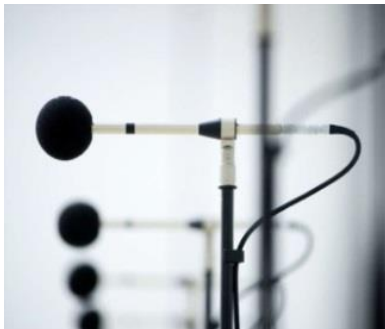


Developing Human Capacity and Technological Infrastructure to Overcome Implementation Obstacles for Sustainable Buildings

German Vietnamese **Science Day**, Đà Nẵng 26 - 27 April 2023

Hartwig M. Künzels, Fraunhofer-Institute for Building Physics

Auf Wissen bauen



ACOUSTICS



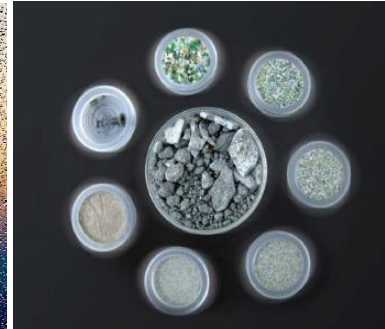
ENERGY EFFICIENCY
AND INDOOR CLIMATE



LIFE CYCLE
ENGINEERING



HYGROTHERMIK



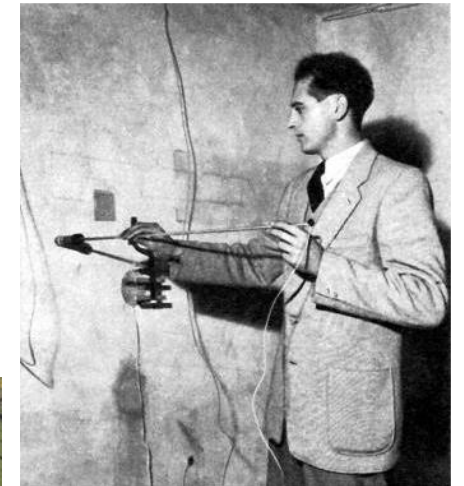
INORGANIC MATERIALS
AND RECYCLING



ENVIRONMENT,
HYGIENE AND SENSOR
TECHNOLOGY

Introduction

Fraunhofer IBP field test site



70 years of field tests to investigate long-term building performance & material durability

Introduction – Research Tools and Methods of Building Physics

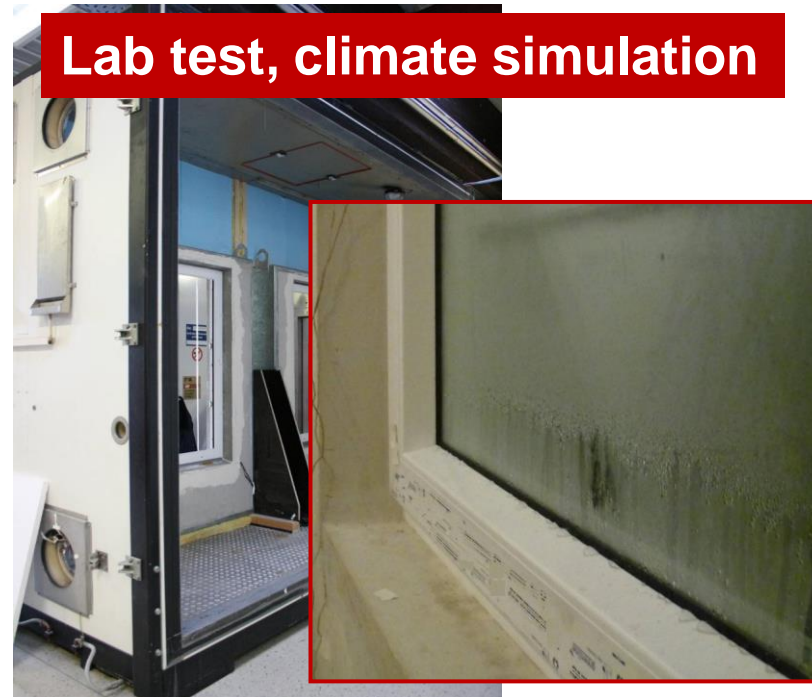
Analyzing energy performance, comfort and durability of buildings

Investigations of integral building performance focusing on heat, air and moisture transfer in building materials, systems and components (hygrothermal performance).

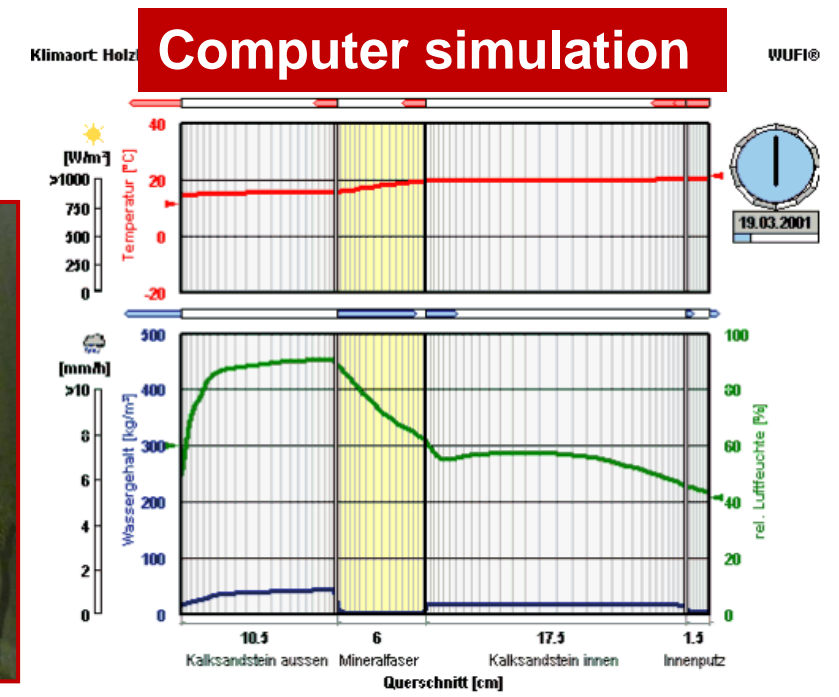
Research in building physics is based on the triplet of **field**, **lab** and **computer studies**



Field test



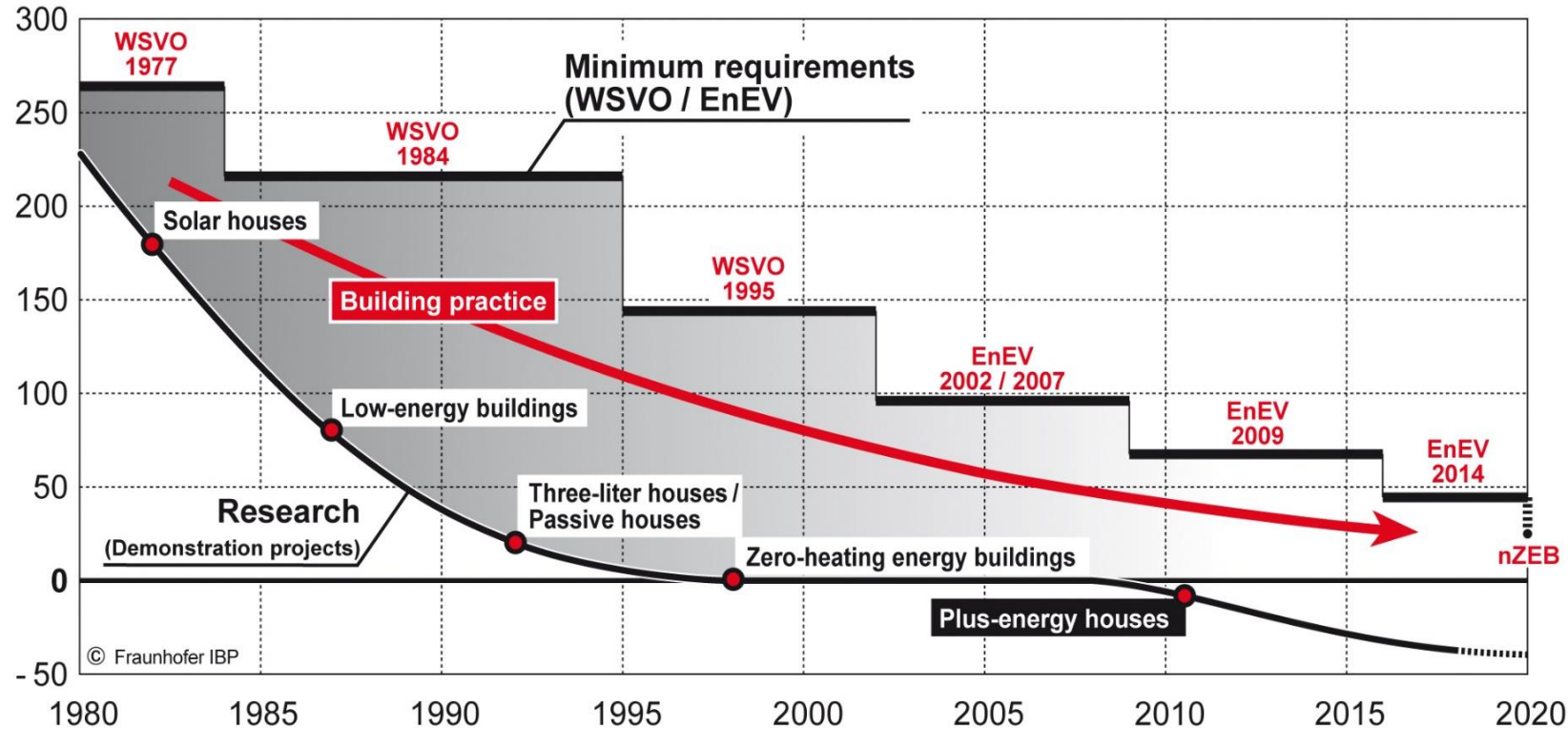
Lab test, climate simulation



Energy regulations in Germany – Oil shock in 1973 and its consequences

Energy efficient buildings in Germany – R&D progress and code requirements

Primary energy need semi-detached house – Heating [kWh/m²a]

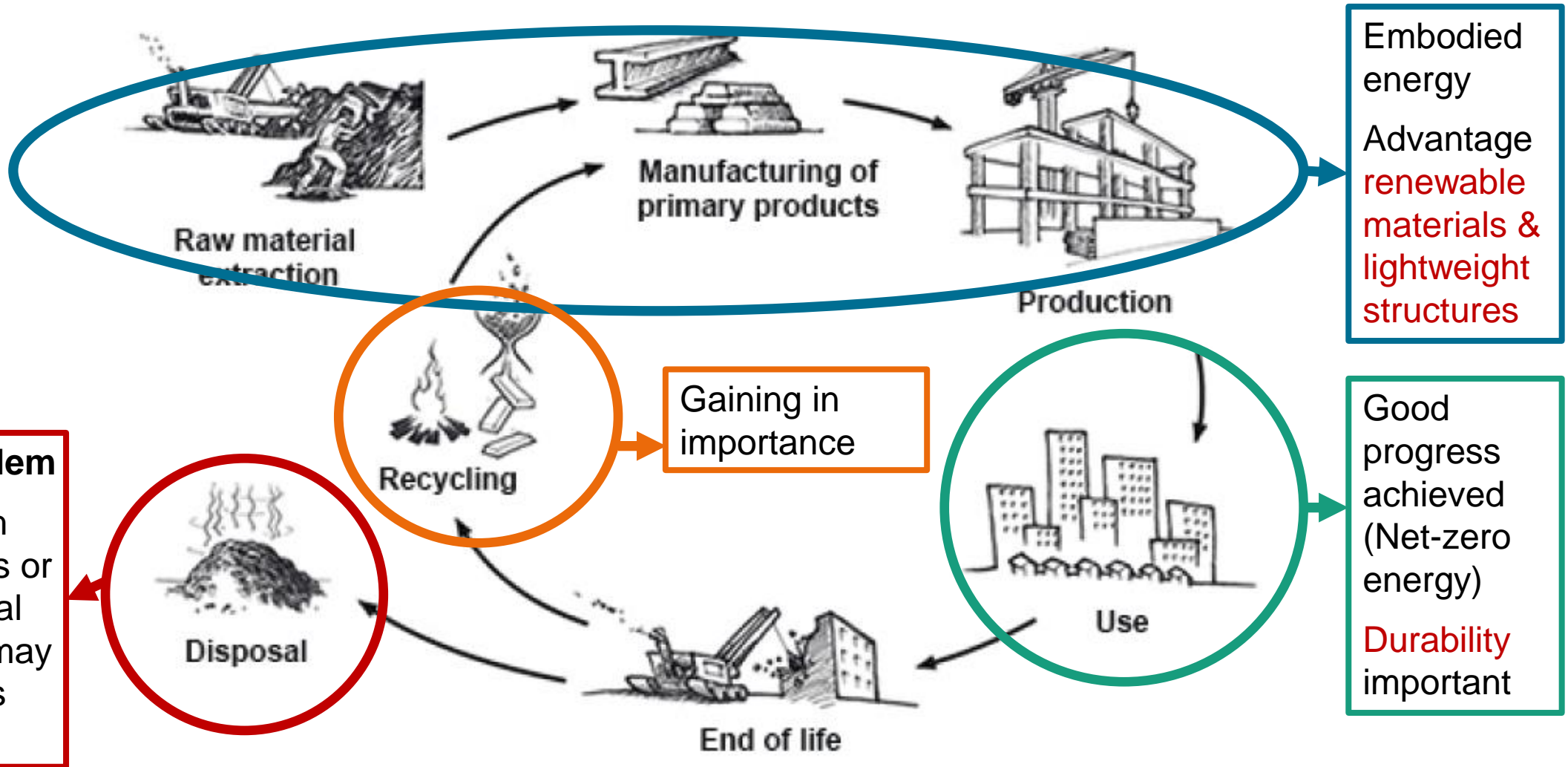


The building energy regulations followed the progress in R&D

Initially, **thermal insulation** had the highest priority, followed by ERVs, heat pumps, PV, smart controls, ...

Worldwide Challenge – Carbon emissions and resource depletion

Life cycle engineering is the basis for Sustainable Buildings



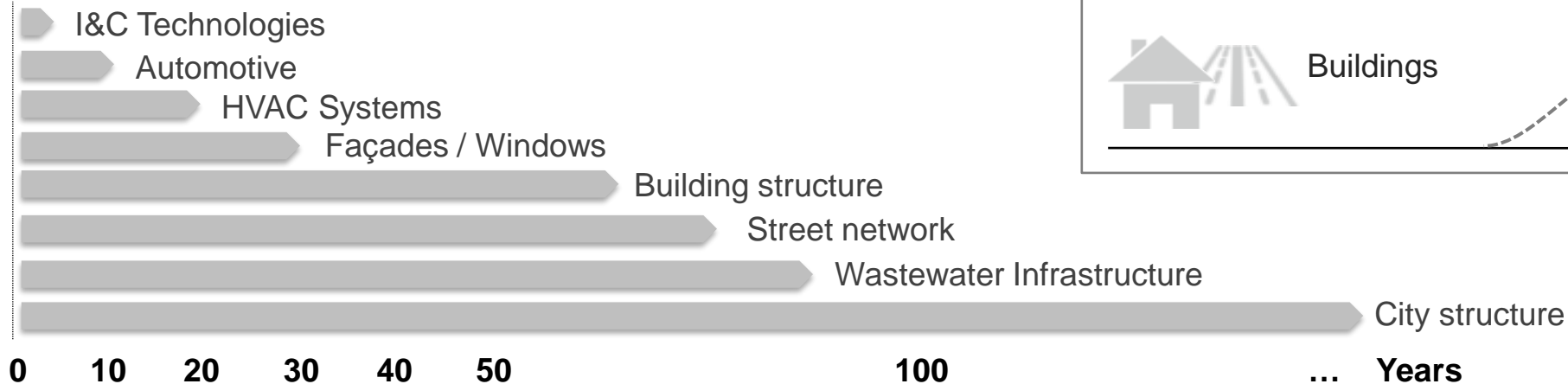
Implementation Obstacles

Very long innovations cycles

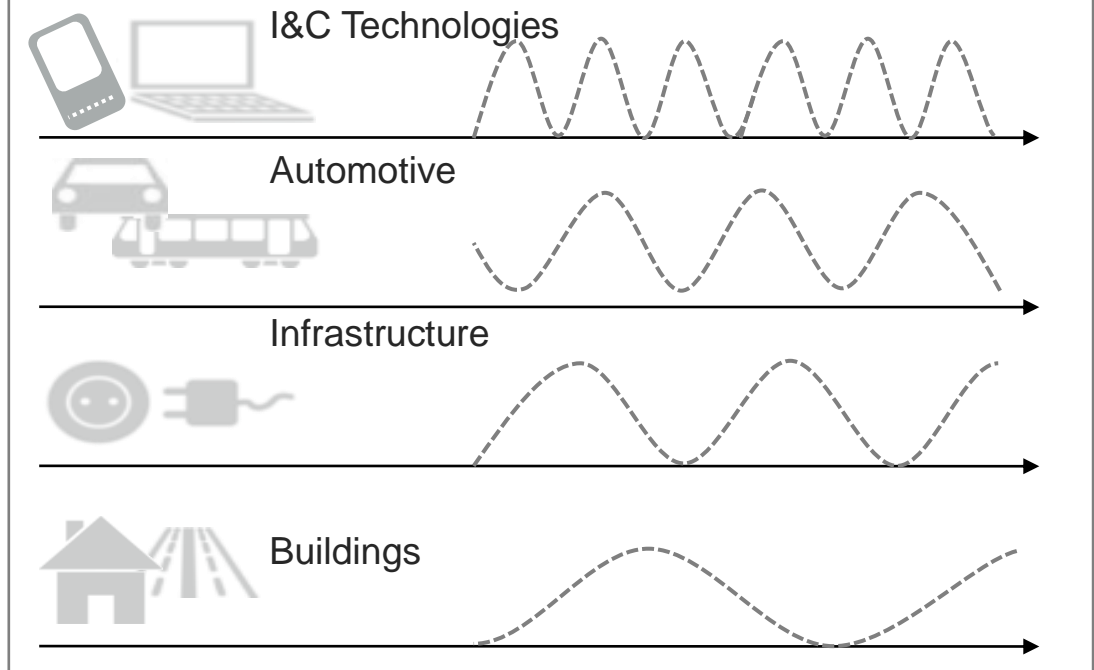
Challenge:

The building sector is the major carbon emitter, however, building innovation cycles are very long!

Therefore, we must take the right steps for sustainable building design and renovation as soon as possible



Differences in innovation cycles:



Implementation Obstacles

Insufficient information on new construction materials and components impedes innovation

VHV-BAUSCHADENBERICHT

HOCHBAU 2021 / 22

QUALITÄT UND KOMMUNIKATION

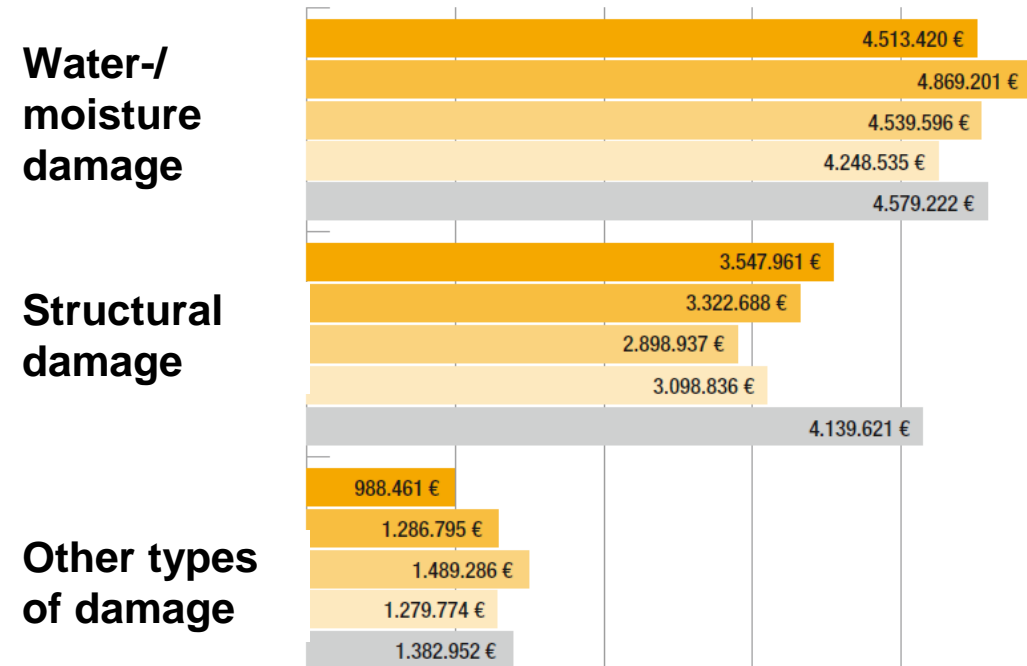
**Building damage report
based of German
insurance company VHV**

Moisture related
damage is most
frequent and
expensive problem

VHV
BAUFORSCHUNG

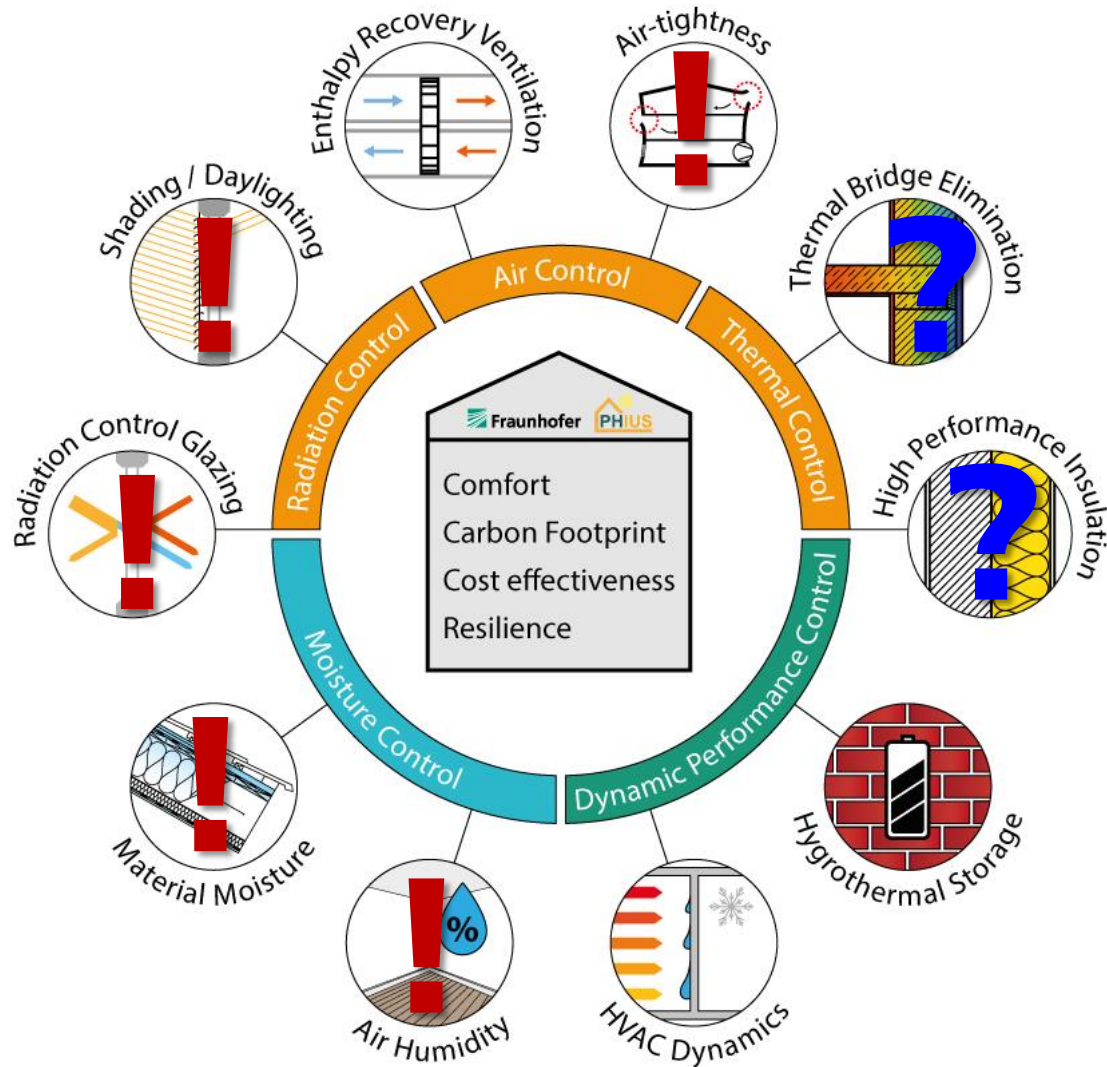
Fraunhofer IRB | Verlag

Repair costs for various types of construction damage, 2016 - 2020



Departing from traditional practice may be risky

Design Principles for Energy Efficient Building



Relevant for Tropical Climates (? or !)

Damage or accelerated ageing may occur if **moisture control** is not an integral part of the design process

Outdoor conditions and building operation may vary significantly (dynamic behavior)
Energy supply will become more unstable due to higher share of renewable energy
► **Impact of heat and moisture storage (inertia) on indoor climate conditions becomes more relevant**

Conclusions

Investing in **building physics research** to foster sustainable buildings in Vietnam

To define and implement energy savings goals adapted to **Vietnamese climate conditions and building traditions** requires the following steps:

- Expand material testing and building physics research infrastructure, (laboratories, **test fields**, modeling and design tools)



VIBM



TDTU



- Educate architects, engineers, facility managers and tradespeople in sustainable building principles and their implementation
- Inform a wider public and decisionmakers (**investors, government officials, building owners**) about the benefits and possibilities of sustainable building design

Developing Human Capacity and Technological Infrastructure to Overcome Implementation Obstacles for Sustainable Buildings



**Thank
you
Cảm
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