The Demand for Environmental Information: Why Do We Rely on Life Cycle Assessment Data?

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Who are «WE»?
City Administration of Zurich

City of Zurich
about 400‘000 inhabitants

Metropolitan area
about 1.7 million inhabitants

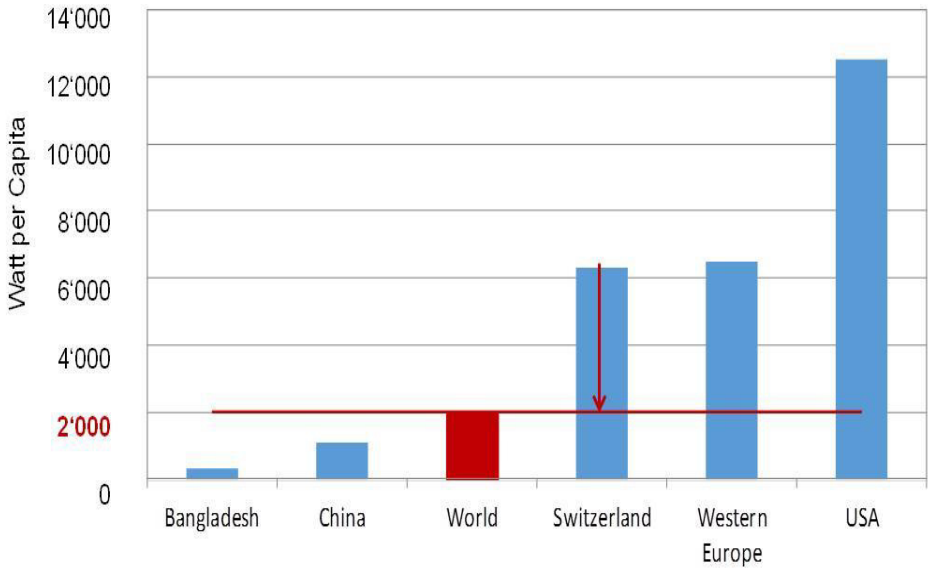
Who are «WE»?
Zurich on the Way to the 2000-Watt-Society

In November 2008, the citizens of Zurich voted, with a large majority, in favour of sustainable development of their city.

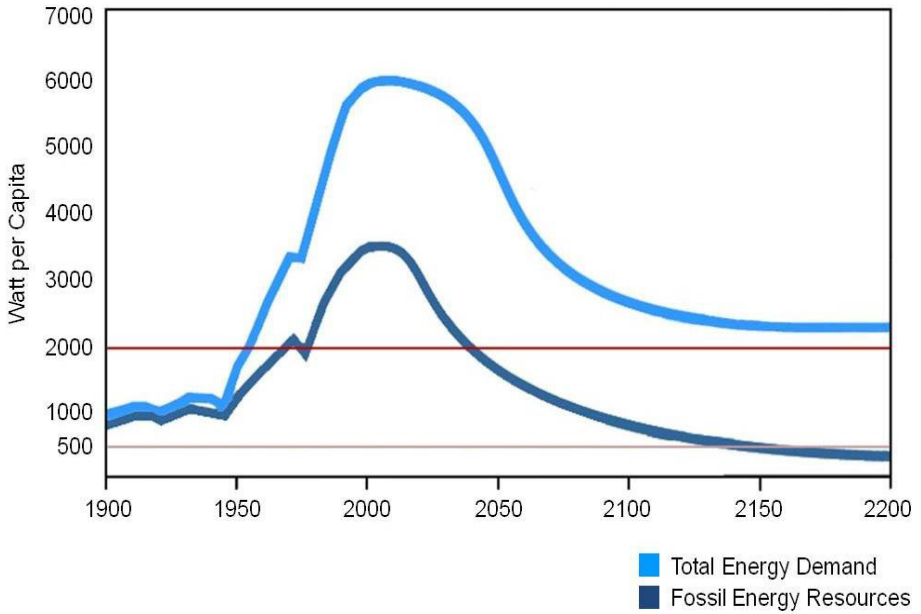
In concrete terms: the goals of the 2000-watt society are now in our municipal code.

About the 2000-Watt-Society:
Worldwide View & Long-Term Perspective

Fair Redistribution of Energy Resources



Long-Term Development of Energy Use per Capita



- Primary Energy Demand: Reduction by 3
- Greenhouse Gas Emissions: Reduction by 9

How to Reach the Goals of 2000-Watt-Society? «Master Plan Energy»

Aims:

- Save Energy Supply
- Reduction of Greenhouse Gases
- Reduction of Primary Energy Demand

Measures:

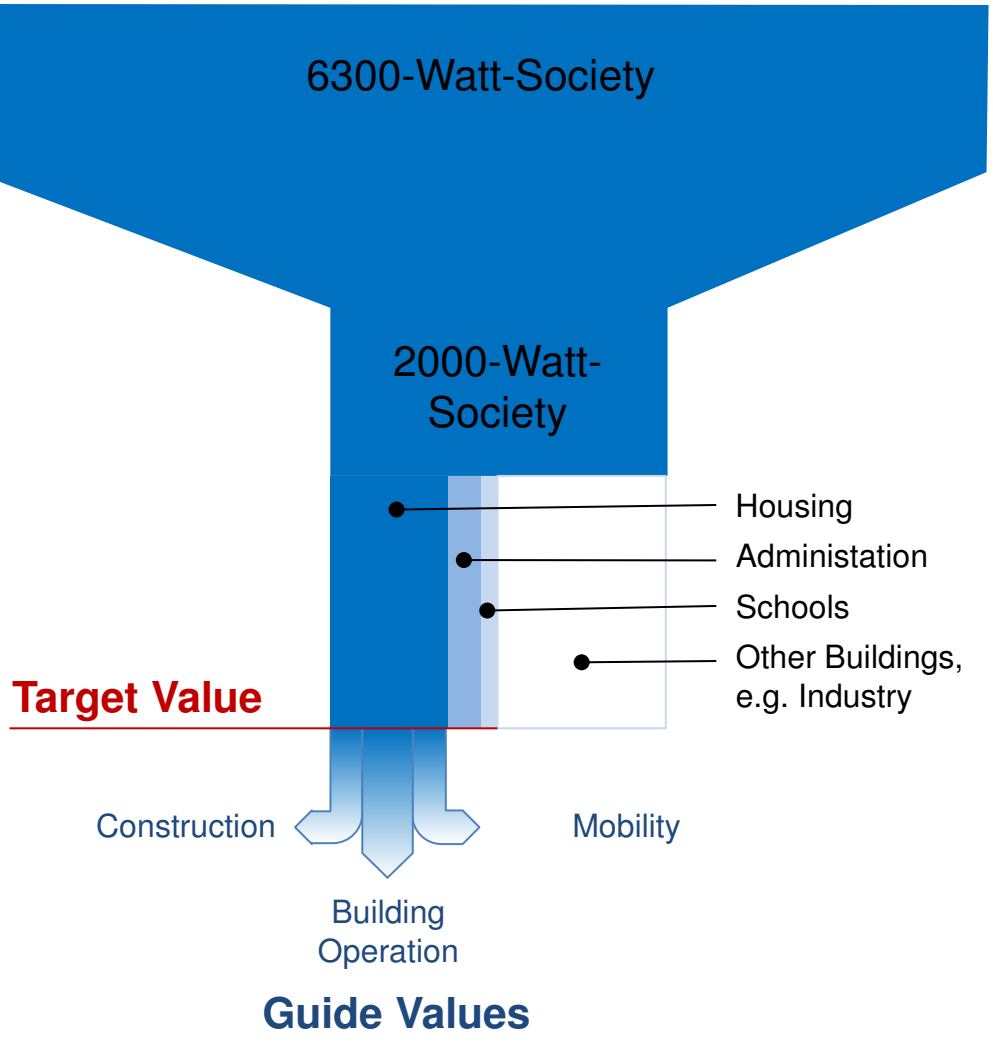
- Sufficency
- Efficiency
- Renewable Energy

Implementation in the Urban Administration

ewz **Electrical Supply Company of the City of Zurich**	**UGZ** **Environmental- and Health Protection of the City of Zurich**	**HBD** **Building Departement of the City of Zurich**
No Quantity Discount	Controlling	Implementation in Urban Planning
Free Choice of Electrical Production Mixes	Environmental Consulting	Implementation in Portfolio Management
Subsidy for Renewable Energy	Energy-Coaching for Building Owners	**Implementation in Construction of Buildings**
Efficiency Bonus for Entreprises	Communication	

Constructions for the 2000-Watt-Society: Energy Efficiency Path (SIA MB 2040)

The target value is an absolute value, not a relativ one (like e.g. in LEED).



Why Do We Rely on LCA-Data for Optimising Our Constructions?

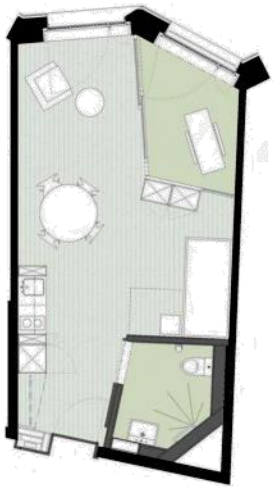
- Because we need a long-term perspective
- Because we want to have a holistic approach considering not only the use phase, but also the construction of a building.
- Because we want to reach the goals of the 2000-Watt-Society, which are expressed in primary energy demand and greenhouse gas emissions over the whole life cycle of a building

Examples

Old Peoples Home Trotte

New Construction

very compact building, very compact heated volume

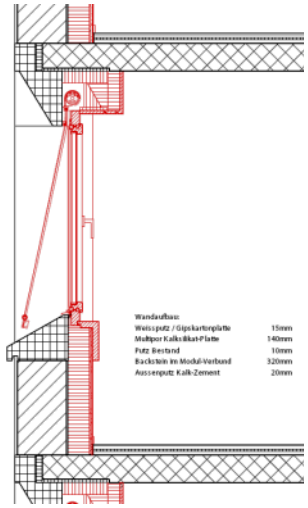


Minergie-P-ECO

Old Peoples Home Dorflinde

Refurbishment

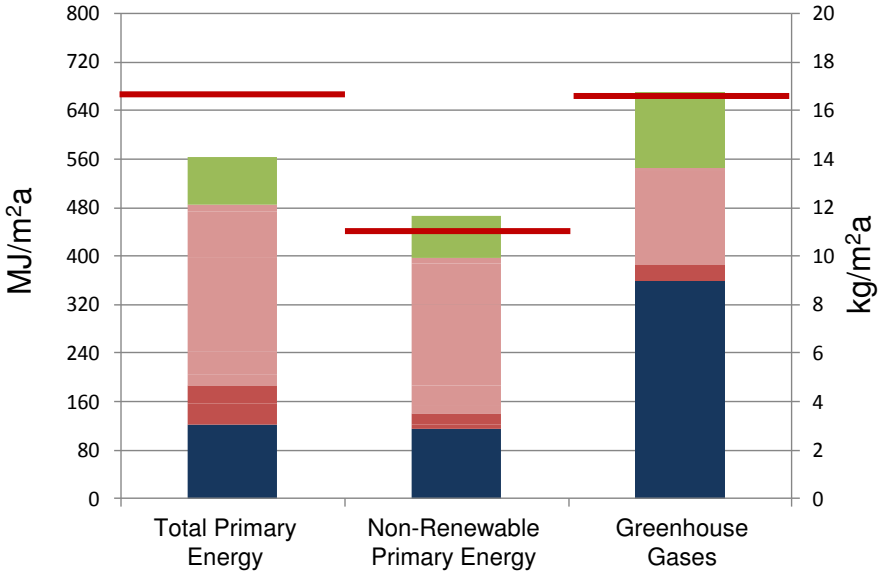
very compact „tower“ of the seventies



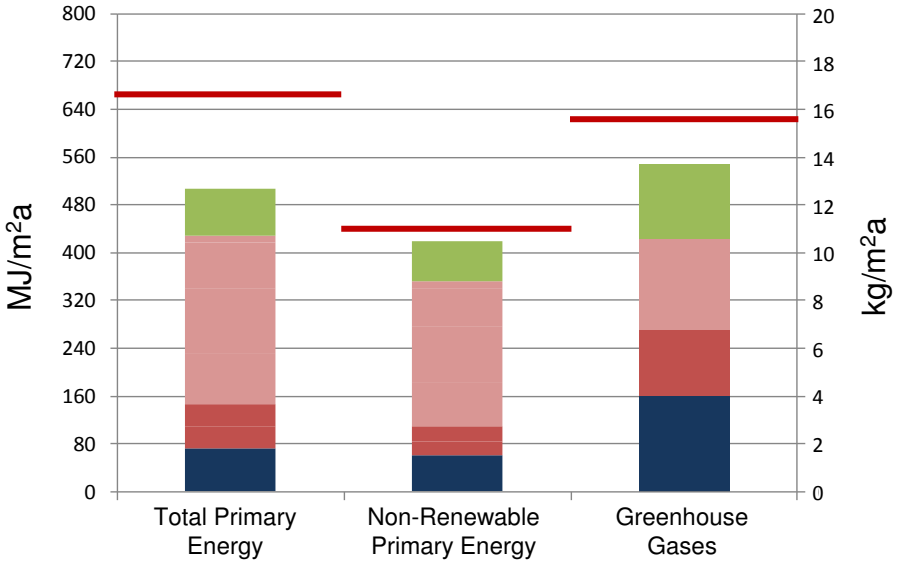
Minergie-ECO (New Construction)

Results of the 2000-Watt-Calculations

Trotte



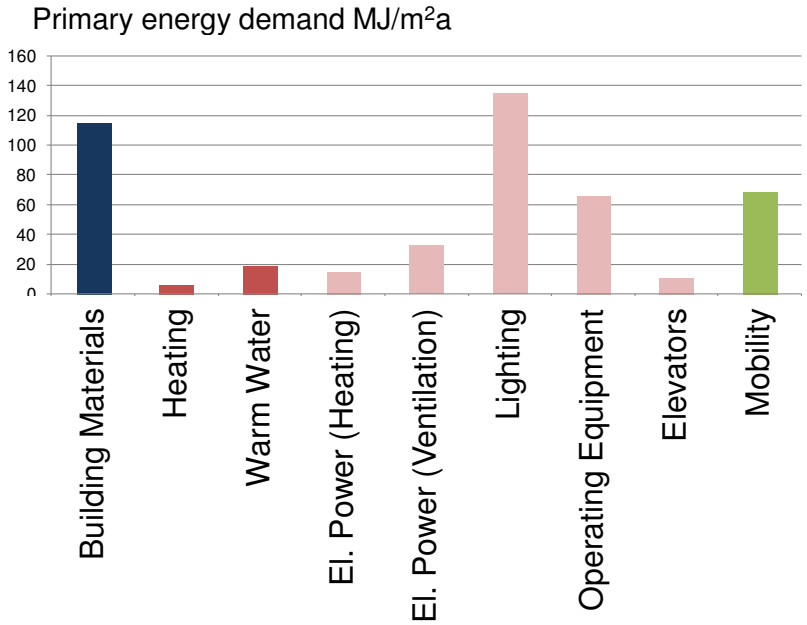
Dorflinde



- Mobility
- Elevators
- Operating Equipment
- Lighting
- Electric Power for Ventilation
- Electric Power for Heating
- Warm Water
- Heating
- Building Materials

Target Values (Energy Efficiency Path)

Old Peoples Home Trotte

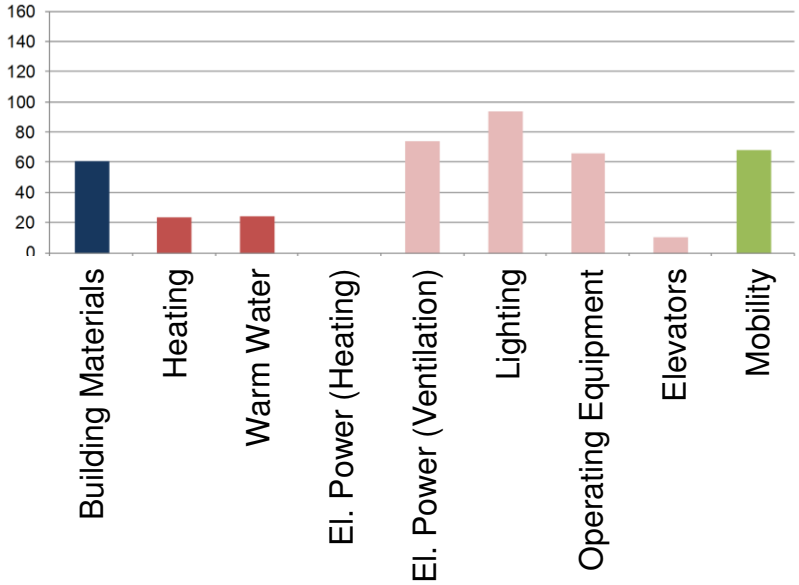


The impact of heating is very low

The building needs a lot of energy for lighting

The materials are relevant

Old Peoples Home Dorflinde

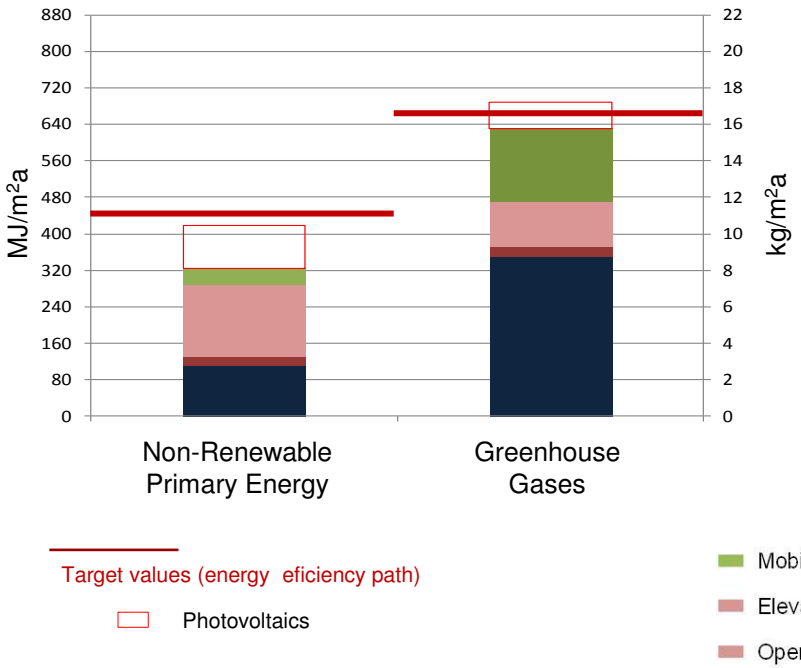


Electric power for ventilation is relevant

Lighting is not as relevant as in the Trotte: is it easier to be sufficient in refurbishments?

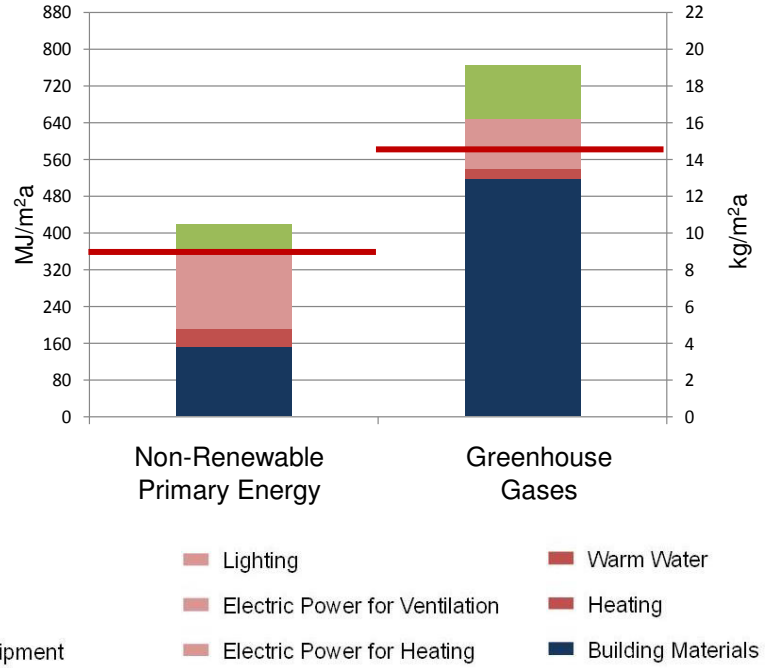
Housing Kronenwiese

Focus on renewable energy



School Blumenfeld

very uncompact building with a lot of windows



Minergie-A-ECO

Minergie-P-ECO

WS Kronenwiese	SA Blumenfeld
The focus on renewable energies does not lead to more liberty concerning the building envelope.	The building materials are the most relevant factor.
A zero-heat-building is possible even in a dense, urban context, but requires explicit political will and additional financial resources.	In new constructions it is very difficult to reduce the impact of building materials.
A zero-heat-building is no guarantee of a 2000-watt-building!	Optimising only material choices has a small impact on the overall balance. The determing factors are located in the volume and floor-efficiency and therefore coincide with economic aspects.

New constructions and total refurbishments are energetically equal! This conclusion is possible because of the absolute (and not relative) target values.

Looking at an Entire Portfolio: Are the 2000-Watt-Goals Realistic?

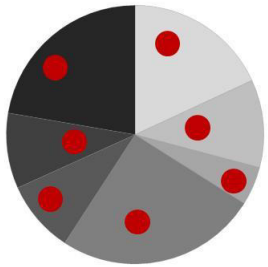
Housing settlements owned by the City of Zurich

53 settlements, growing portfolio (→ 59 settlements in 2050)

40% of existing settlements are protected (building conservation)

heating: 68% fossil fuels

little floor space requirements per person

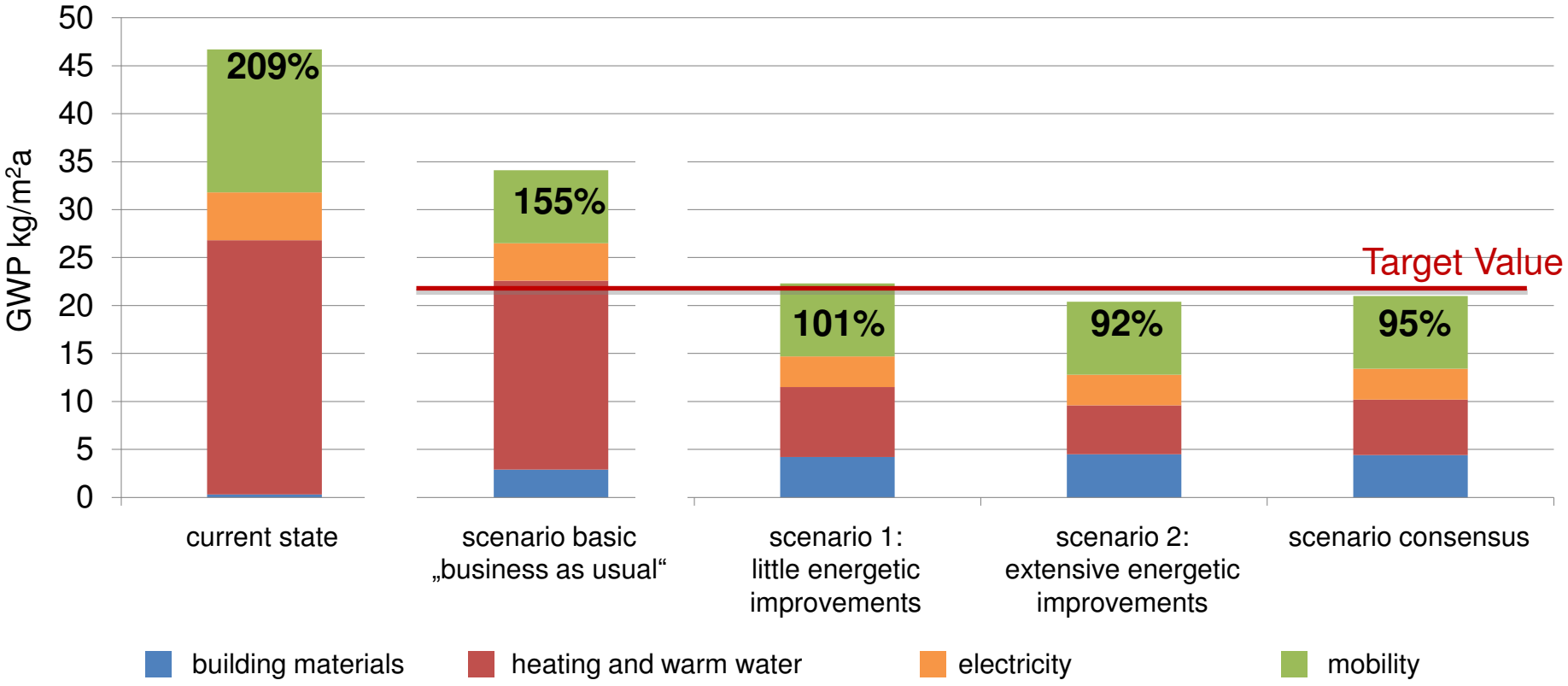


The building stock was categorised.
Exemplary settlements have been calculated.
Extrapolation of the results for the whole building stock.

Four scenarios:

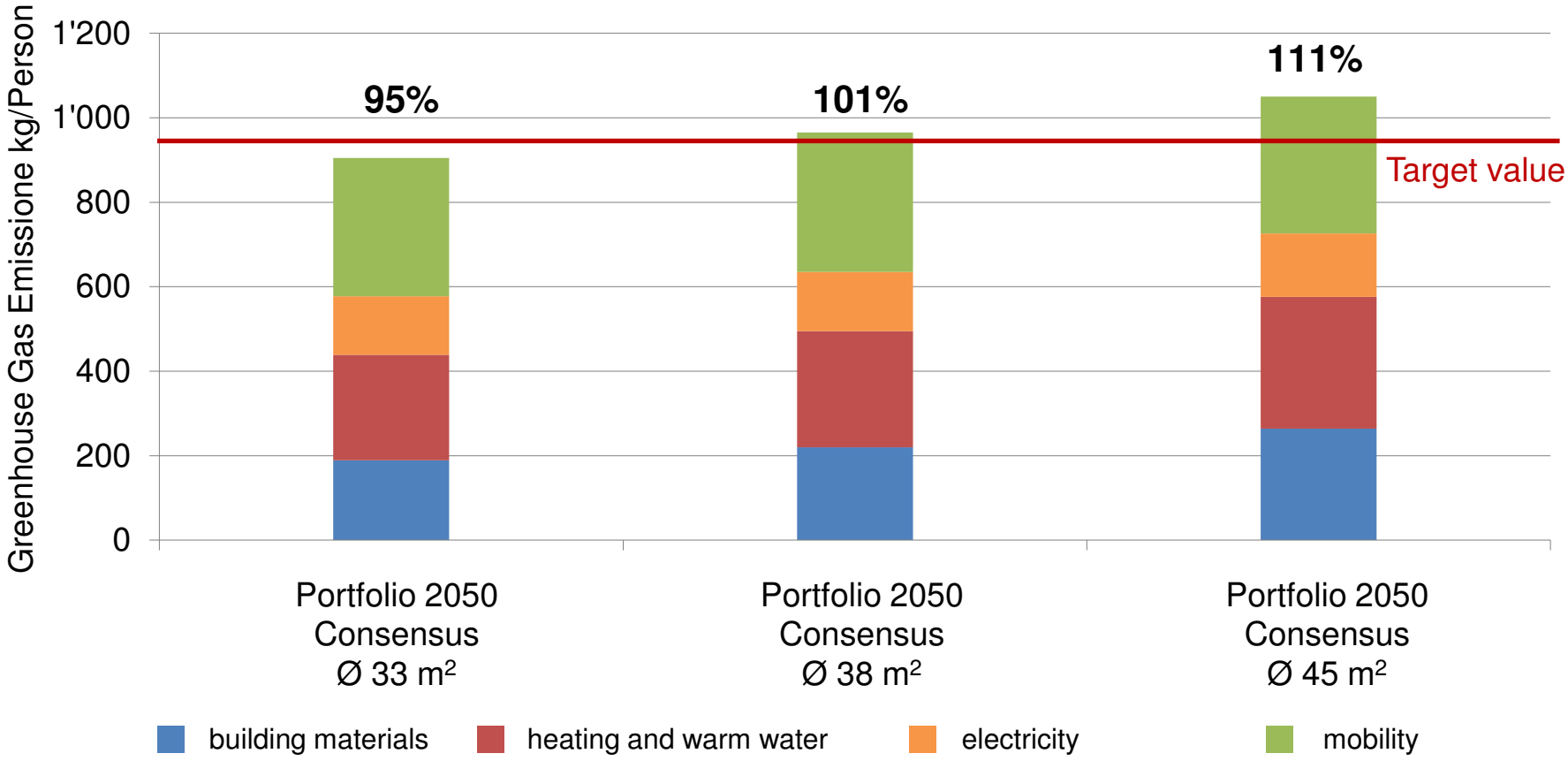
Scenario basic: „business as usual“
Scenario 1: partial energetic improvements
Scenario 2: extensiv energetic improvements
Scenario consensus

Results for Greenhouse Gas Emissions



- The goals are reachable. There is a range of possible solutions. Not in every case the energetic maximum has to be implemented. The scope is to find the optimum!

The Impact of Floor Space Requirements



- Floor space requirements have the bigger impact than a lot of technical energetic improvements!

Conclusions

The holistic approach and the use of LCA-Data increases the range of solution strategies. Looking at a whole life-cycle of a building makes it possible, to compare the environmental impact of the materials with the impact of the use phase.

Therefore, new buildings and entire refurbishments (including energetic improvements) are energetically equal.

The goals of the 2000-Watt-Society in the building sector are reachable. A high rate of refurbishments is needed (2%).

Important measures are the reduction of mobility and heating demand using only a small amount of materials (efficiency); the use of renewable energies (consistency) and the reduction of floor space requirements (sufficiency).

The use of LCA-Data helps us to create multicolored approaches to the 2000-Watt-Society