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Future Trends in Swiss Energy Research

Strategy for Energy Research of the Swiss Confederation



ECTP-Eracobuild Conference, Warsaw, 15 September 2011
Andreas Eckmanns, Swiss Federal Office of Energy



Energy Research in Switzerland

1978: „Energy research is one basic pillar of the Swiss energy policy“ (GEK-report)

1984: First strategy for energy research of the Swiss Confederation

1986: Constitution of national energy research commission CORE

2010: New concept of the confederation's energy research in four priority areas by CORE



General targets¹

- Switzerland is a think and workplace with worldwide acceptance;
- Swiss research on future technologies is in a top level;
- Swiss research institutes are among the best worldwide;
- Professional education and universities of applied sciences form a strong and practice oriented specific base;
- Education of young scientists is secured.

¹ according to „Botschaft über die Förderung von Bildung, Forschung und Technologie in den Jahren 2008–11“



Future Trends in Energy Research...

...in the context of policy and science:

IPCC: GHG Reduction of 25–40 % until 2020 and 80–95 % until 2050 (max. temp. increase 2°C)

ETH: 1 t CO₂ per person and 2000-Watt-society

EU: 20–20–20-Strategy CO₂, renewable energy and energy efficiency until 2020

CH: CO₂-law reduction of 20 % vs. 1990 until 2020
Step out of nuclear

→ CORE is orienting its work along this long time targets of policy and science.



2013-2016 Strategy for Energy Research of the Swiss Confederation

CORE defined four priority areas:

- „Living and Working of the Future“
- „Mobility of the Future“
- „Energysystems of the Future“
- „Processes of the Future“



Living and working of the future - basic principles

On the path to energy efficient and nearly zero-emission building stock

- Energy consumption of existing buildings must be dramatically reduced and their operation must be made CO₂-free.
- New buildings should not produce a net amount of polluting emissions during their operation life. Emissions, either direct or grey emissions, caused by construction and end-of-life demolition shall be reduced by a factor of 10.



Definition

The priority area “Living and Working of the Future” looks at technologies and concepts involving energy demand, energy conversion, energy use and the local generation of renewable energy in buildings, sites, settlements and cities.



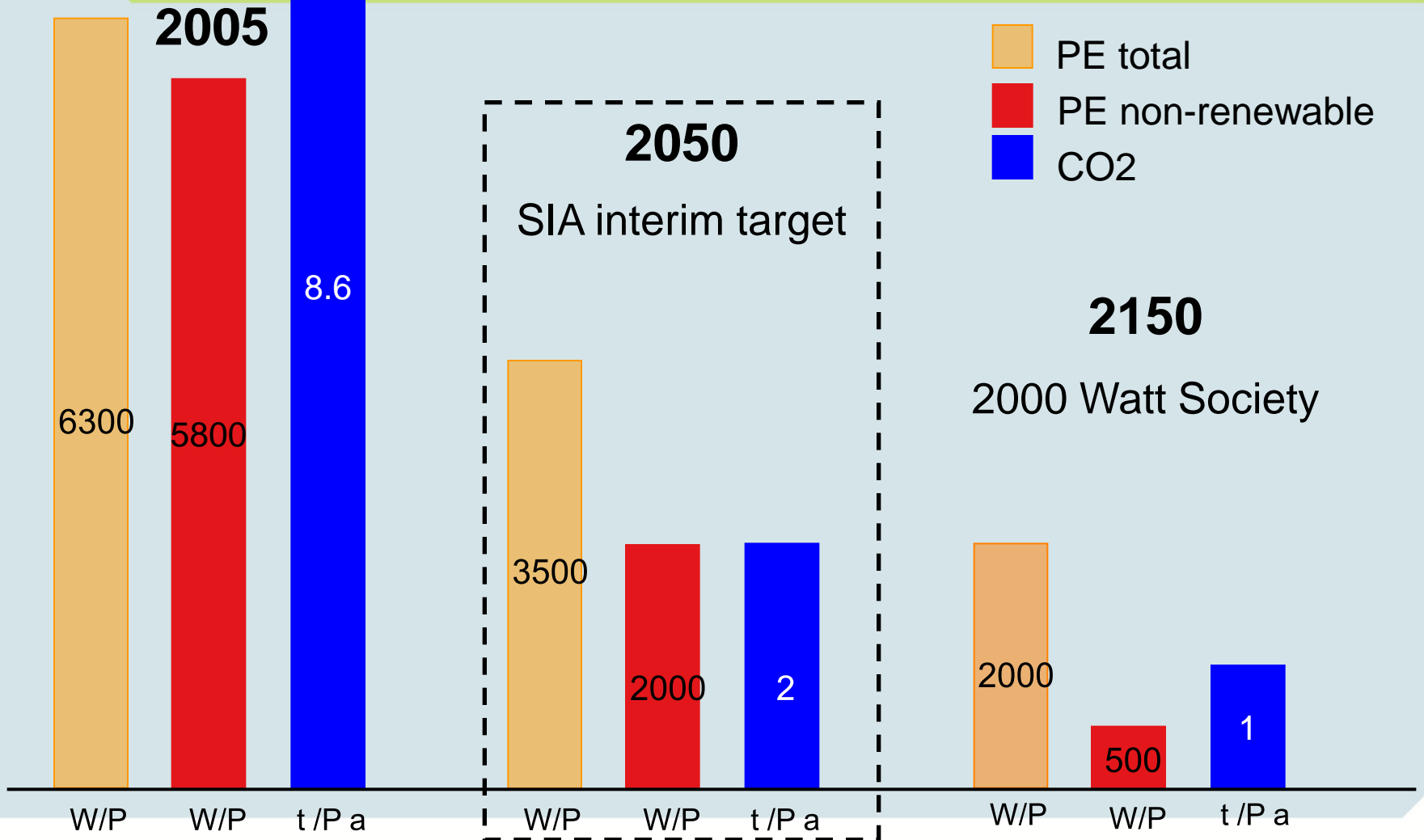
Background

- International Target = one tonne CO₂-equivalent and dramatic reduction of the energy consumption
- Base CH: „2000-watt society” and the „strategy of decarbonisation”
- Interim target 2050 of the SIA energy efficiency path

SIA Energy efficiency path	Reduction per person	Reduction factor
Non-renewable primary energy	5800 to 2000 W	2.9
GHG emissions	8.6 to 2 t CO ₂	4.3



Background – SIA Efficiency Path





General conclusion

Effort is needed for all options:

- **reduction** of energy consumption,
- **substitution** of non renewable energy carriers by RE and
- **decarbonisation** of remaining amount of non renewable PE.



Research priorities (1) – existing buildings

Residential: Technologies, methods and tools for energy and GHG optimised building renovation in a cost effective way.

Non residential: same, but with different optimum (internal loads).

Renovation solutions that respect the architectural value of façade, windows, etc. of **historical buildings**.

Solutions for sustainable development of **sites, settlements and cities**.

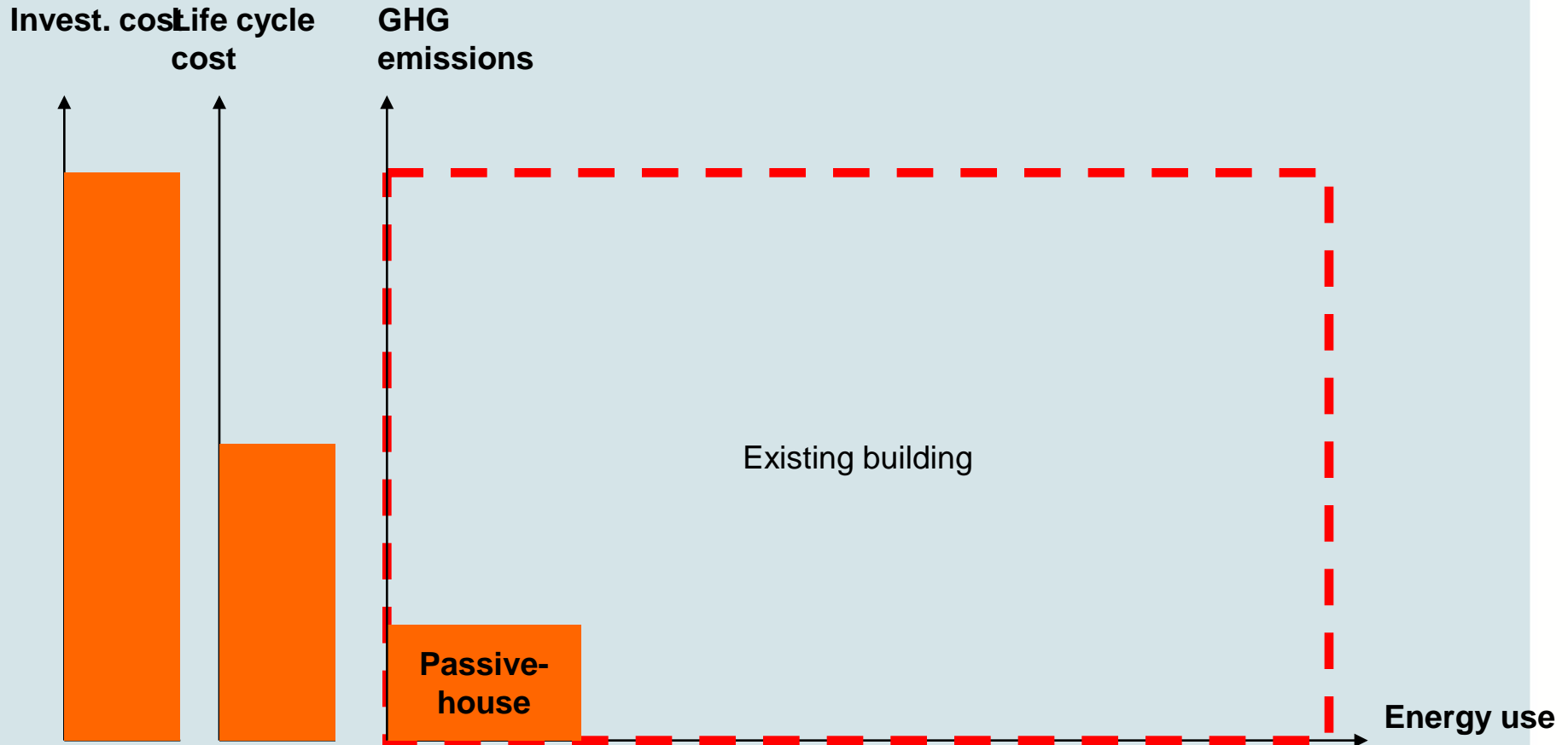


Approach and Potential



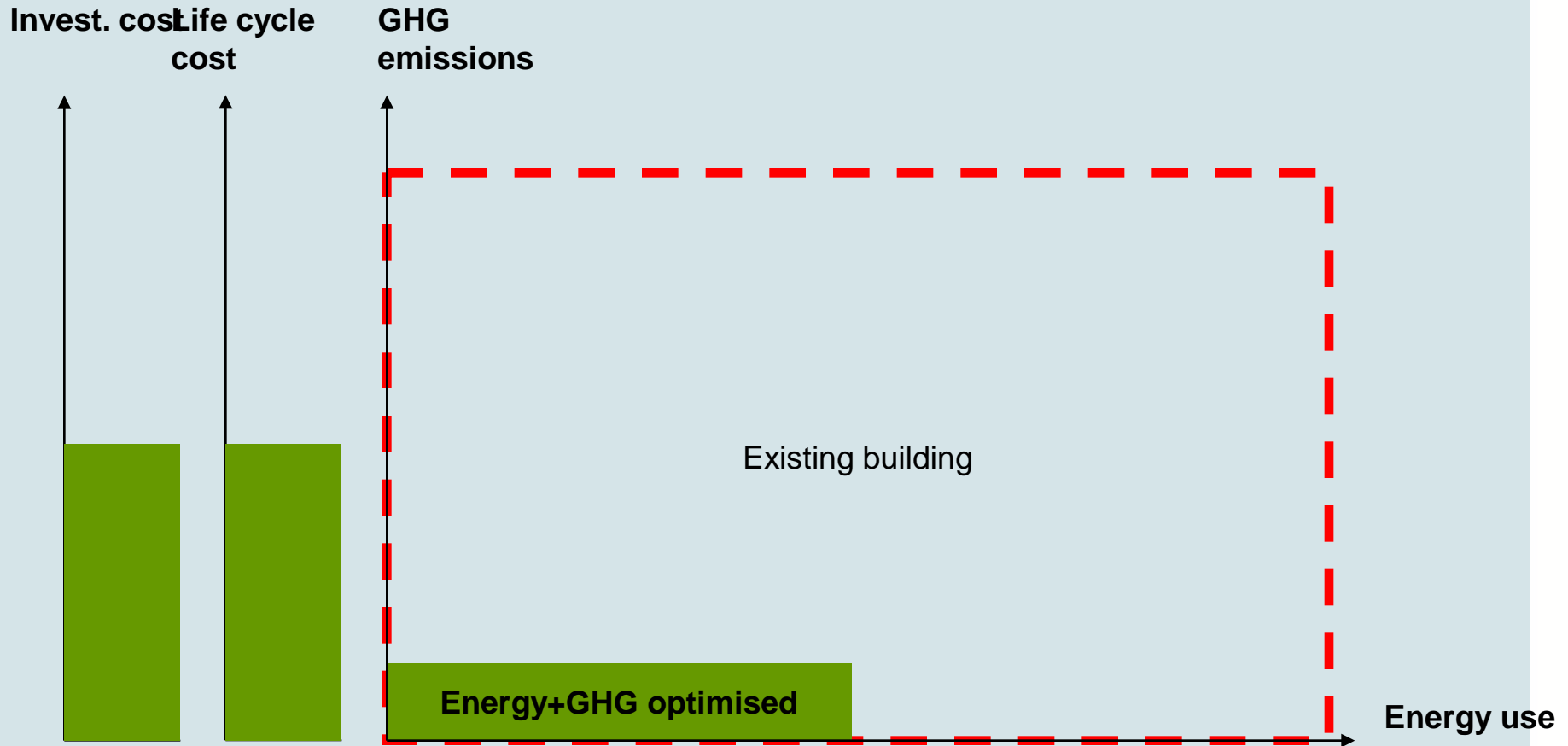


Approach and Potential





Approach and Potential





Research priorities (2) – new buildings

Life-cycle approach:

New high performing technologies for further **reduction of energy demand and GHG-emissions** during operation phase, that allow architectural diversity.

Minimisation of **embodied energy** and corresponding emissions by development of new materials and planning tools.



Research priorities (3) – building technologies

Improve **renewable energy technologies and systems** with a high priority on building integration.

Prove of concept and economic performance of **thermal storage** (heat and cold).

Increase efficiency of **electric appliances** by intelligence and minimisation of stand-by losses.

Innovative solutions for **demand and production management** over the building's borders, to sites, settlements and cities.



Research priorities (4) – integration of living and working

Development of new **concepts for settlements** that enable new kinds of **living and working models**.

Technologies and concepts to optimise **user's behaviour** that address the needs of different consumer segments and age groups.



More information

www.energieforschung.ch