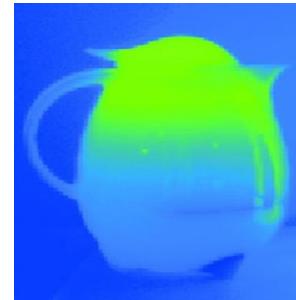
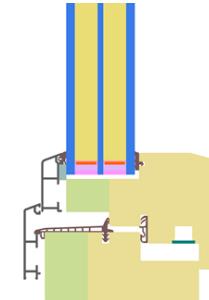


Energy Efficiency: Key for sustainable development

Prof. Dr. Wolfgang Feist





Dramatic Loss of Insects

Zoologists: -75% in 30 years...

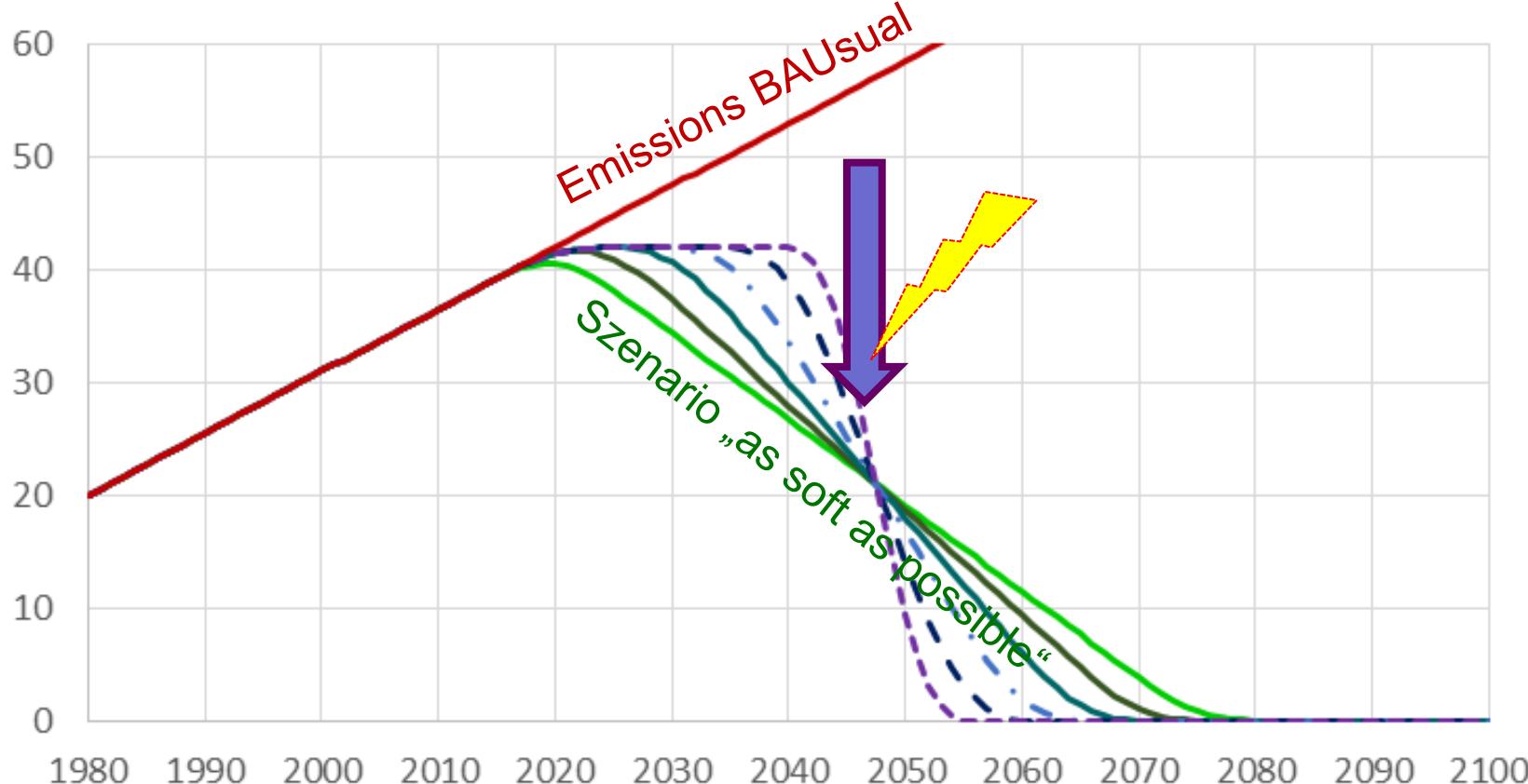
- causes: reduced habitats, fertilizer & pesticides, Climate Change
- Just this is a serious problem!
- But only one out of many: extreme weather, ocean level, acidification,...

- **Climate Change: no doubt, it's getting warmer**
(Science: Susskind et al 2019; citizen scientists: Glaciers)
- **Causes: It's the greenhouse gases, especially CO₂**
(Science: Miller et al 2014; citizen scientists: video Cox; CO₂)
- **This is an existential problem for human civilisation!**
(Science: IPCC; citizens: world wide reaction to migration)
- **But we can still limit it to an acceptable level.**
(...that is what this conference is about!)

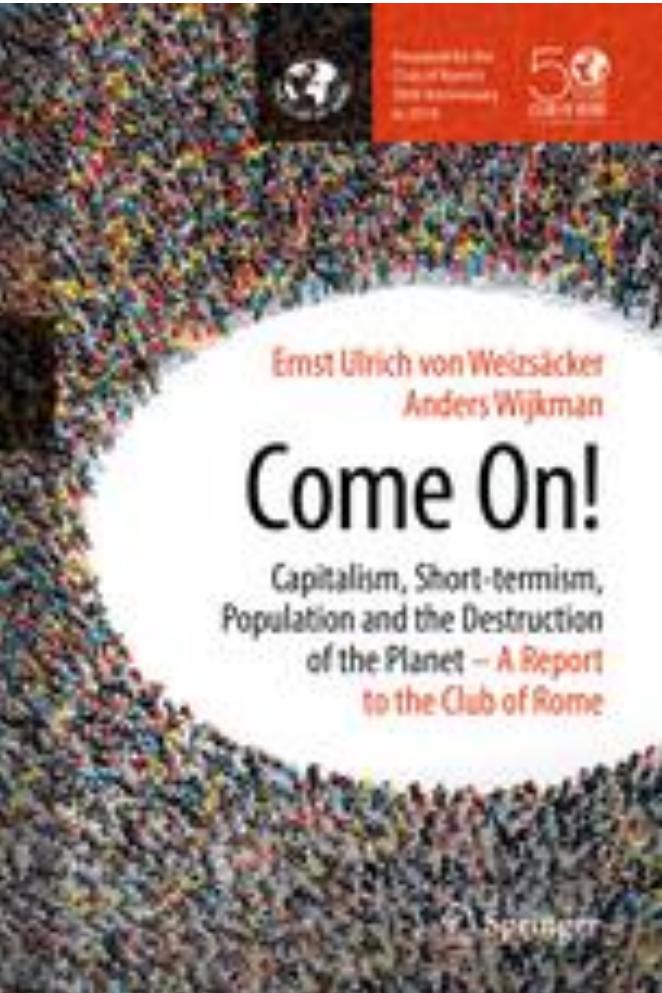
Make no mistake: Temp. will at the beginning still continue rising.

The laws of nature don't care about human psychology.

Mrd to CO₂äqu/a CO₂-Budget und zug. Reduktionskurven



- Curves of equal budget-emissions Billion tons CO₂-equi (IPPC 1170Gt)



Can we still
manage this?

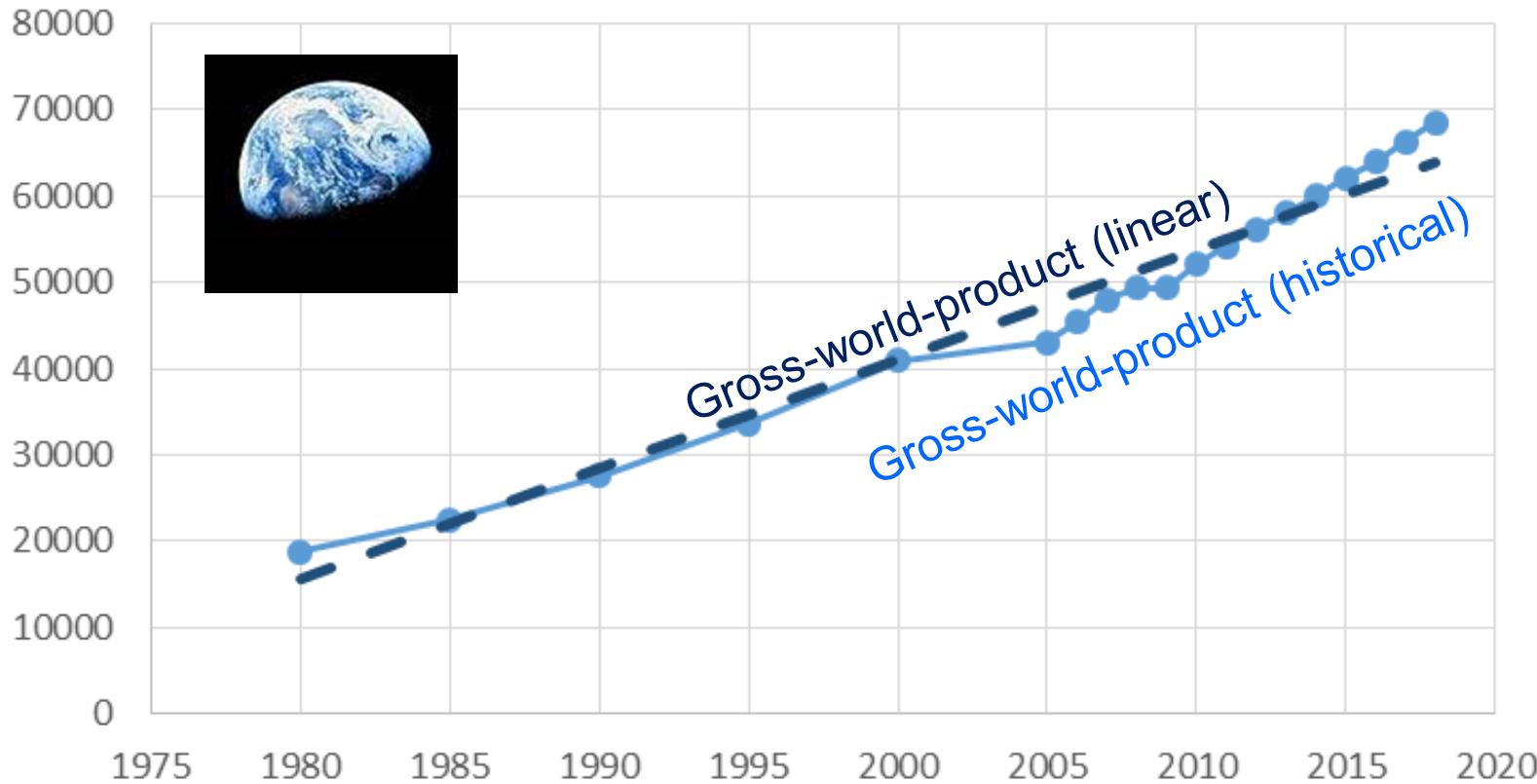
**What will not work:
the extremes:**

- **Busin. As Usual (BAU)**
- **Fast Total Emission Stop**

We will need:

- **Real change**
- **Decisive action**
- **Everything doable**
- **Transformation of the whole
energy system**

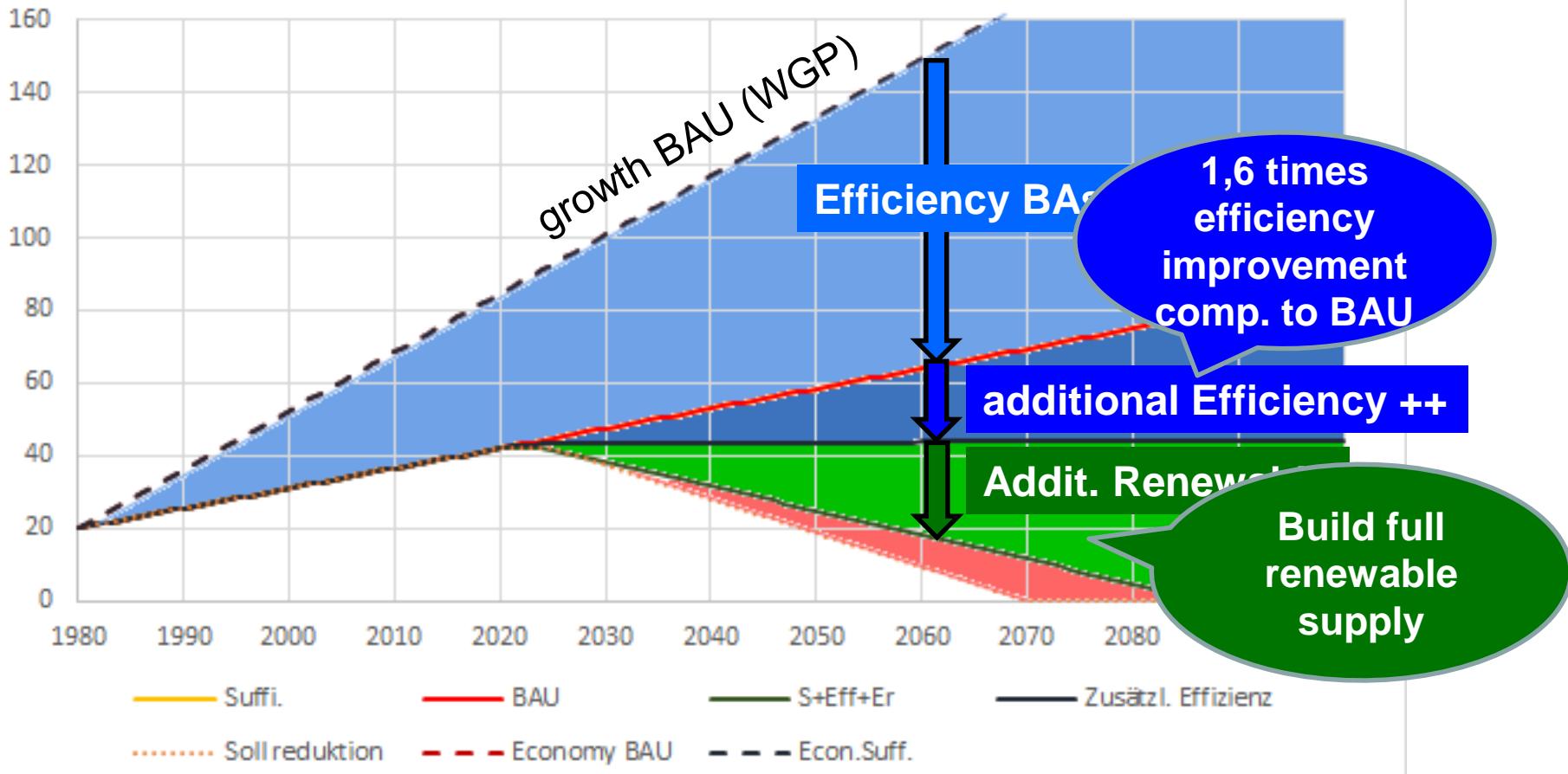
Growth of world internal product (real) 10^9 US\$/a)



Global wealth (gross-world-product)

Mrd to CO₂äqu

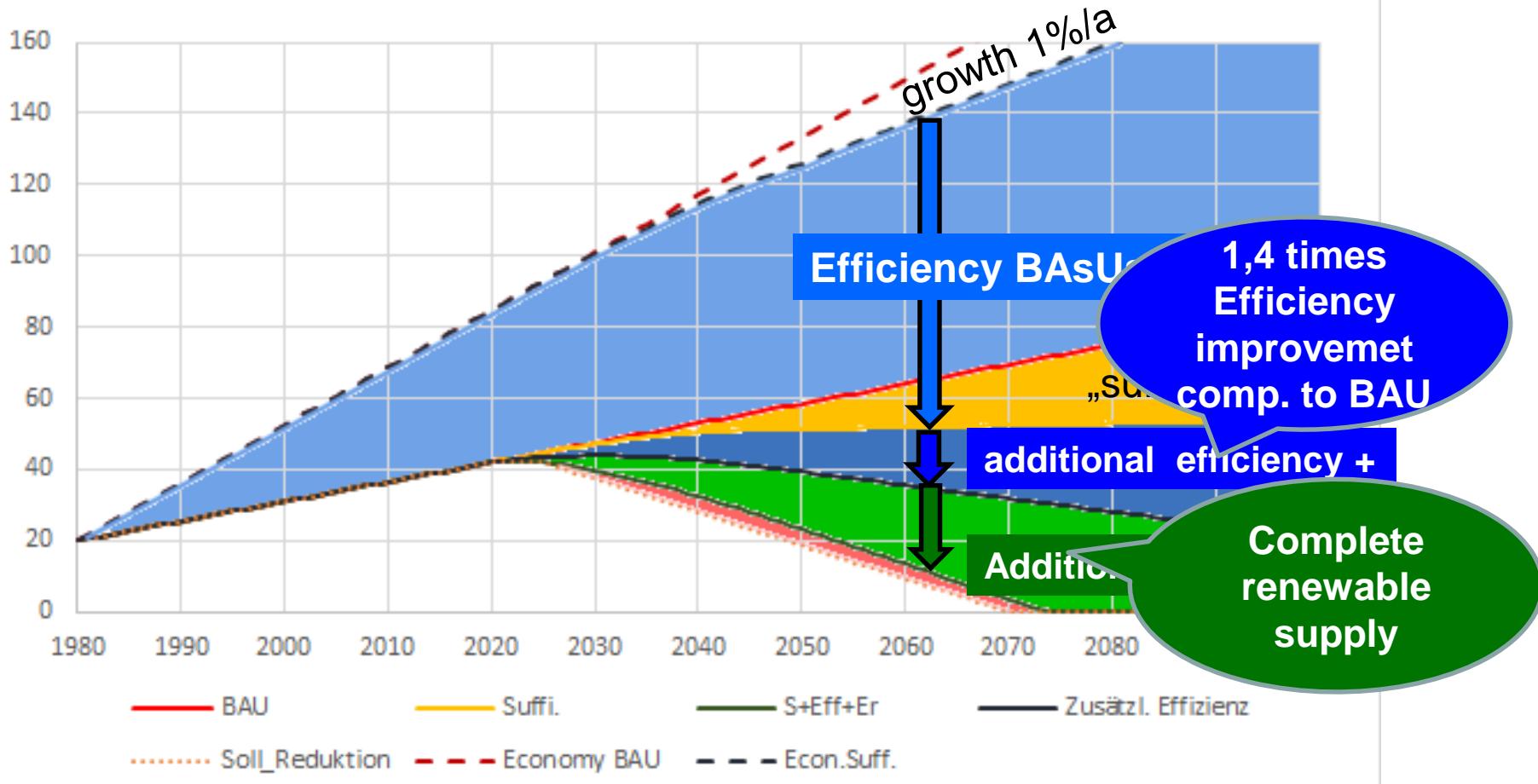
BAU Scenario and EEI and RES



- Scenario on the basis of economy „Business As Usual“ (BAU)
- + maximum improvement of efficiency for all services EEI
- + massive installation of Renewable Energy RES

Mrd to CO₂äqu

Realistic Scenario

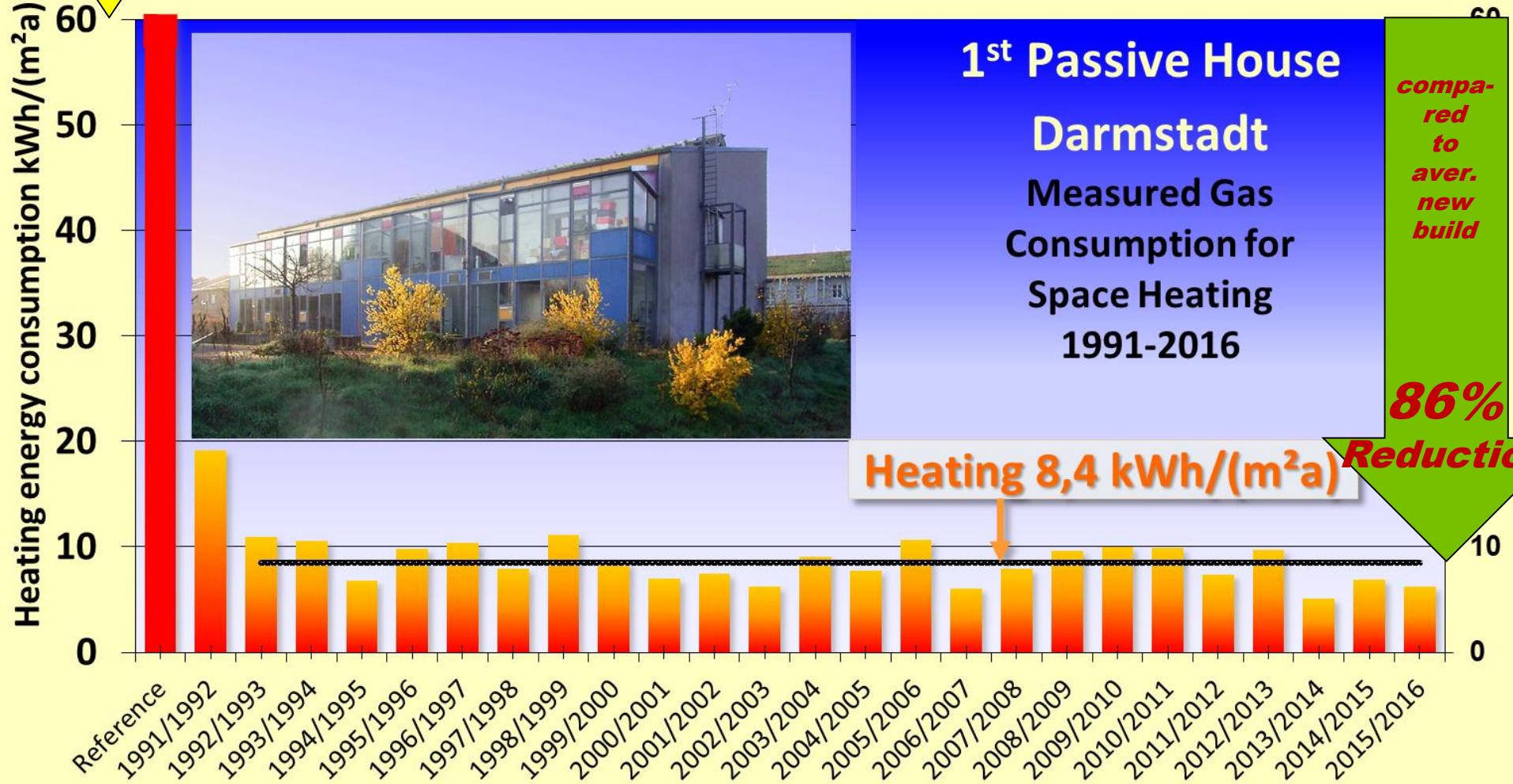


- Scenario based on „sufficiency“ economie 1%/a from 2040
- + realistic consequent Efficiency improvement all services
- + realistic deployment of Renewable Energy

-56%

conv.

Passive House Contribution



➤ Passive House Eff.: Factor 1,5*improved to std-new construction (>1,4)



Before

More
than
200
 kWh
 m^2a

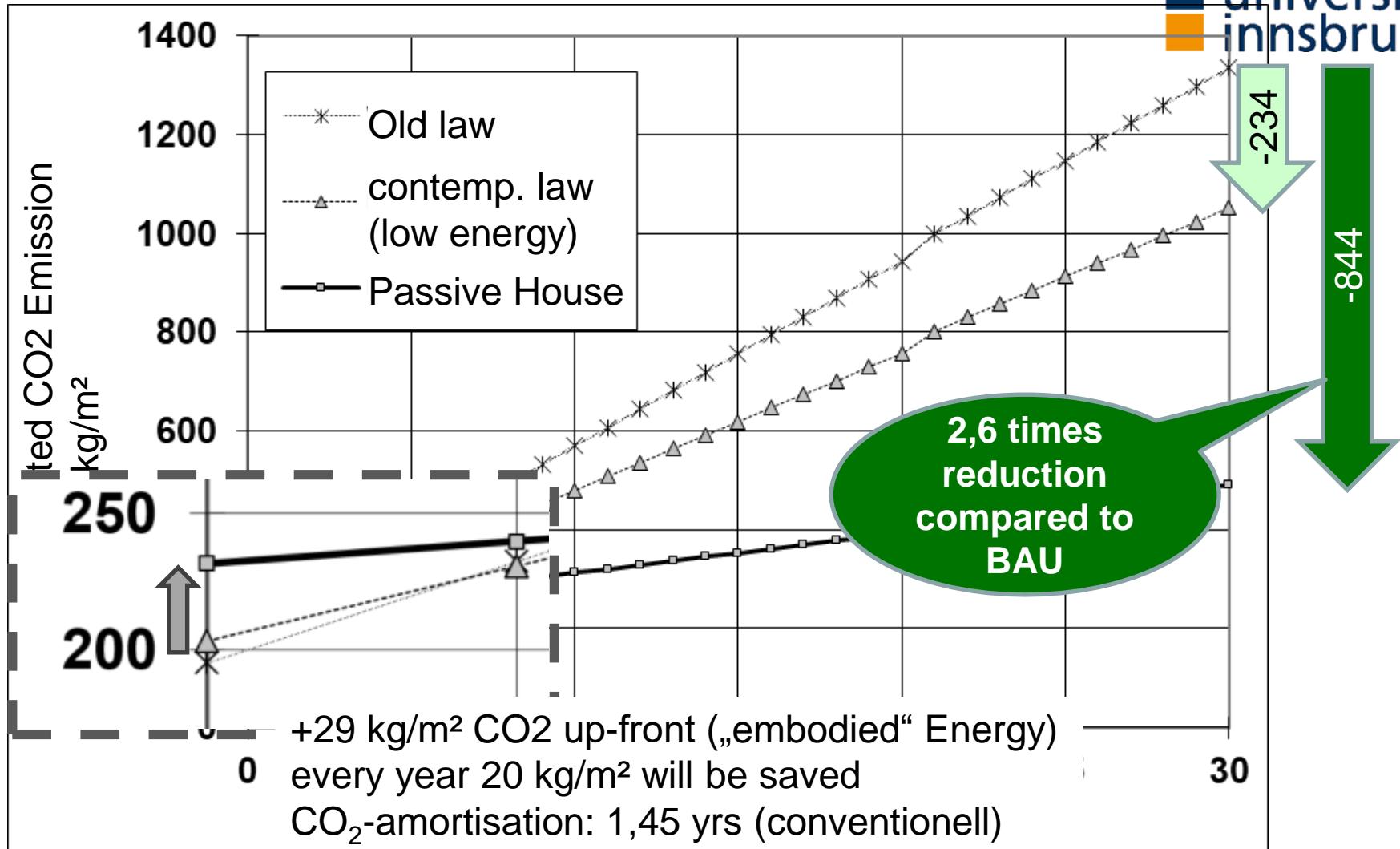


After

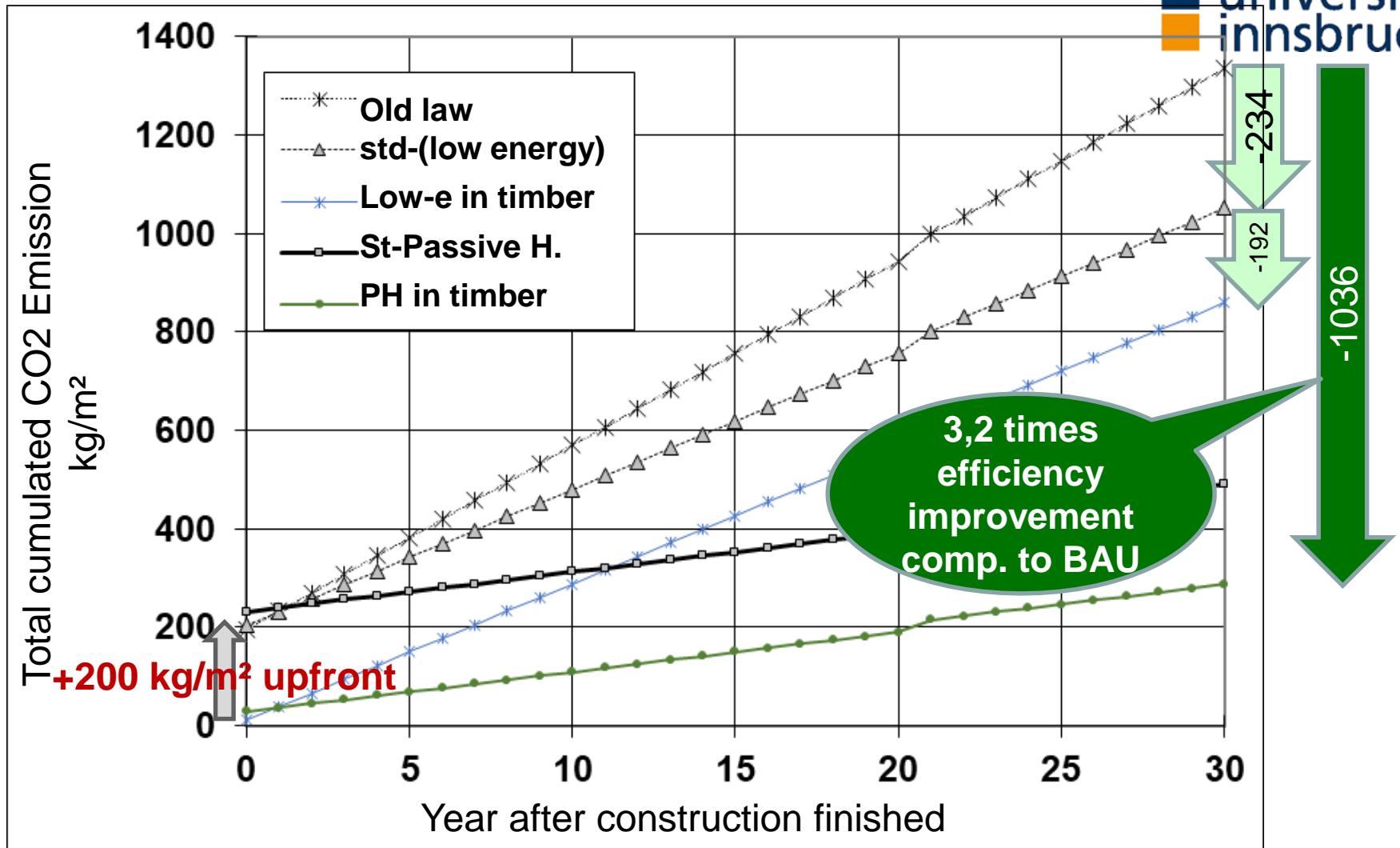


26
 kWh/m^2a

- EnerPHiT-Eff.: Factor 1,6*improved to std refurbishment (>1,4)



➤ ecological Balance (CO₂ / embodied energy)



➤ ecological Balance (CO₂ / embodied energy)



Architect Björn Kierulf / Bratislava; production in Vilnius
Ecococon – certified straw-prefabricated Passive House-Constr. System

- **Passive House: +Renewable + sustainable material (Timber/Straw)**

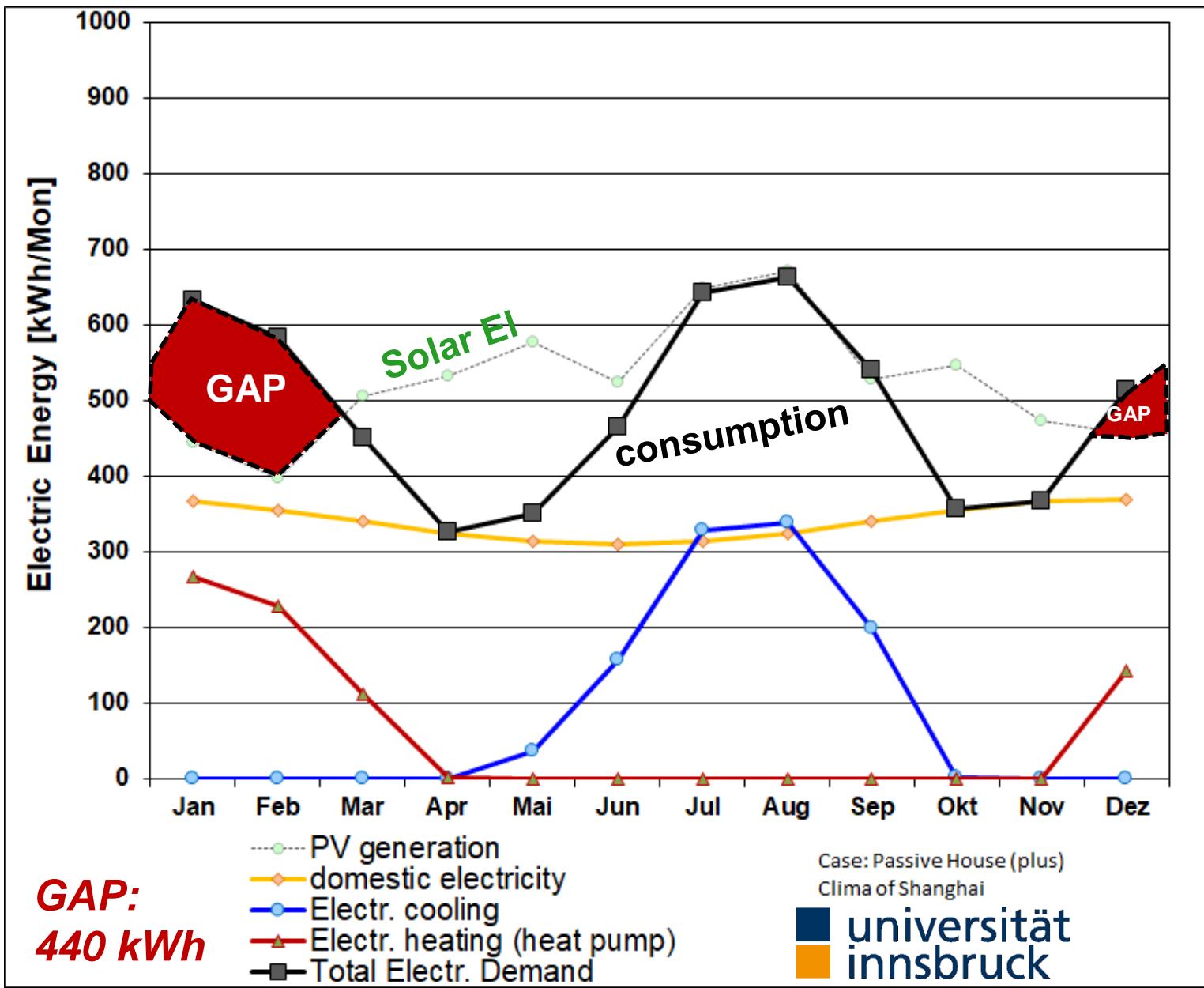
Passive Houses for affordable residential buildings



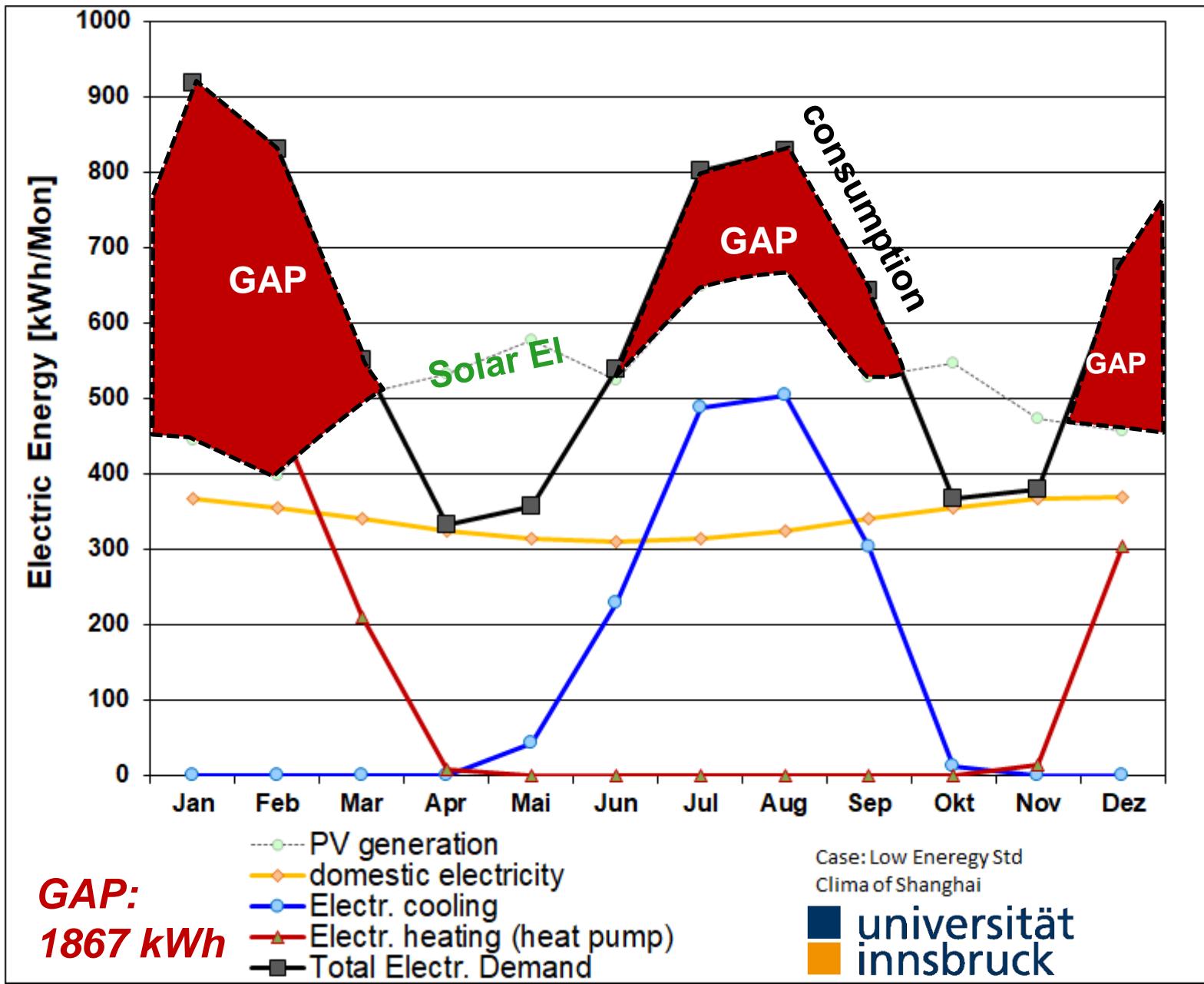
Savings
45kWh/(m²a)
@83 €/m²



Passive Houses in Shanghai Climate



Low E House in Shanghai Climate





IWU
[Großklos 2017]
(... here also
measurement
results)



Monitoring of Passive House Plus (Frankfurt)

Passivhaus:

- optimal comfort
- healthy indoor air
- reduced total cost
- solution for climate protect.
- sustainable growth
- participation and comprehension

win⁶



彻底改善农民的生活
Thoroughly improve the lives of farmers

Source: Zhang Xiaoling / former Mohurd China





彻底改善农民的生活

Thoroughly improve the lives of farmers

- 极大地改善了农民的居住环境

Improving farmer living inside environment.

- 帮助农民摆脱贫困

Help farmer to get rid of poverty

1)采暖费少了 Reducing heating cost

2) 获得了可留给子孙的财产 Obtain property that be left to future generations.

3) 助农户获得房产收入 Help farmer to obtain income from passive housing

3 降低了农民的日常劳动强度 Reduce labor intensity

4 村民病痛得到缓解 To alleviate their pain and suffering.

5 人们可以随时洗个澡了 Take a bath at any moment

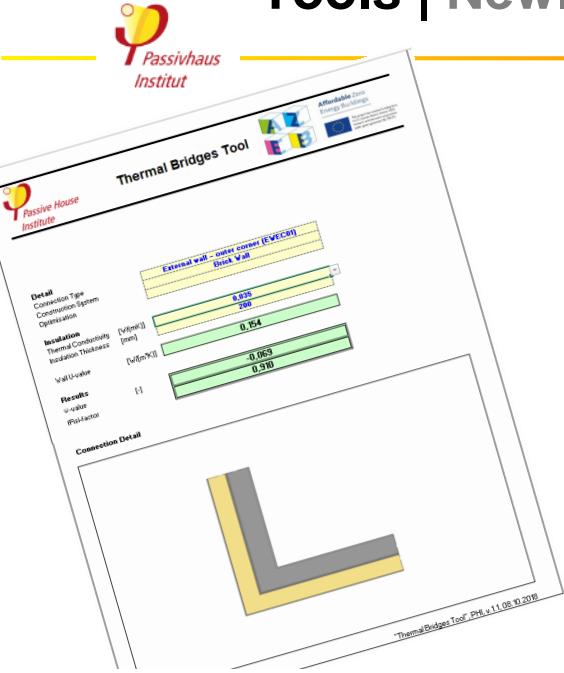
6 农民回流了 Backflow to countryside

7 对保护青山起了积极作用 Protect the green mountains

8 改变了农民的生活方式 Change farm's life-style.



Source: Zhang Xiaoling (Beijing Qiangji certification center)



Tools | Newly developed supprotng Tools



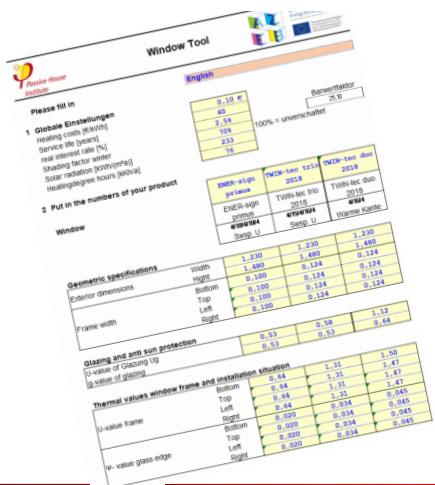
Affordable Zero
Energy Buildings



This project has received funding from
the European Union's Horizon 2020
research and innovation programme
under grant agreement No 754174

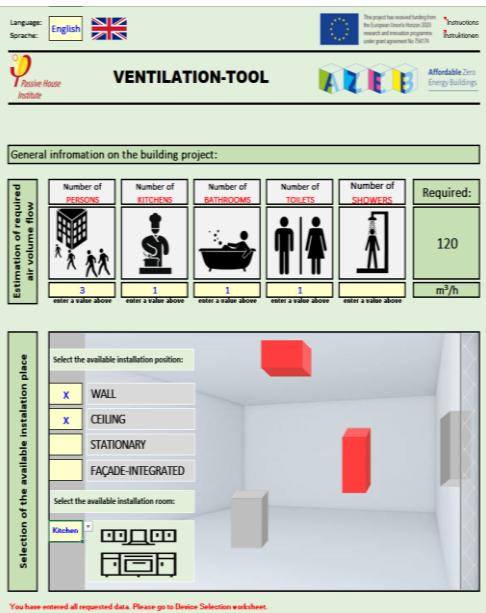
Wärmebrücken-Tool

Thermal Bridge Tool



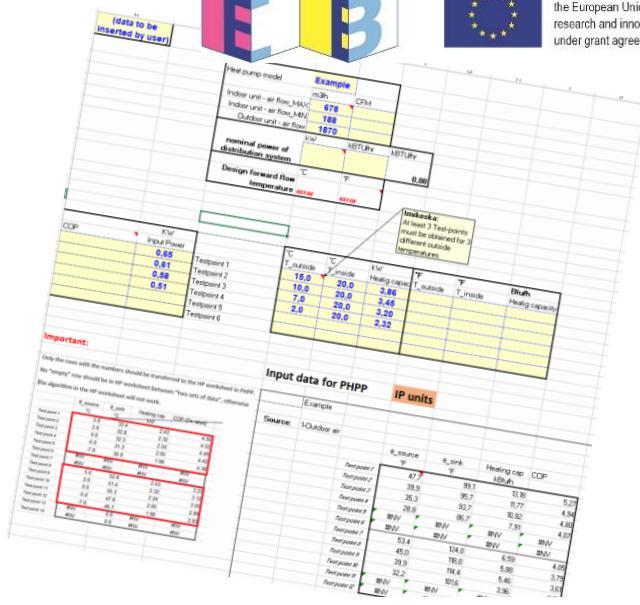
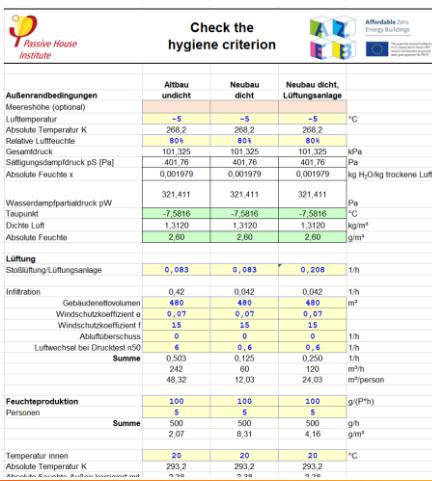
Fenster-Tool

Window Tool



Lüftungs-Tool

Ventilation Tool



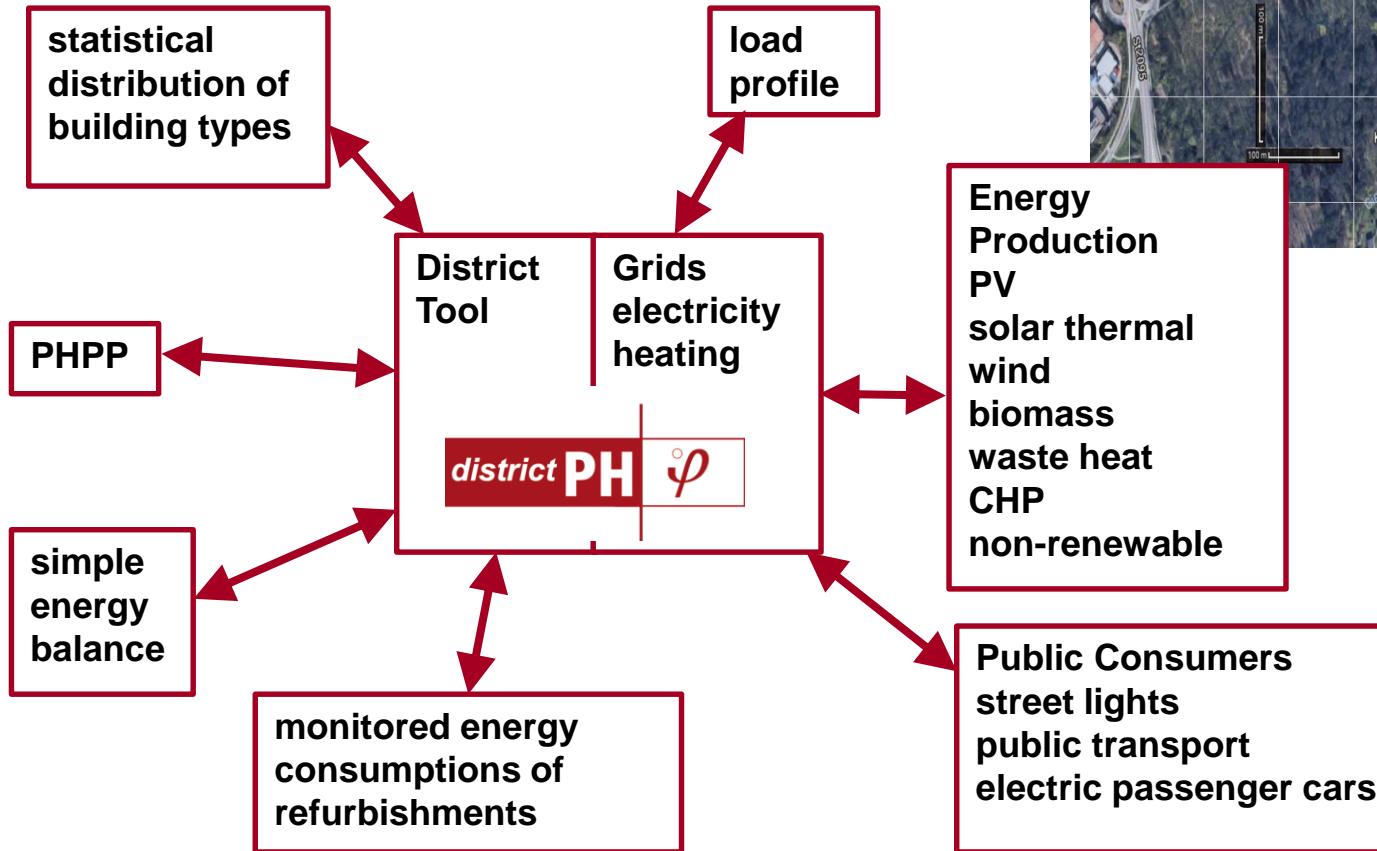
WärmepumpeTool

Heat Pump Tool



districtPH

energy balance on district level



- Excel based
- Focusing on refurbishment scenarios

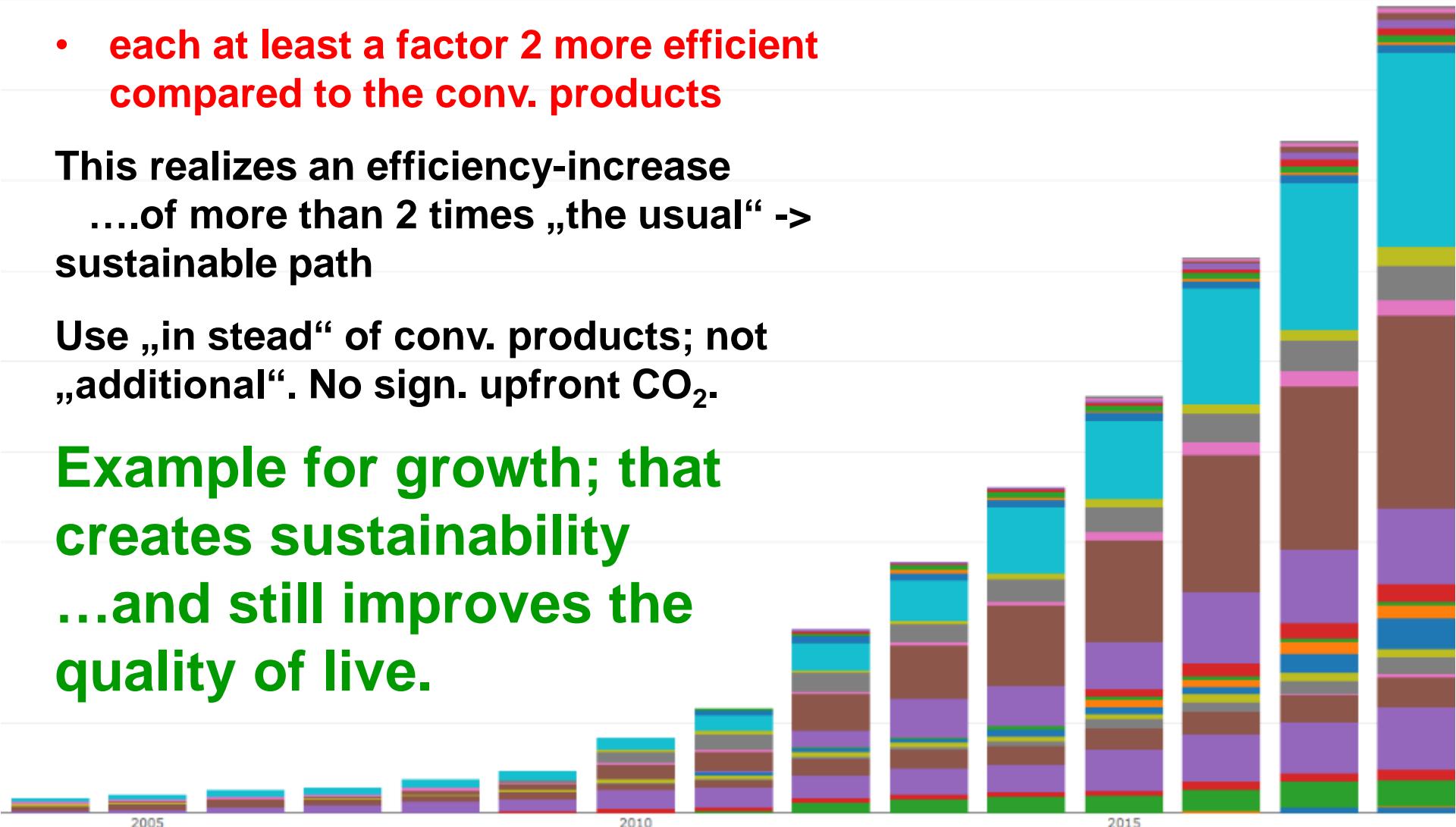
These Components are:

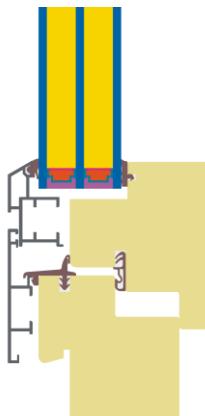
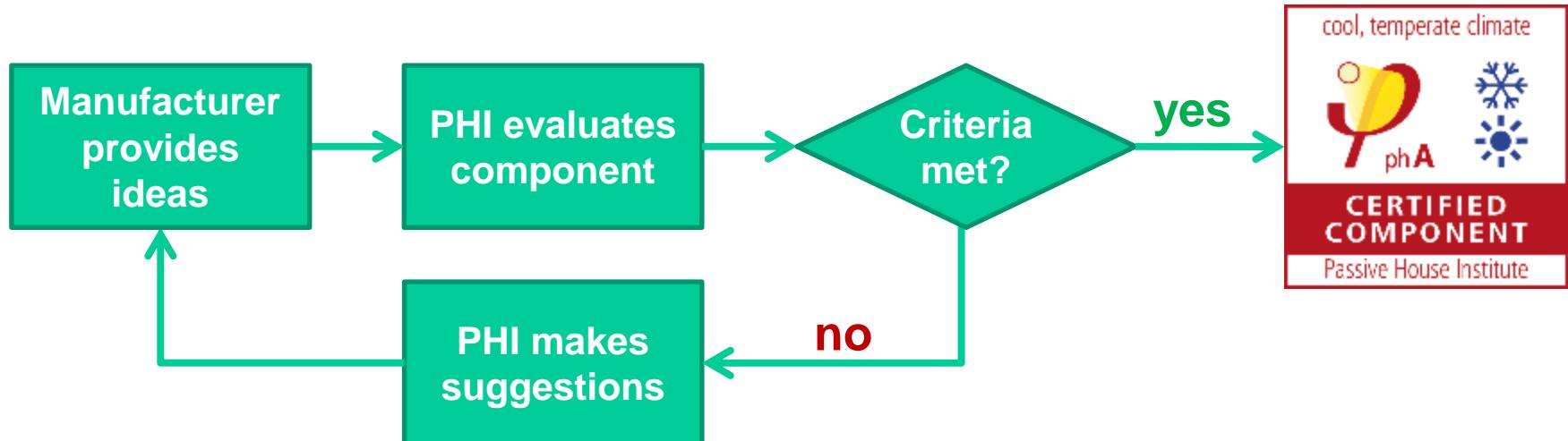
- **each at least a factor 2 more efficient compared to the conv. products**

This realizes an efficiency-increase
....of more than 2 times „the usual“ ->
sustainable path

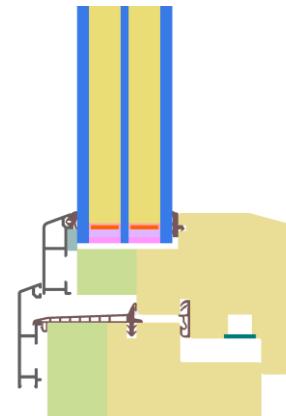
Use „in stead“ of conv. products; not
„additional“. No sign. upfront CO₂.

**Example for growth; that
creates sustainability
...and still improves the
quality of live.**





- Can be done in one week...
- But many cycles might be necessary. In some cases this process might take more than a year
- So far, every request has led to successful certification!



... means helping to develop



Offenes Passivhaus

*Wohlfühlen
im Passivhaus!*



*Experience
the comfort for
yourself!*

IG
Inform



Tage der offenen Tür im Passivhaus

PASSIVHAUS-BEWOHNER LADEN EIN

8.-10.
November
2019

Lassen Sie sich vom
Passivhaus verzaubern!

- angenehmes und gesundes Raumklima



International Passive House Open Days

PASSIVE HOUSE BUILDINGS ACROSS THE WORLD OPEN THEIR DOORS

8-10
November
2019

Talk about Passive House with residents
and construction professionals

Learn firsthand what it is like to live
in a Passive House:

- Superior comfort
- Low heating & cooling costs
- Fresh air day and night
- Complemented by renewable energy
- Suitable for new builds and retrofits

Please visit www.passivehouse-international.org for
further information. Participating buildings will be listed
from September on www.passivehouse-database.org

SINFONIA stands for "Smart Initiative of cities Fully committed to Invest In Advanced large-scaled energy". This project has received funding from the European Union's Seventh Programme for research, technological development and demonstration under grant agreement No 600019.



Passive House Training



Weltweites Training / Netzwerk von akkreditierten Kursanbietern

Worldwide training / network of accredited course providers

Weltweites Zertifizierungssystem für Bauschaffende

Worldwide certification system for building professionals

Kursmaterialien / E-Learning-Module in verschiedenen Sprachen

Course material / e-learning modules in different languages





2019 internationale Passivhaus-Tagung

Lectures | Workshops | Excursions | Exhibition

Passive House Worldwide!



9 – 11 October 2019
Gaobeidian | China

**23RD INTERNATIONAL PASSIVE
HOUSE CONFERENCE 2019**

SESSION 07 China implementing Passive House 中国被动房项目实施



SESSION 07 China implementing Passive House 中国被动房项目实施





3.5 Future Different Scenarios Prediction

Scenarios analysis

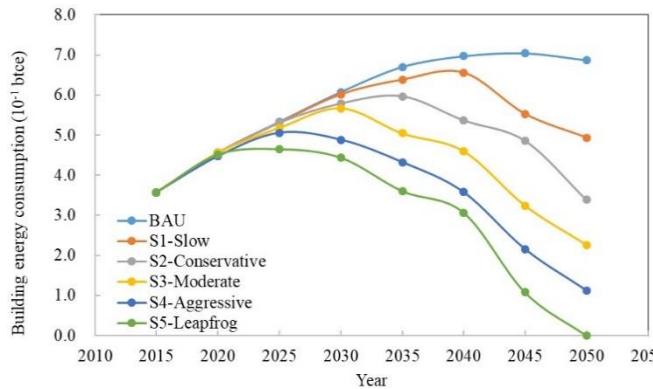
随发展速度增快
From the BAU to leapfrog

- 能耗峰值下降
The peak decreases.
- 能耗峰值发生年份提前
The occurrence time of the peak advances.
- 峰值后下降速率增快
The decline rate after the peak increases.

达峰条件 Peak condition:

总体而言，当超低/近零/零能耗建筑占约50%时，建筑领域能耗才会达峰、然后下降。

In general, only if the total percentage of ultra-low, nearly-ZEBs and ZEBs is larger than 50% does the building energy consumption begin to decrease



不同情境下建筑领域能耗发展预测
Building energy consumption pathway 2015-2050

	峰值 (亿tce) Peak (million tce)	峰值年份 Peak Year
BAU	704	2045
S1-Slow	656	2040
S2- Conservative	596	2035
S3-Moderate	567	2030
S4-Aggressive	506	2025
S5-Leapfrog	465	2025

Impact of zero energy buildings on medium-to-long term building energy consumption in China

Xinyan Yang, Shicong Zhang*, Wei Xu
Institute of Building Environment and Energy, China Academy of Building Research, No. 30, Bei San Huan Dong Lu, Beijing, China

ARTICLE INFO

Keywords
Ultra-low energy building; Nearly-zero energy building (nearly-ZEB); Zero-energy building (ZEB); Building energy consumption pathway

ABSTRACT

The future development pathway of upgrading building energy codes in China remains unclear. No studies have addressed the impacts of Zero Energy Building (ZEB) on medium-to-long term building energy consumption. This paper aims to analyze the impact of energy codes in China in the last 30 years (1986–2015), regularized by the study of energy consumption in buildings, and to propose the medium-to-long term building energy consumption pathway. Based on the study of the development of ultra-low energy buildings, nearly-ZEB and ZEB in the successive building energy codes upgrading goals towards 2030–2050, the results show that the medium-to-long term building energy consumption and the peak year of advancement, in general, only if the ultra-low energy building, nearly-ZEB and ZEB account for more than 50% of total floor area, does the building energy consumption begin to decrease. In medium-to-long term consumption pathway, the building energy consumption will decrease to 465 million tbee by 2025. Compared to 2015 scenario, in leapfrog scenario, the accumulated saving of final fuels can be reduced by up to 930 million tce till 2050, which contributes most to mitigation of climate change.

1. Introduction

As the world's second-largest economy, China has set an energy consumption cap to improve industrial efficiency and control greenhouse gas emissions. China is also making supply-side structural reform and people-oriented green development. In 2015, China submitted its Intended Nationally Determined Contribution to the United Nations Framework Convention on Climate Change, pledging to peak CO₂ emissions by 2030 and strive to achieve it as soon as possible. In 2016, the Chinese government issued the "13th Five-Year Plan (2016–2020)" published in 2017 also sets ambitious targets, including controlling China's primary energy consumption within 6 billion ton by 2020, with non-fossil fuels higher than 20%. The building sector plays an important role in China's energy consumption. It is estimated that the environment and energy use, globally, public and residential buildings account for 20.1% of the total delivered energy consumed (IEA, 2017). In China, the building sector consumed approximately 20% of the total energy and approximately 22% of the electricity consumed in 2015 (CHINEREC, 2017).

Future building energy efficiency pathways involve rapid and extensive transitions. Many developed countries have proposed goals and policies for zero energy buildings (ZEBs) (Frangoulis and Feller, 2013). The goals of ZEBs generally include: 1) reducing energy demand to an excess low-level step-wise reduction; 2) improving the energy efficiency of products; and 3) replacing the remaining fossil fuels by various sources of renewable energy (Izquierdo, 2007). There is no doubt that the development of ZEBs will restructure the energy mix in the building sector.

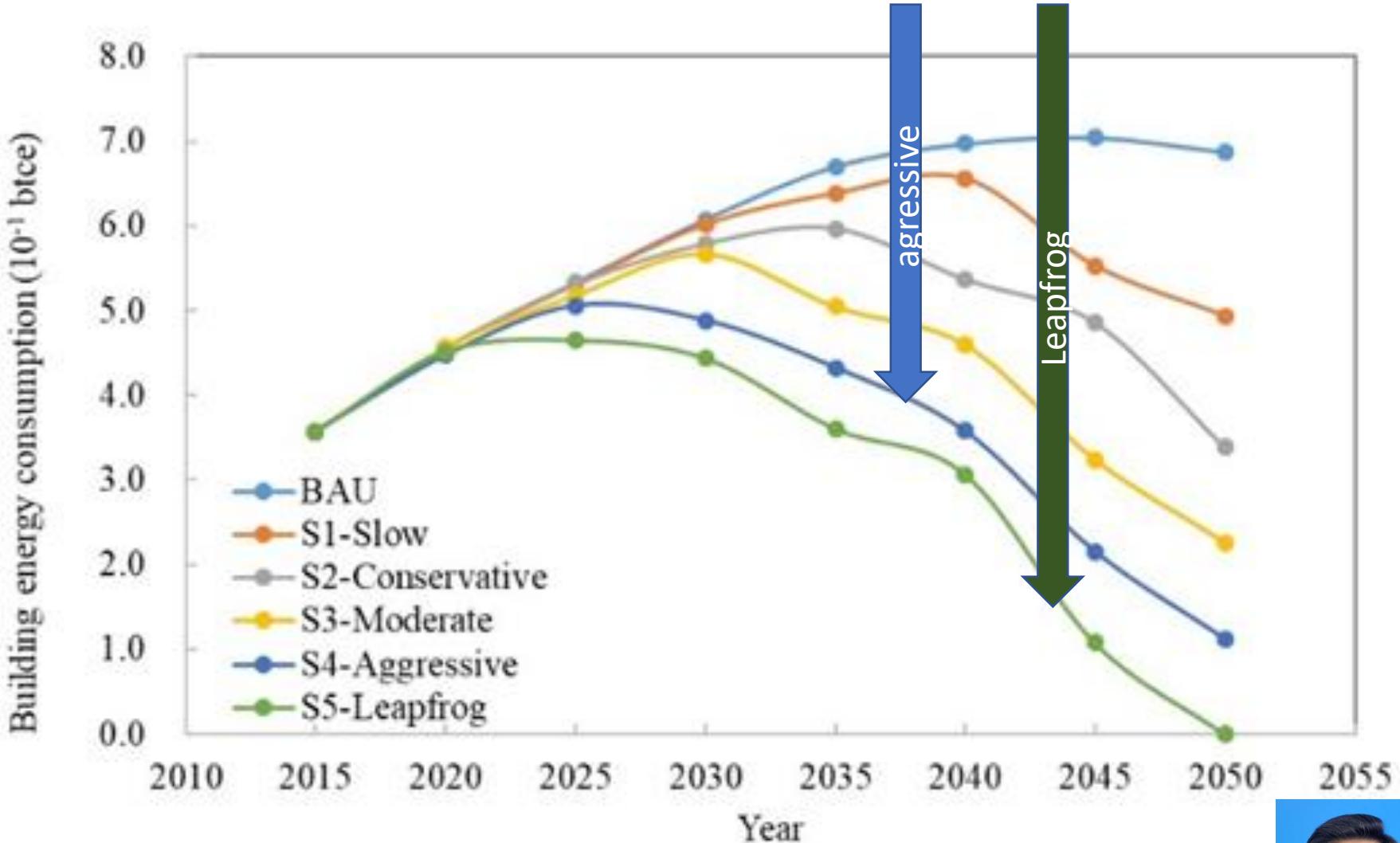
1.1. United States

The Building Technology Program of the US Department of Energy has set the goal to achieve marketable net zero energy homes by 2025 and public net zero energy buildings at low incremental cost by 2035. The state of California has also proposed bold strategies for designing and building net zero energy buildings. The U.S. Department of Energy recently released a common ZEB definition that specifies measurement methods and design strategies development (DOE, 2015). The total energy savings of new building energy codes released in 2016 provide an excess of 30% energy savings compared to the codes from a decade ago (DOE, 2016).

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China implementing Passive House



Source: Xu Wei CABR China



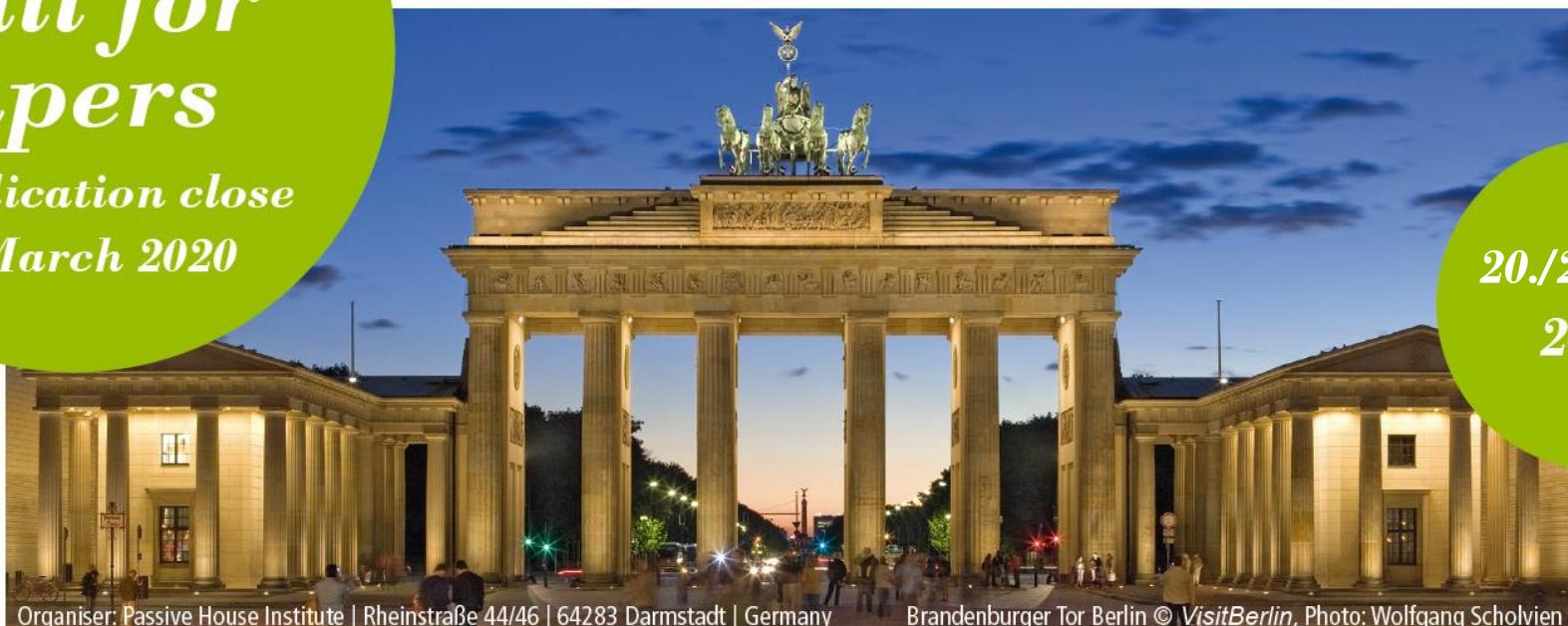
...let's see next year in Berlin!

www.passivehouseconference.org

Call for Papers

*Application close
2nd March 2020*

24TH INTERNATIONAL PASSIVE HOUSE CONFERENCE 2020



Organiser: Passive House Institute | Rheinstraße 44/46 | 64283 Darmstadt | Germany

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