Technical Restrictions on Retrofit Insulation of Buildings

Peter Mellwig, ifeu – Institut für Energie- und Umweltforschung

Patrick Jochum, Beuth Hochschule für Technik Berlin

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3. Nomenclature of Restrictions on Insulation
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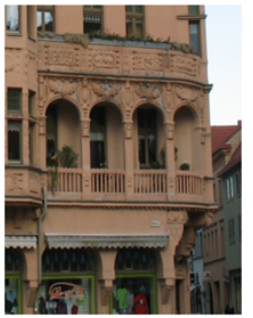
Examples for Restrictions on Insulation



Restrictions on Insulation are everywhere!

Natursteinfassade	
Anzahl im Bild	1 Stk.
Wärmeverlust konv. Sanierung:	10.526 kWh/a
Wärmeverlust zukunft. Sanierung:	12.631 kWh/a

Terrassen	
Anzahl im Bild	4 Stk.
Wärmeverlust konv. Sanierung:	976 kWh/a
Wärmeverlust zukunft. Sanierung:	-

Durchfahrt	
Anzahl im Bild	2 Stk.
Wärmeverlust konv. Sanierung:	1.172 kWh/a
Wärmeverlust zukunft. Sanierung:	1.432 kWh/a

Ornamente	
Anzahl im Bild	1 Stk.
Wärmeverlust konv. Sanierung:	23.564 kWh/a
Wärmeverlust zukunft. Sanierung:	-

Anschluss Erker/Tür	
Anzahl im Bild	2 Stk.
Wärmeverlust konv. Sanierung:	2.017 kWh/a
Wärmeverlust zukunft. Sanierung:	-

Survey

63 restrictions in multiple-choise-questions

participants can add restrictions

participants can add free comments

Survey

Denkmalschutz

***Wie oft erleben Sie in Ihrer Praxis, dass die genannten Bauteile aus Gründen des Denkmalschutzes nicht vorschriftsmäßig oder gar nicht gedämmt werden können?**

	sehr oft	häufig	selten	nie	weiß nicht
Außenwand Außendämmung	○	○	○	○	○
Außenwand Innendämmung	○	○	○	○	○
Außenwand Außen- und Innendämmung nicht möglich	○	○	○	○	○
Fenster / Türen	○	○	○	○	○
Dach	○	○	○	○	○
Dachflächenfenster	○	○	○	○	○

63 restrictions in multiple-choise-questions

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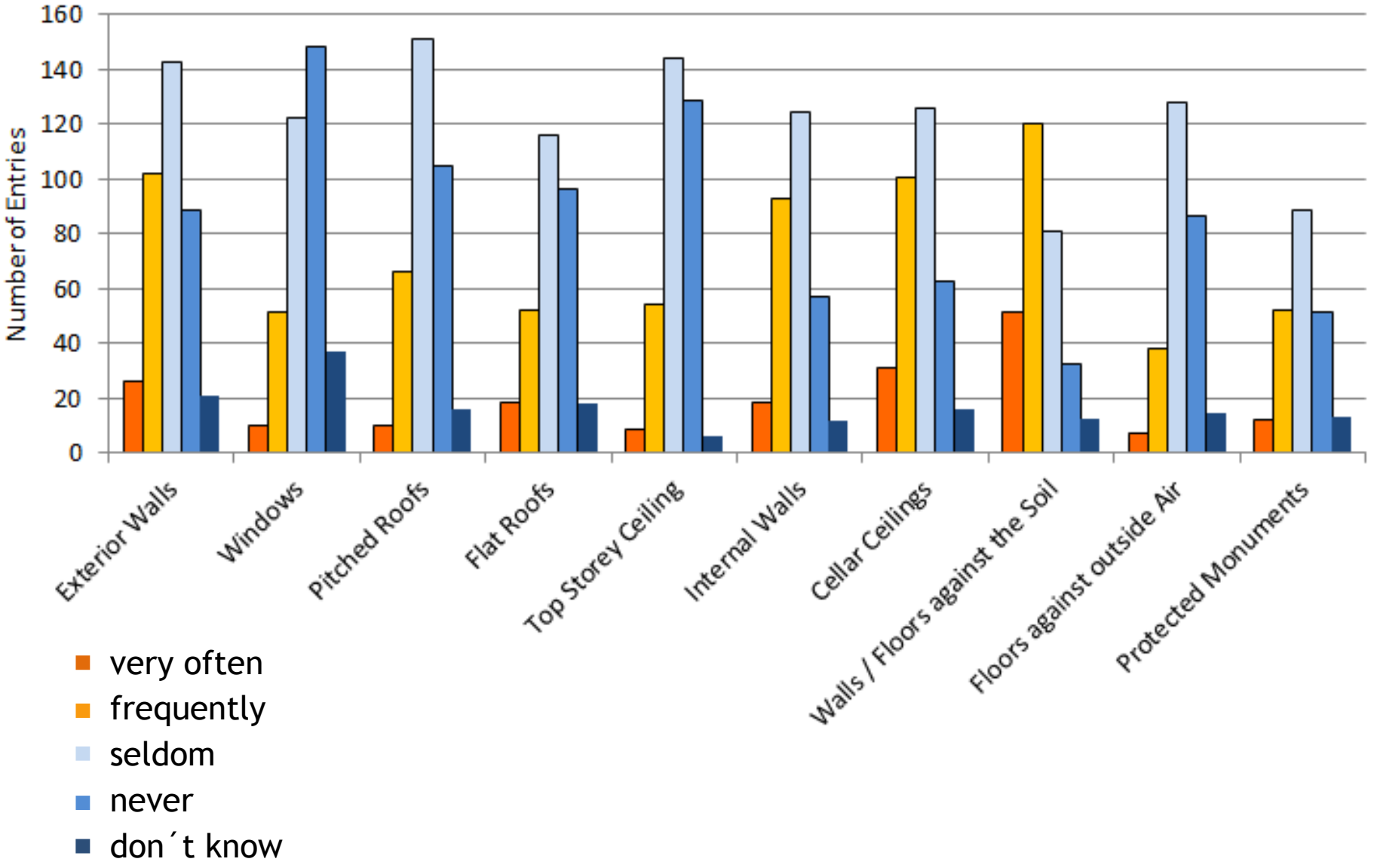
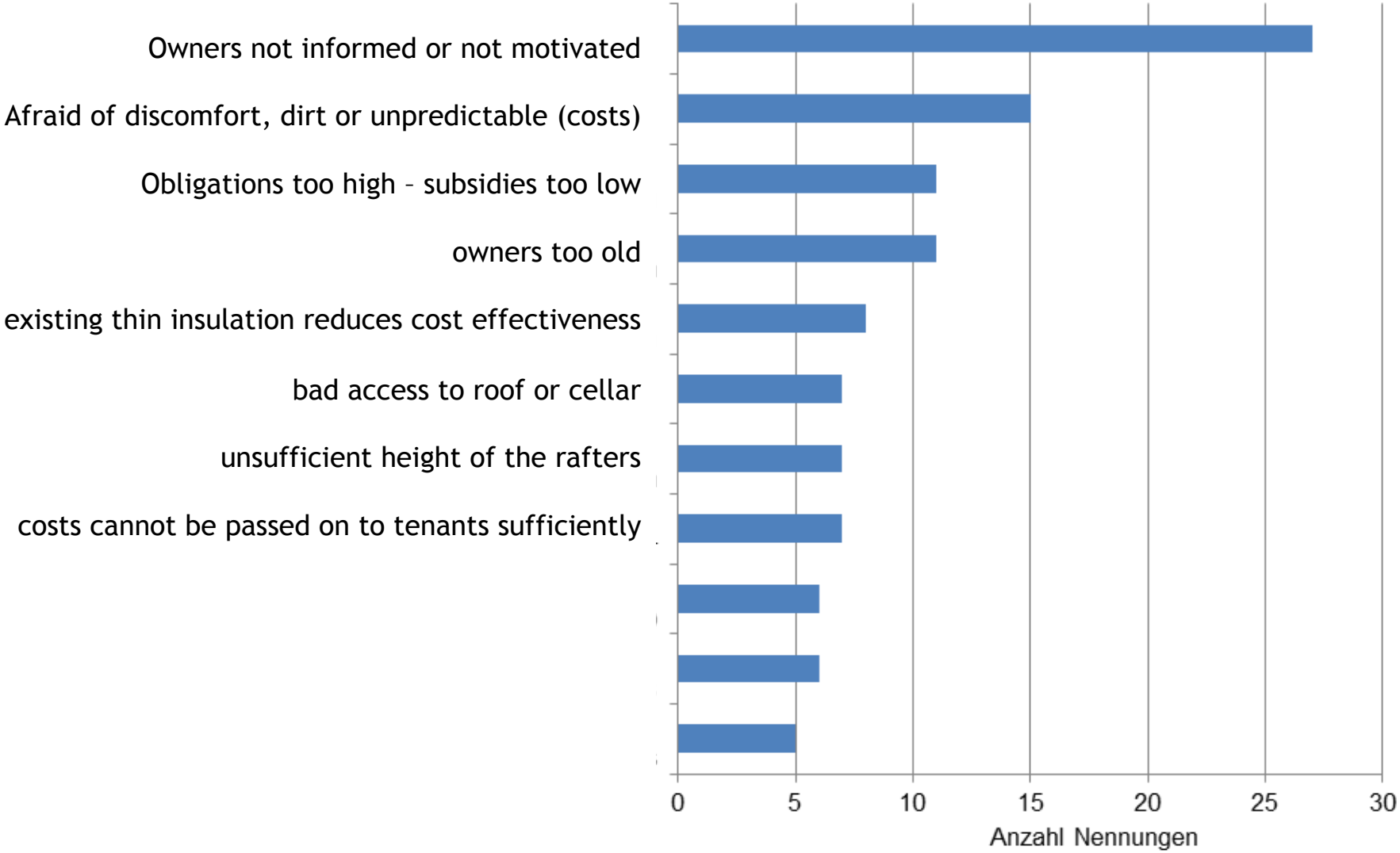
Analysis of the Multiple-Choise-Questions



Analysis of the Comments



Definition of restrictions on insulation

Restriction on insulation mean that ...

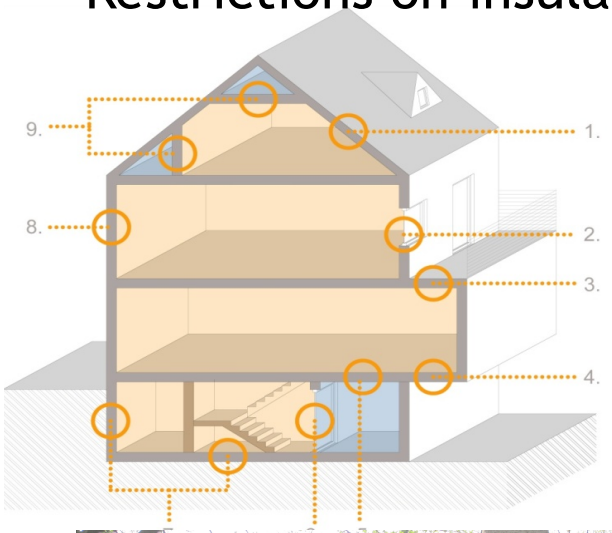
... entire buildings or single components ...

... cannot be insulated at all or not be insulated sufficiently in relation to the regulations.

Restrictions on insulation only occur when existing buildings shall be retrofitted to improve their energetic quality

Differentiation of restrictions on insulation

Restrictions on insulation do not mean ...



... thermal bridges;
thermal bridges necessarily occur in every building;

They usually form lines or points;

They are examined quite well

... non technical restrictions
like fassade greening
or low motivation

Causes of Restrictions on Insulation

construction-related restrictions

- e.g. components against the soil

building physics

- e.g. beam heads that interupt interior insulations

geometrical restrictions

- e.g. windows close to internal corners

regulatory restrictions

- e.g. monuments, minimum distances

aesthetic restrictions

- e.g. exposed brickwork, stucco

behaviour-related restrictions

- e.g. building owners not motivated, too old, insufficient planning

All Mixing Forms possible

Is low cost effectiveness a restriction ??

low cost effectiveness is not an additional restriction but is a symptom of the shown restrictions

cost effectiveness is determined by 2 extrema

cost effectiveness doesn´t matter:

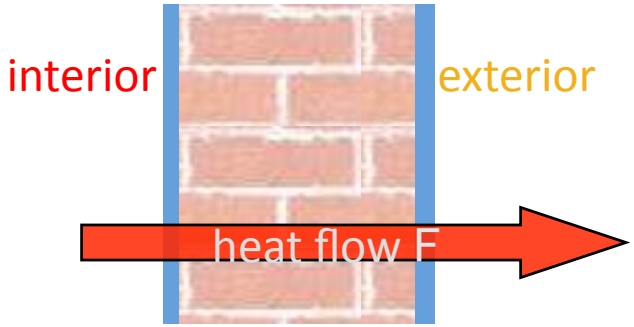
No consideration of restrictions on insulation

cost effectiveness is the only driver:

Too high consideration of restrictions on insulation

Heat Loss at Restrictions on Insulation

$$\Phi = U \cdot A \cdot \Delta\theta$$



- Φ heat flow [W]
- U heat transfer coefficient

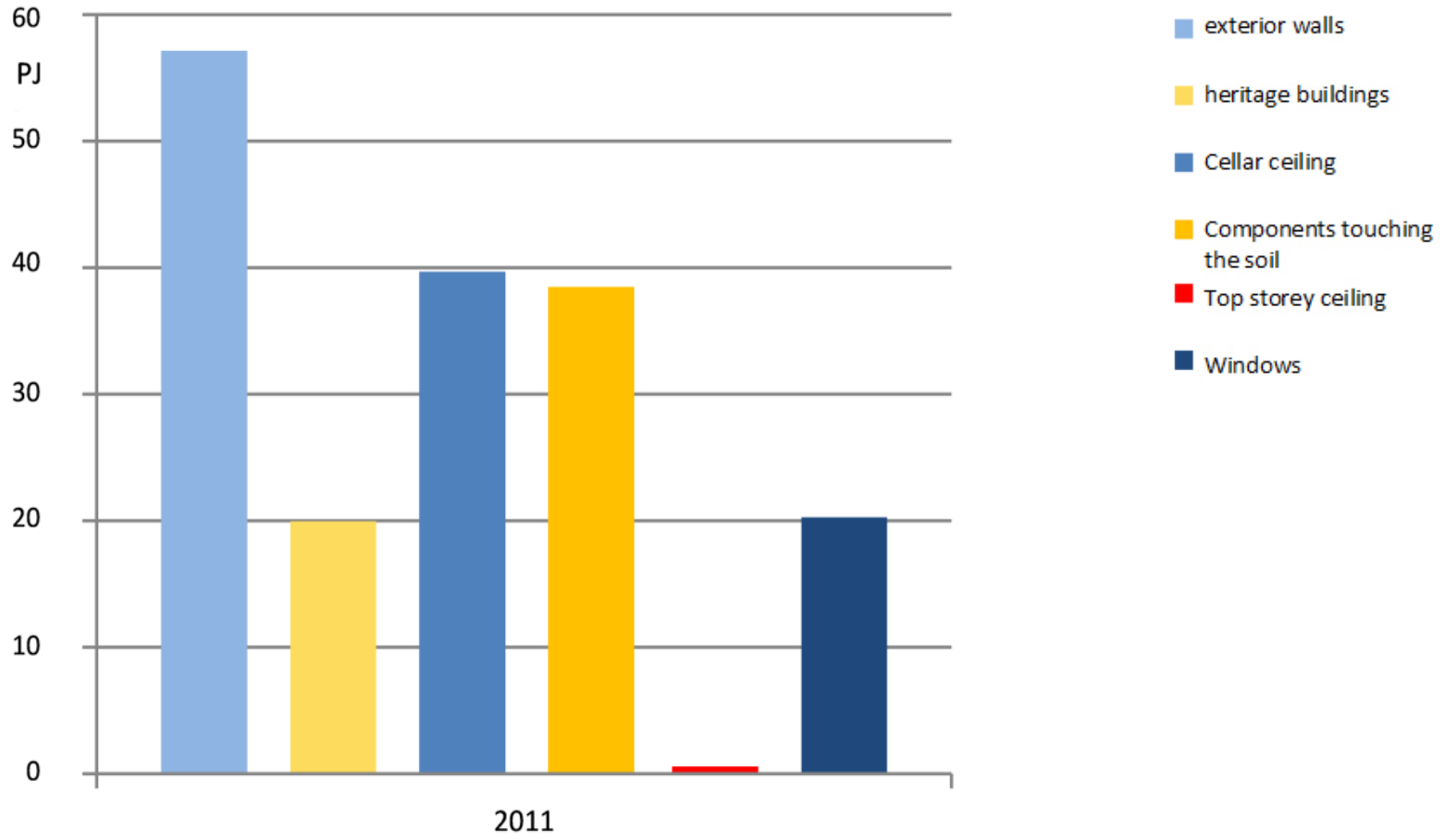
  $\Delta U\downarrow Restriction = U\downarrow Restricton - U\downarrow target$

  difference between achievable and targeted U-factor
- A area of the restricted component

  e.g. from tyoplogies
- $\Delta\theta$ temperature difference

  reference from DIN standard

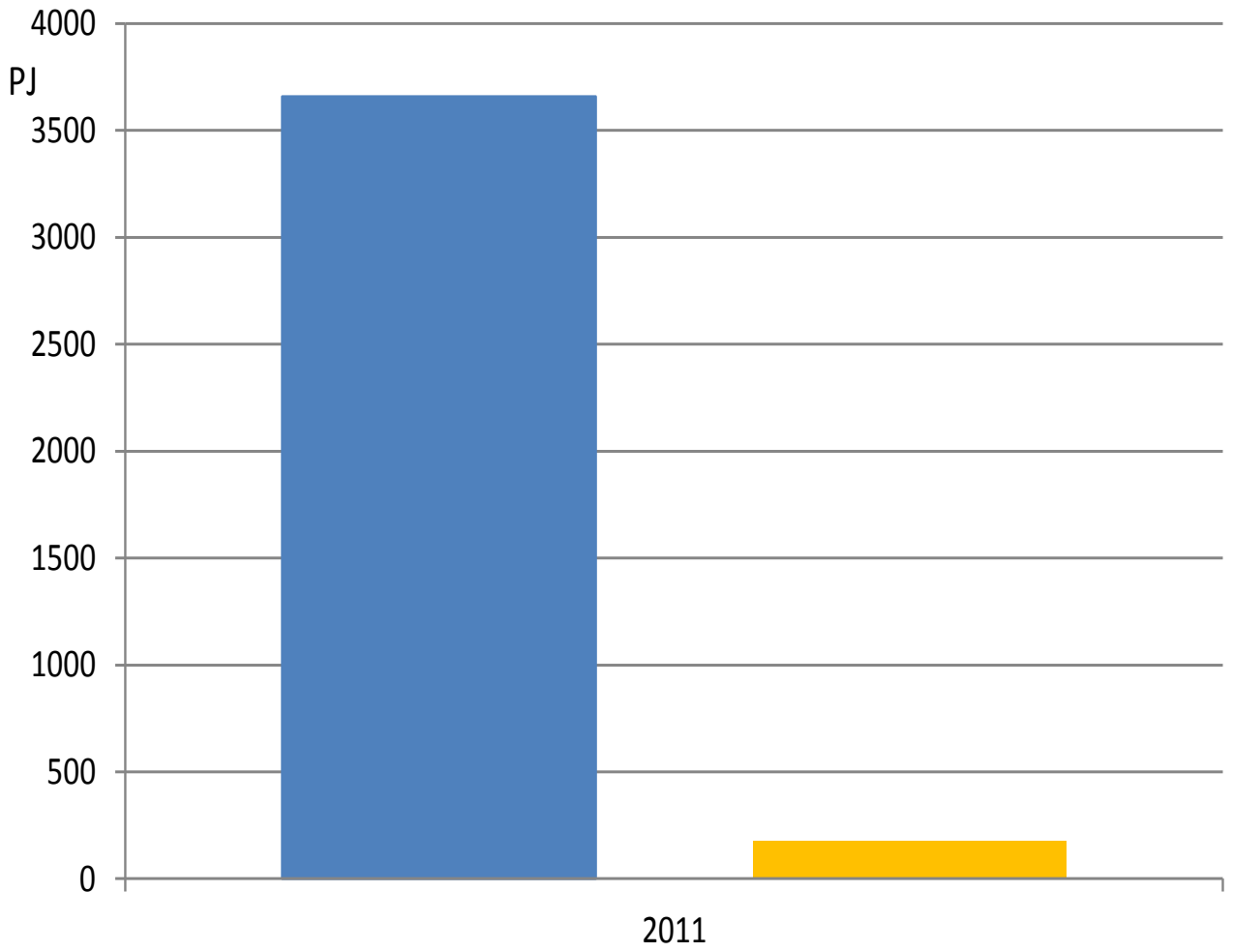
Heat Loss caused by Restrictions on Insulation



Heat Loss caused by Restrictions on Insulation

- total heat demand
- heat demand from restrictions

~ 5 %



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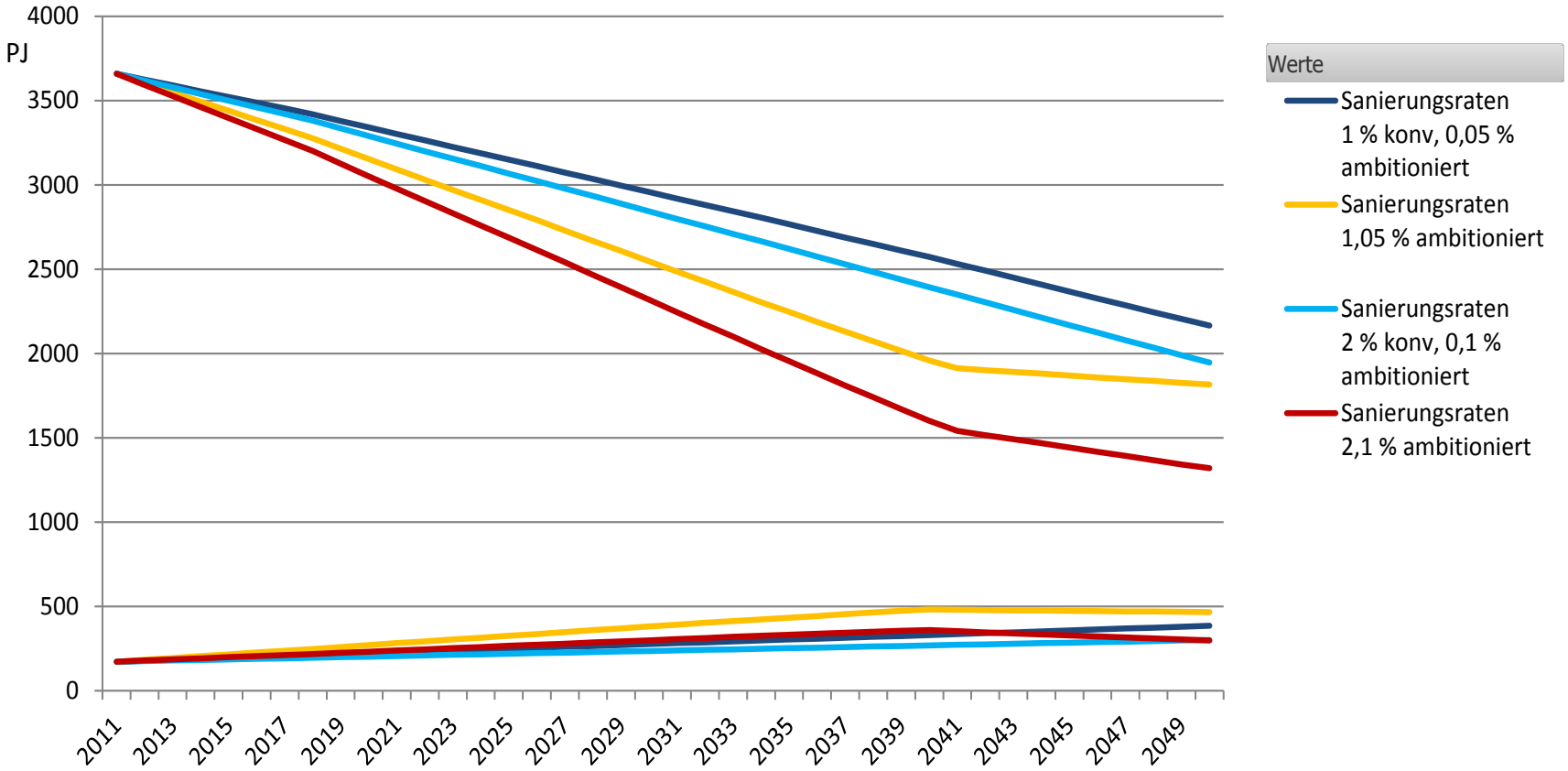

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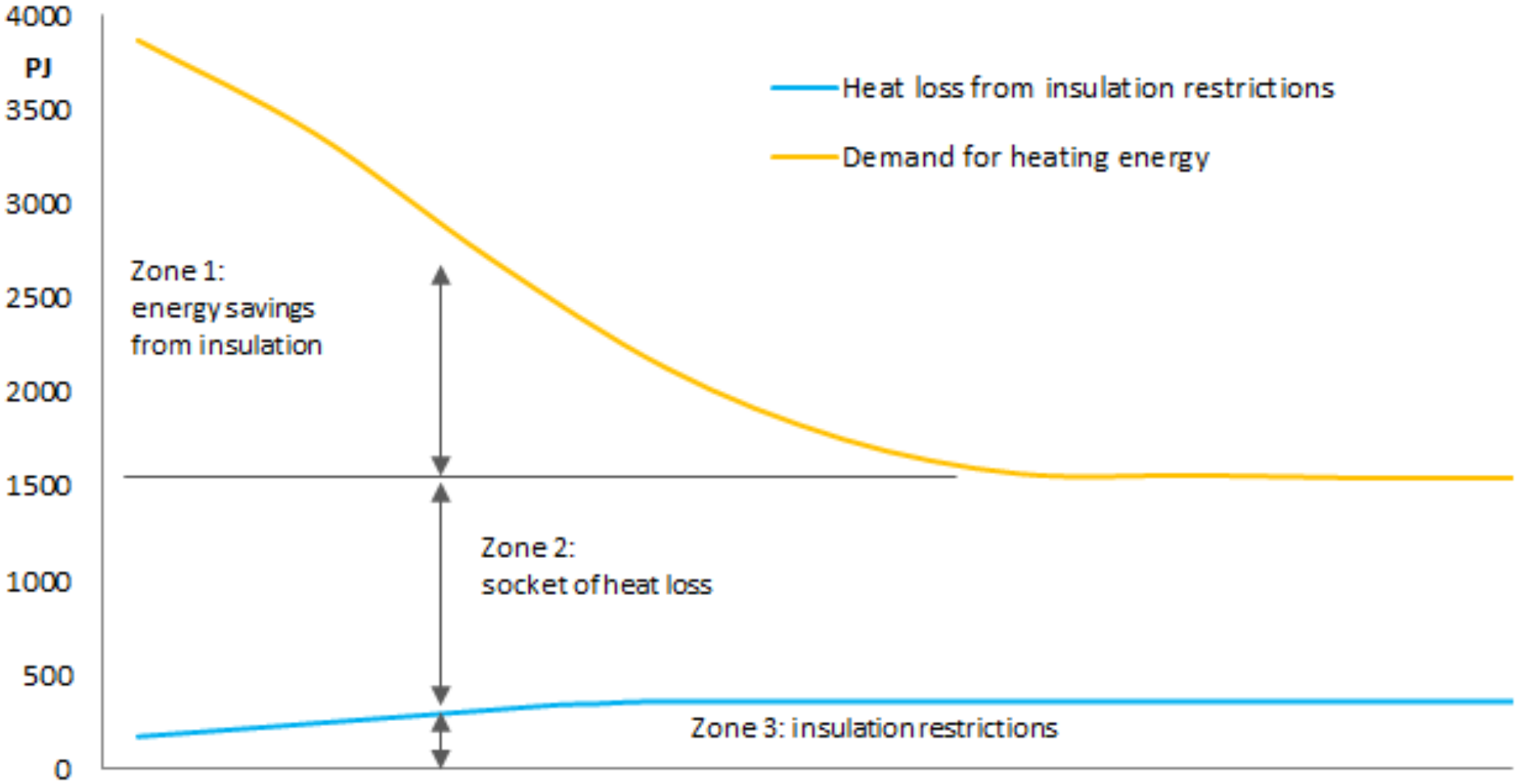

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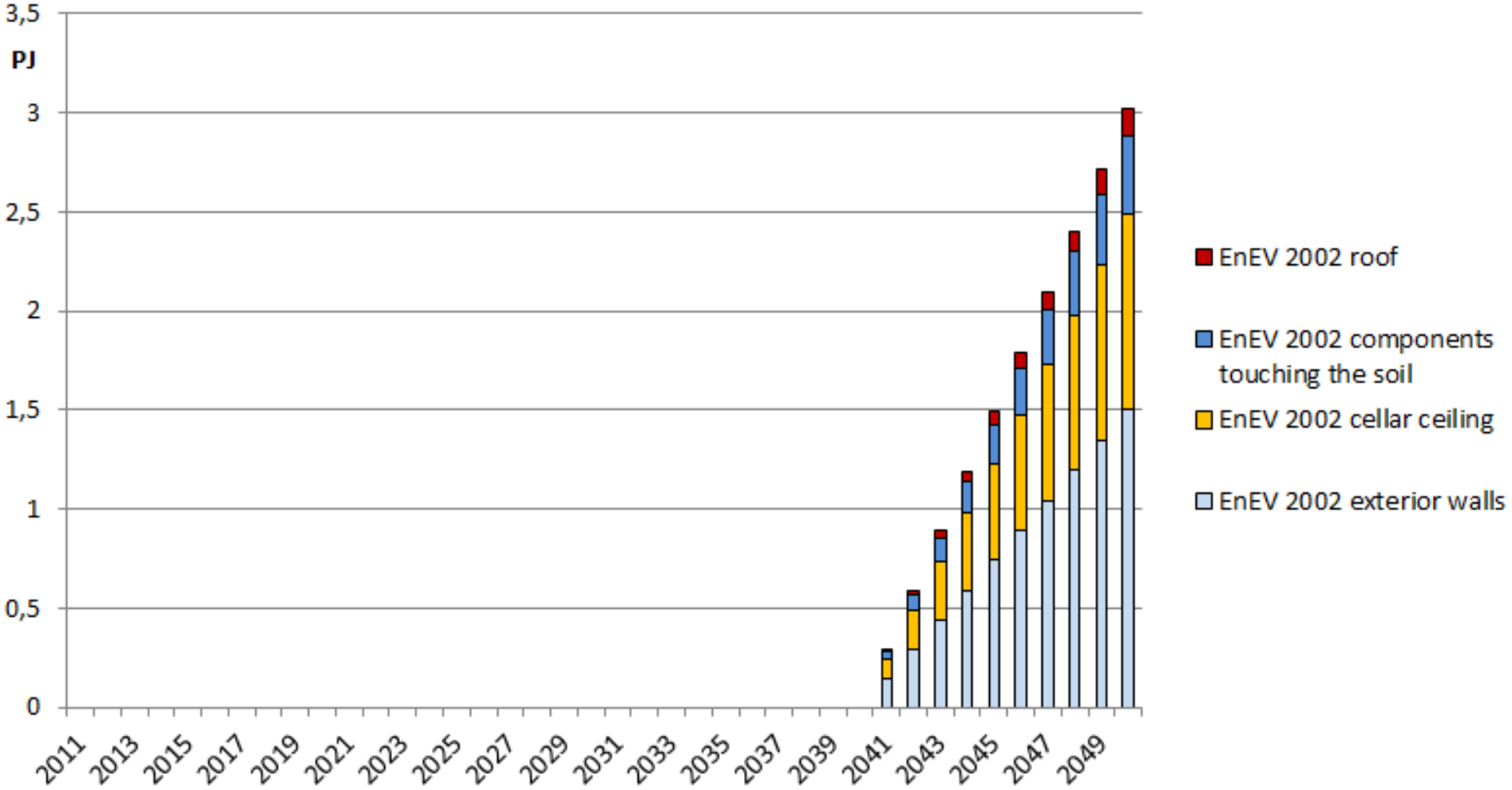

Summary and Outlook

- Restrictions on insulation exist in various forms, they cause about 5 % of the present heat loss.
- As the restrictions concern energy refurbishments, their percentage rises in time with the on-going process of renovation. In 2050 they will make up up to 25 % of the remainung heat loss.
- Restrictions need to be compensated in other components. Higher demands are required. Low-standard refurbishments will leed to economical restrictions in the future (Lock-In-Effekt).
- Many behaviour-related restrictions result from the owners uncertainty. Information, funding, and regulations are needed.

Thank you for your Attention

Peter Mellwig
ifeu - Institut für Energie- und
Umweltforschung Heidelberg GmbH
Raumerstraße 26
D-10437 Berlin

Fon: +49 (0) 30 / 4000-3584
Fax: +49 (0) 6221 / 47 67 -19
E-Mail: peter.mellwig@ifeu.de