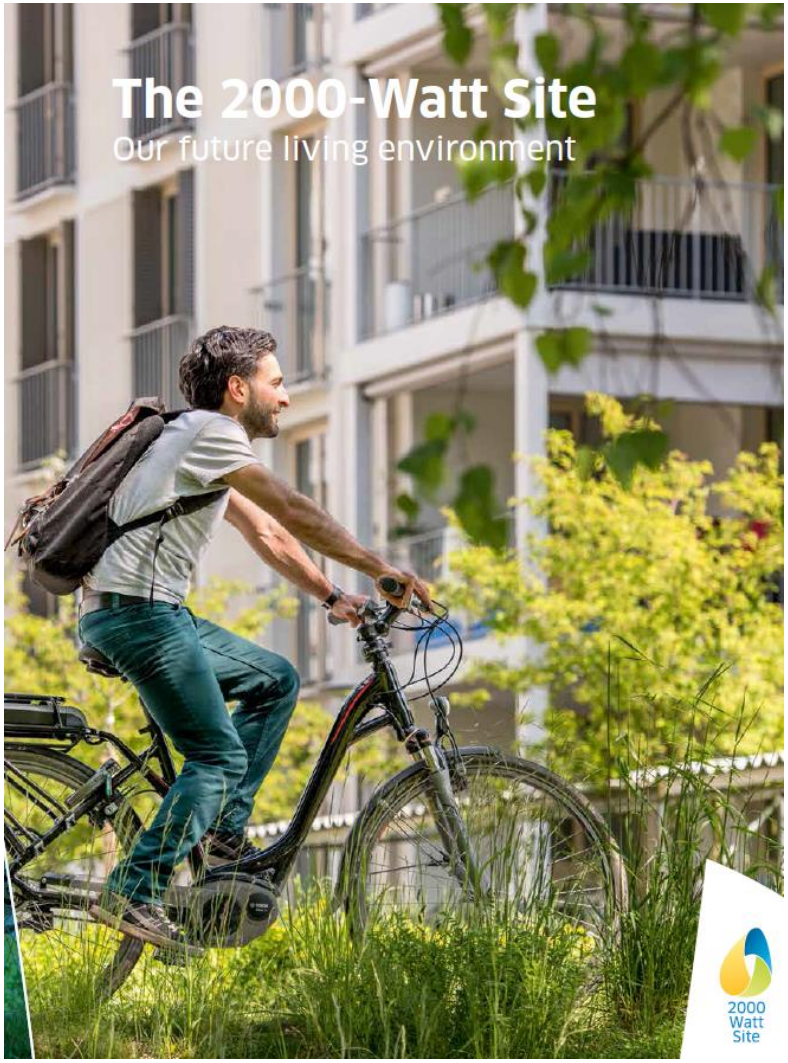
2000-Watt Society - different players

cities	area/site	buildings	people
			
energy politics according to the 2000-Watt concept	investors, developers, owners, city planning 2000-Watt sites	builder, architects, planer, Swiss building norms according to 2000-Watt concept	households, residents 2000-Watt living standard

pictures: www.zurich.ch, www.mehralswohnen.ch, www.2000watt.ch

based on Zertifikat 2000-Watt-Areal Neue Empfehlung für Gemeinden, Heinrich Gugerli, presented at Erfahrungsaustausch 2000-Watt-Areal - 28. Sept. 2016

2000-Watt Site
For the community of the future



- Swiss national certificate
- comprehensive view on
  - site instead of single building
  - total energy balance instead of only operational energy (includig construction and mobility)
  - operational phase after construction is monitored
- first five certificates «in operation» in 2016

based on Zertifikat 2000-Watt-Areal Neue Empfehlung für Gemeinden, Heinrich Gugerli, presented at Erfahrungsaustausch 2000-Watt-Areal - 28. Sept. 2016

2000-Watt-Sites typical measures

construction

- «sufficient» living/working space per person (e.g. «Kalkbreite» 32 m^2)
- compact low-energy building
- limited basement floors
- construction/material with low «grey» energy footprint (e.g. lightweight wood construction)

operation

- compact building shell, good isolation
- heating/cooling site supply according to 2000-Watt concept (low CO_2, PE)
- waste heat supply
- renewable energy supply
- photovoltaic
- smart grid

mobility

- excellent provision of public transport
- limited car parking /large bicycle parking space (sometimes no private cars)
- convenient walking and bicycling routes
- good daily shopping infrastructure
- (electric) car-sharing facilities

based on Zertifikat 2000-Watt-Areal Neue Empfehlung für Gemeinden, Heinrich Gugerli, presented at Erfahrungsaustausch 2000-Watt-Areal - 28. Sept. 2016

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Challenges to the 2000-Watt transformation process

(1) faster modernization of buildings

(2) accelerated change of energy sources, meaning in the city context more line-based energy sources (district heating, lake water, waste water, biogas etc.)
→ coordination of energy planing and stimulation necessary

(3) only with comprehensive measures (substitution, efficiency, sufficiency) on all levels of regulations is it possible to reach the 2000-Watt targets by 2050

(4) mobility: traffic on its own uses up the GHG-contingent 2050 → measures regarding air travel are imperative

(5) potential actions by the city are limited
→ lobbying towards Canton and federal administration necessary

Success factors for a 2000-Watt society

Masterplan Energy
Targets (2050)
Activities Program (4 years)

Settlement	Energy Supply	Buildings	Mobility	Consumption
Regional Development Strategy	Energy Planing Power of Tomorrow Energy Concept	Consulting and Information Energy Concept	Urban Traffic Program	Environment Masterplan
2000-Watt sites	Eco-power for city buildings	«7-Miles» Building Code	Travel policy Car policy	Procurement Guidelines

Energy Plans of 17 City Departments (1-2 years)

1) Strong Political Commitment

- long term goals as part of municipal law based on consistent methodology

2) Assertive Implementation and Management

- energy politics is a cross-sectoral task (challenge in line-organisations)

3) Financial Ressources

- transition phase: from subsidies to incentive taxes and market solutions

A 2000-Watt future can look very bright

This story was filed by ***CBS News correspondent Elizabeth Palmer****.*

[CBS news report]

„Can a City Cut Its Energy Use by 2/3?"

find more details in the

[Energy Policy Report City of Zurich]

[Energy Masterplan City of Zurich]

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Sources pictures: publications City of Zurich, picture archieves ewz, VBZ and other city departements

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