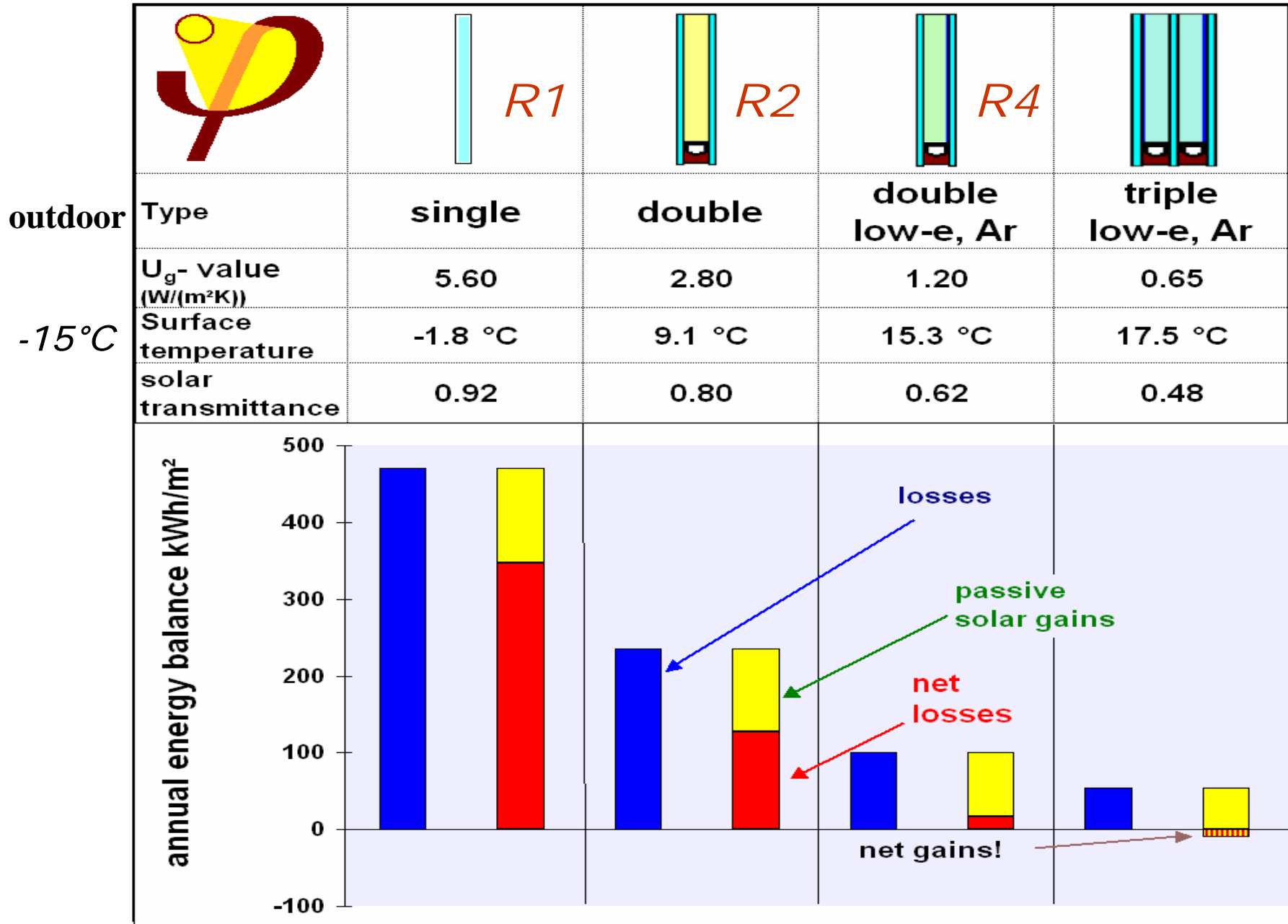


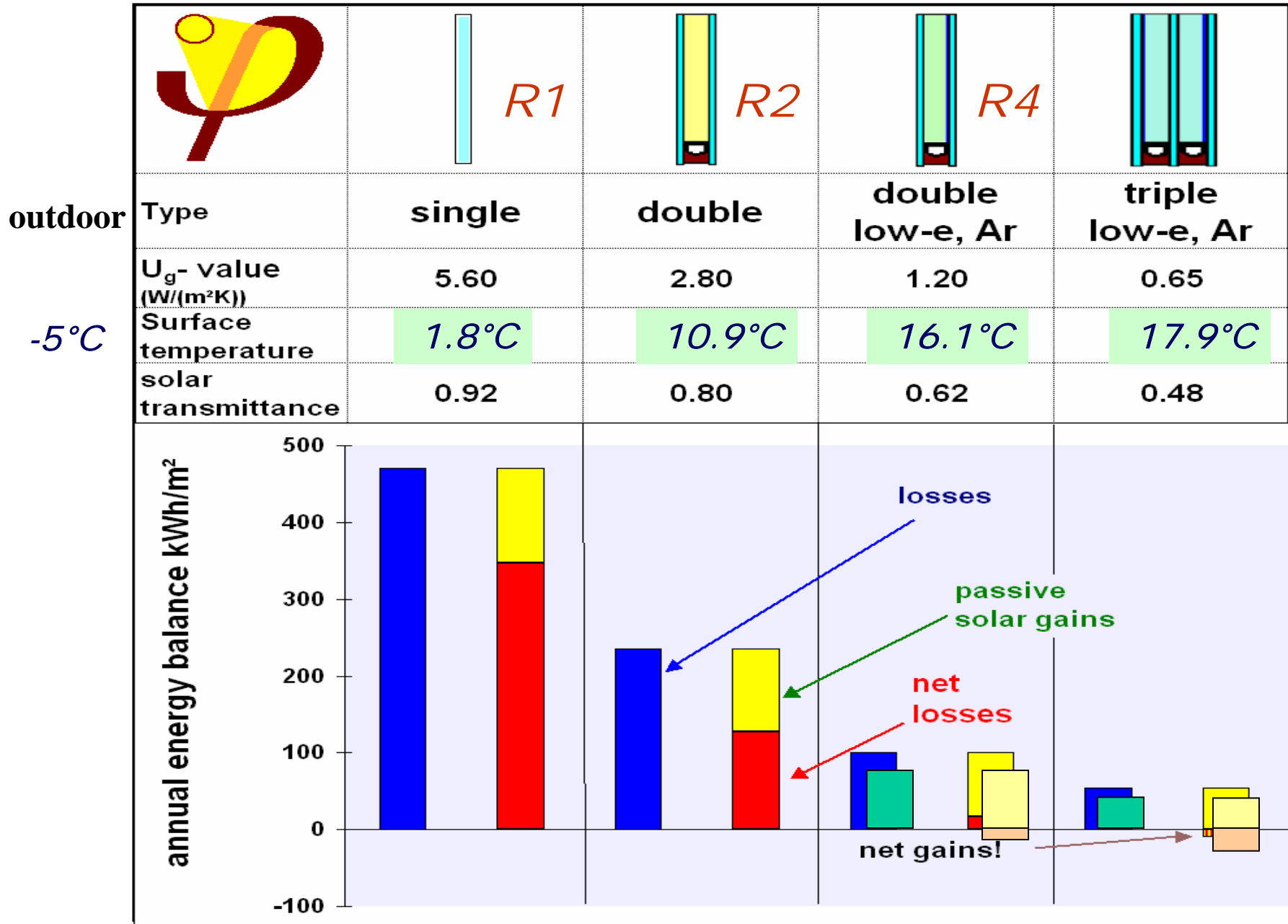
Superwindows / Central Europe

R8



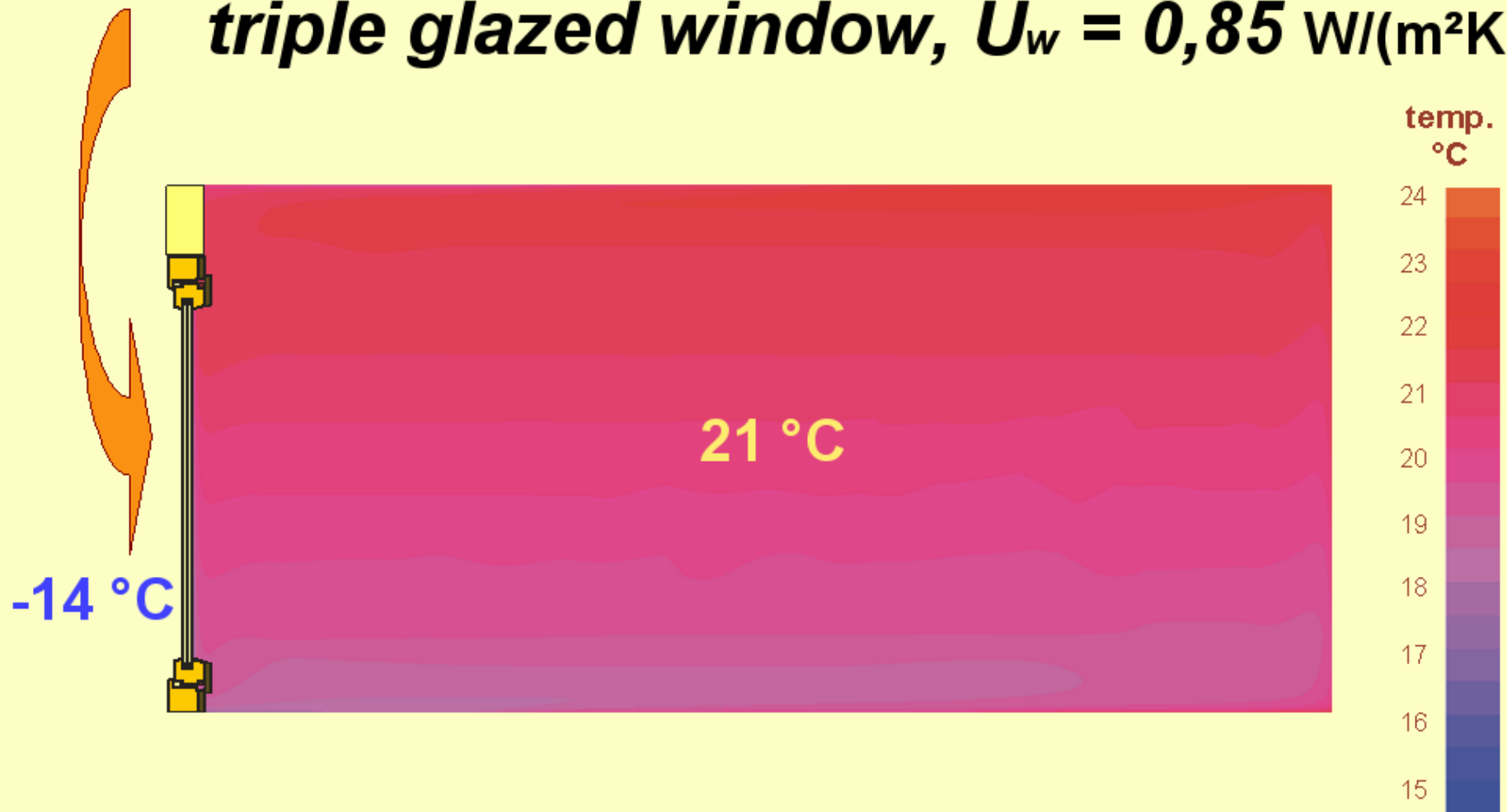
Superwindows / London

R8

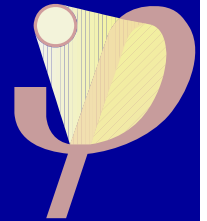


temperature stratification

triple glazed window, $U_w = 0,85 \text{ W/(m}^2\text{K)}$



Window IR-photographie



Lintel: well insulated

> 18°C

No added insulation at the bottom

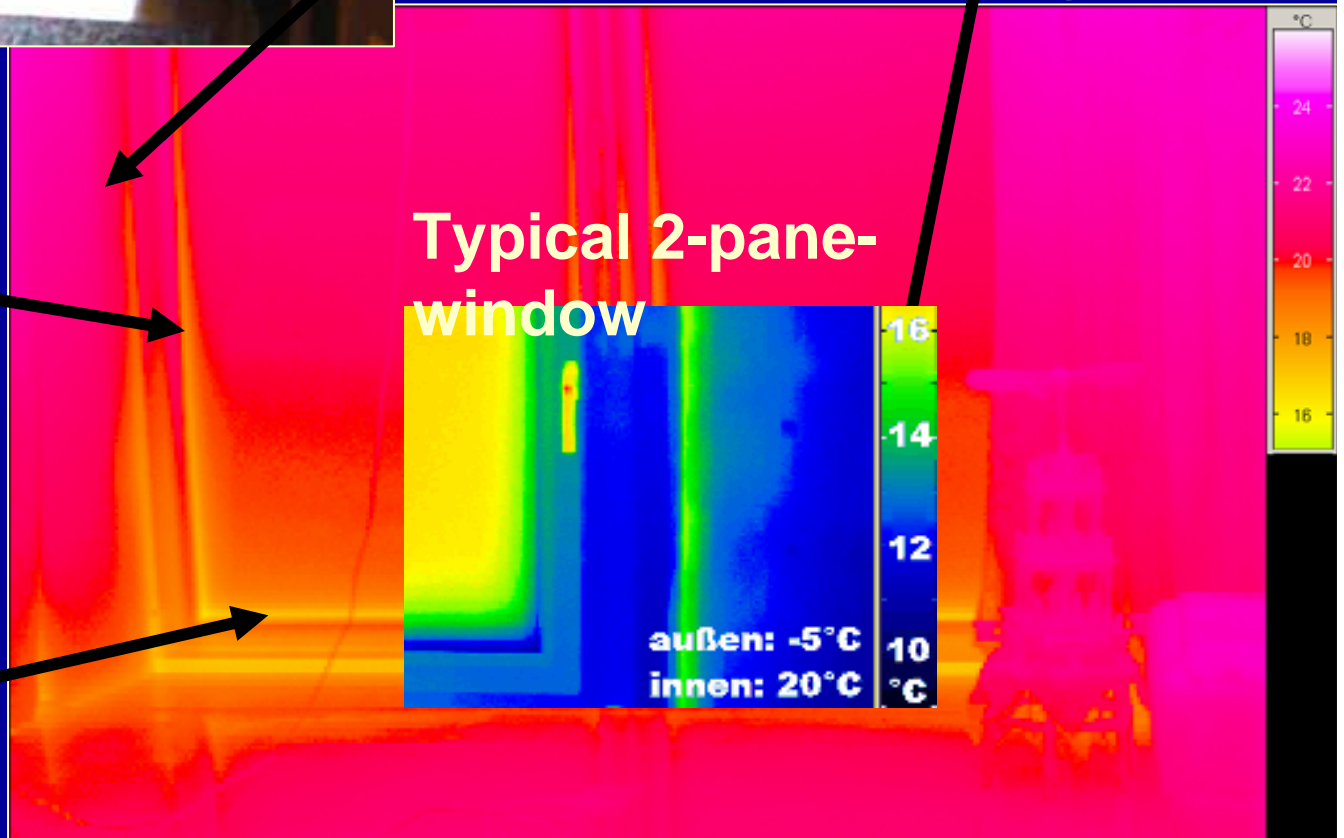
> 17°C

Spacer:

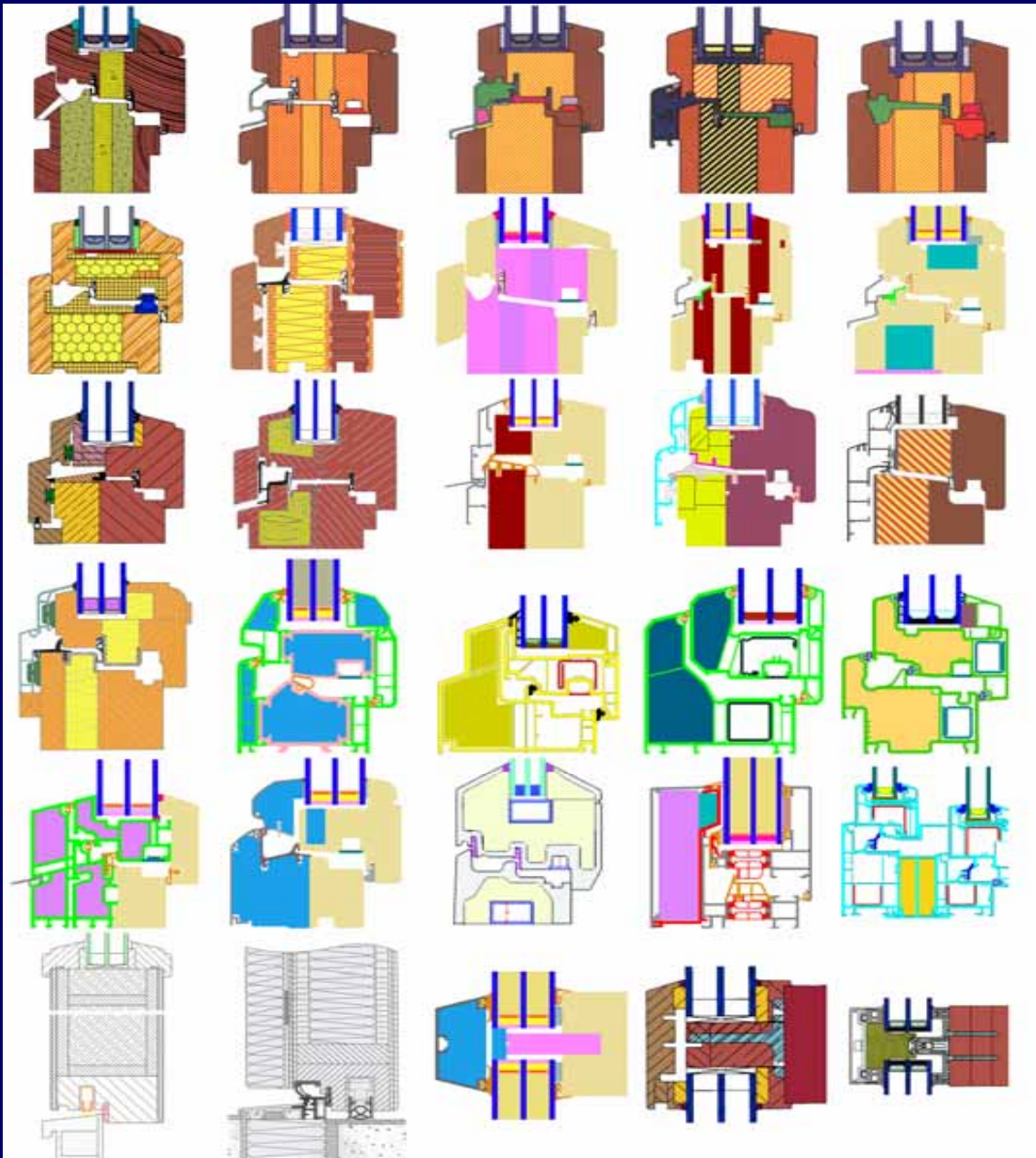
> 16,5°C

+ convective transfer

> 16°C



Superinsulated Windows: More than glazing



Germany:

U_w not higher than

0.8 W/(m²K)

(R-7)

Innovative Products:

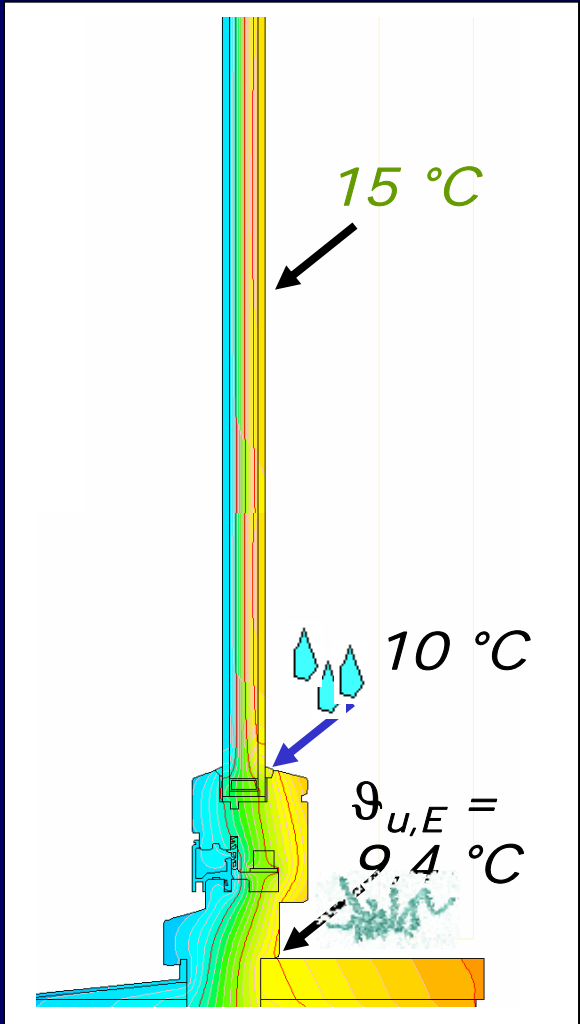
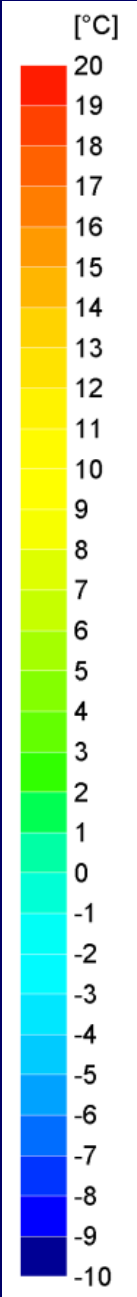
- CO₂ mitigation
- improved comfort
- job creation in small and medium enterprises



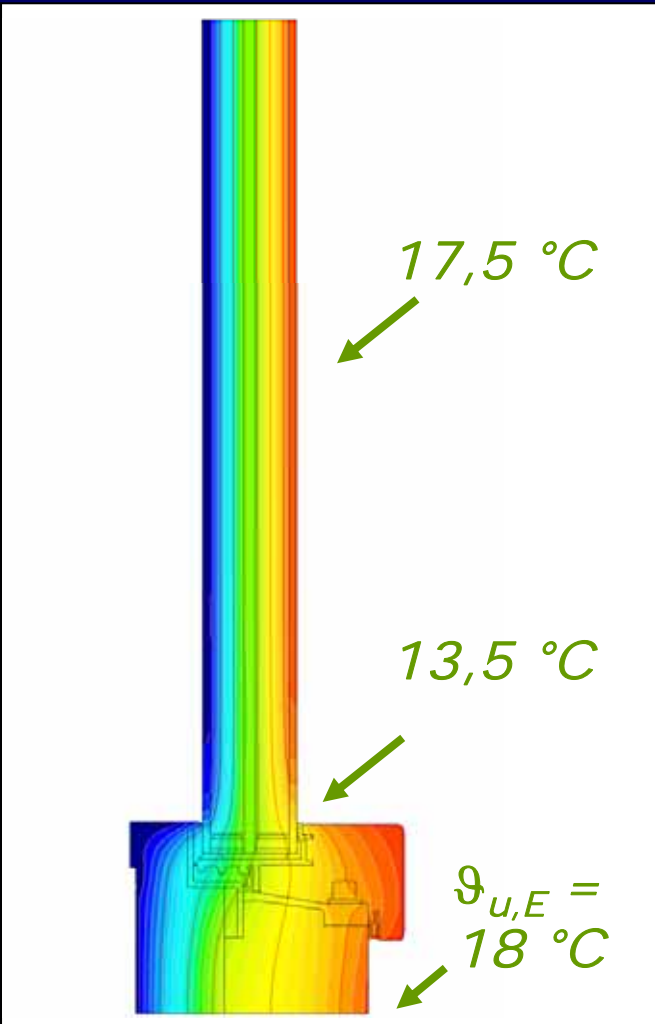
*contemporary
window*



*Window of
the future*



contemporary window

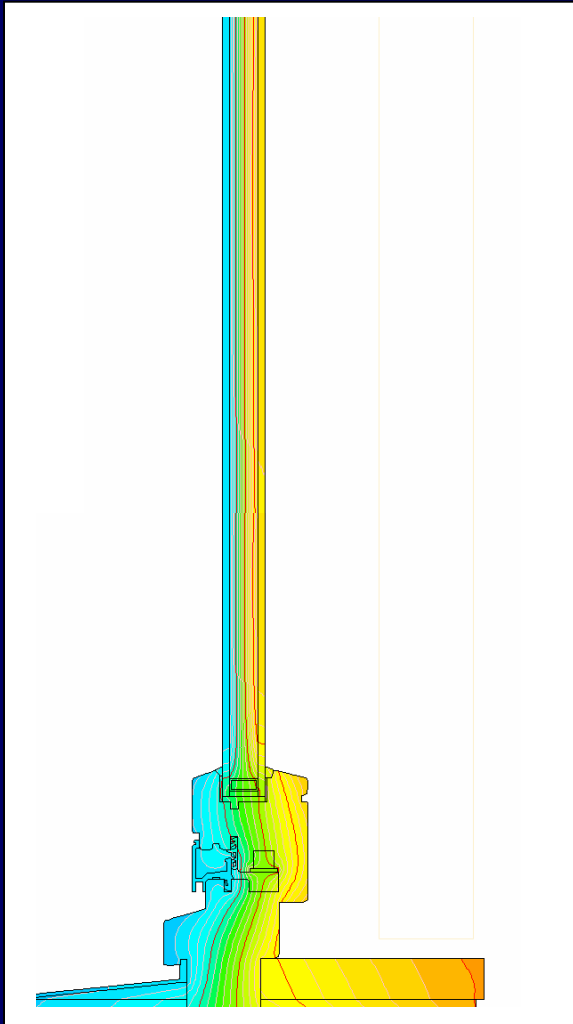


Window of the future

U_g 1,2

Ψ_g 0,06

U_f 1,6



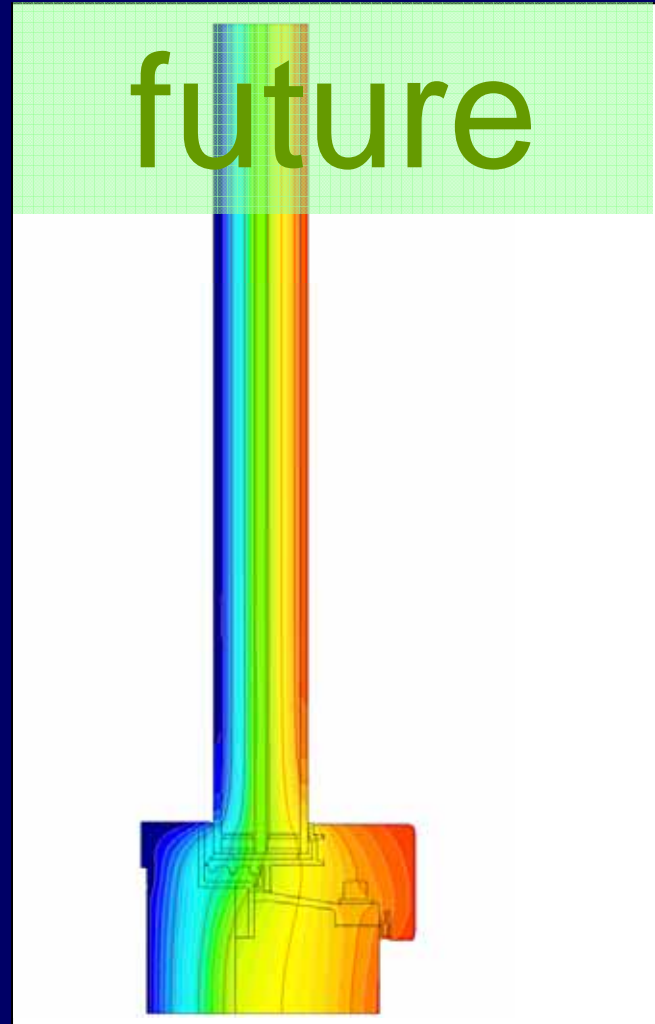
$$U_w = 1,46 \text{ W/m}^2\text{K}$$

future

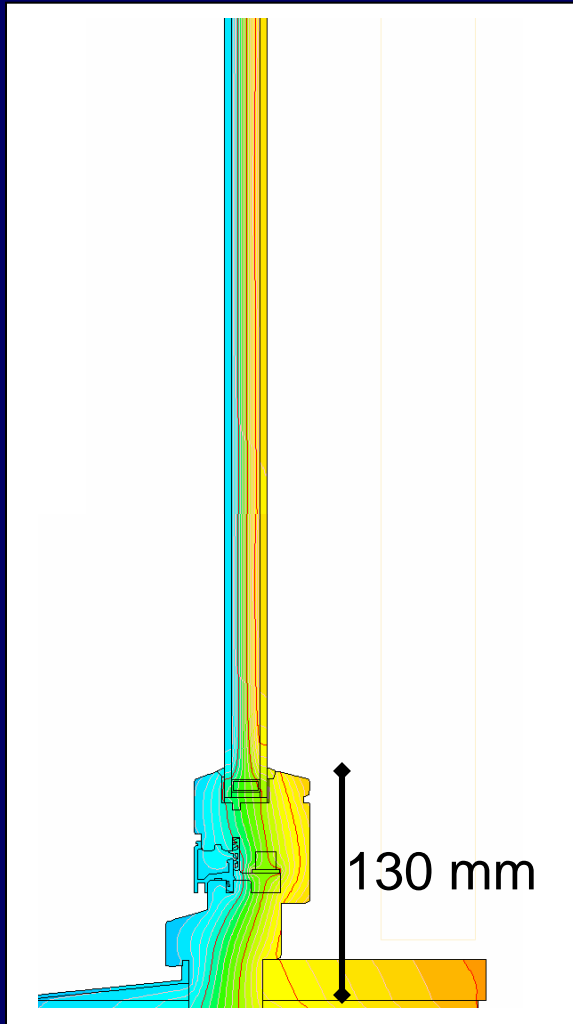
U_g 0,58

Ψ_g 0,03

U_f 0,64



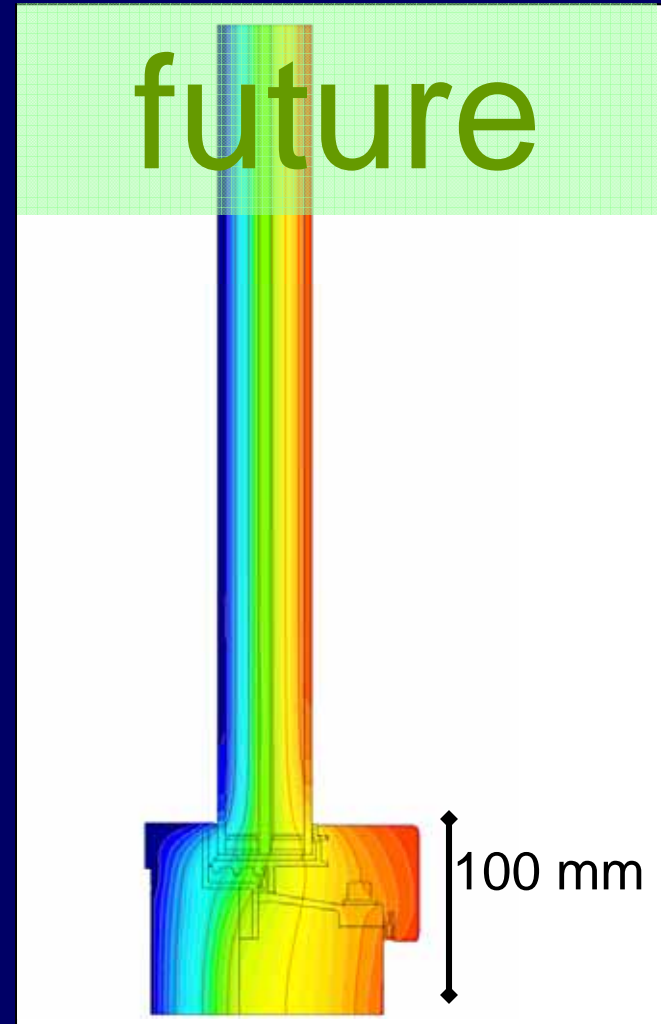
$$U_w = 0,67 \text{ W/m}^2\text{K}$$



$$F_f = 68\%$$

$$U_w = 1,46 \text{ W/m}^2\text{K}$$

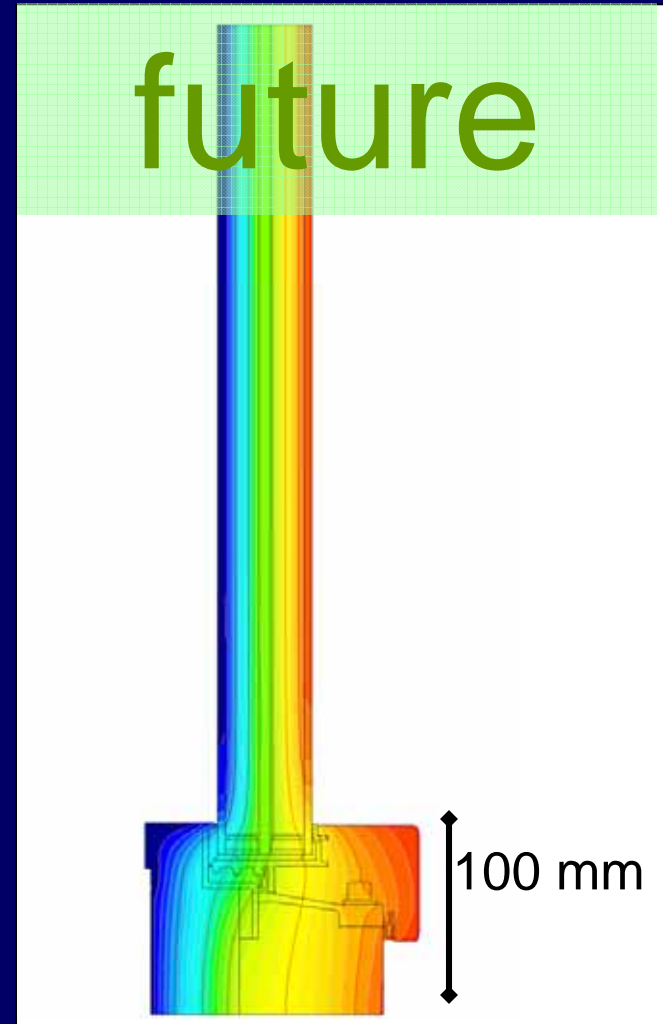
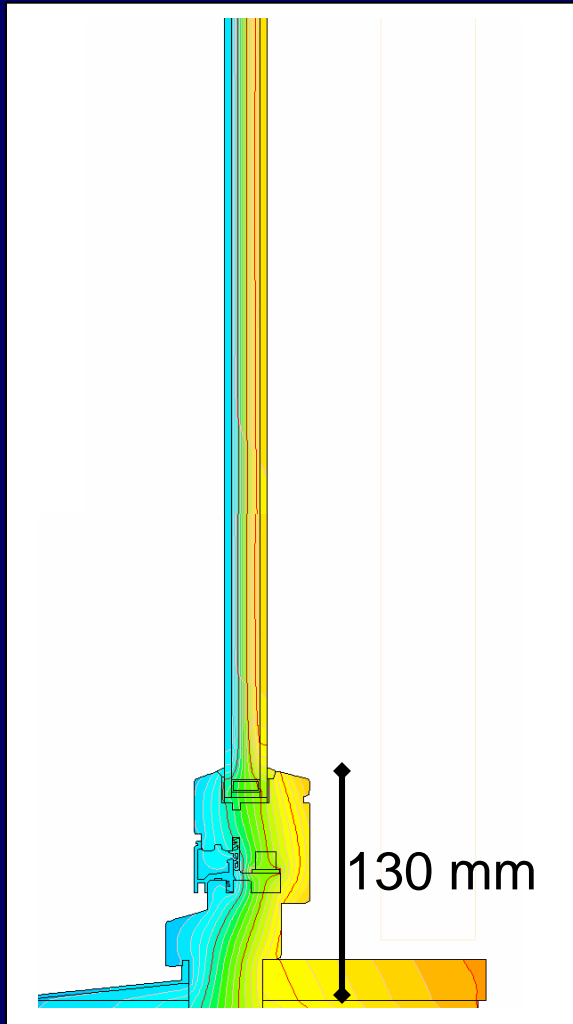
$$U_{eq} = 0,4 \text{ W/m}^2\text{K}$$



$$F_f = 75\%$$

$$U_w = 0,67 \text{ W/m}^2\text{K}$$

$$U_{eq} = -0,2 \text{ W/m}^2\text{K}$$

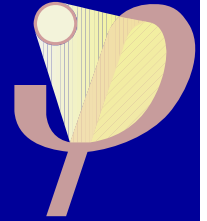


Net heat gain window

$$U_{eq} = 0,4 \text{ W/m}^2\text{K}$$

$$U_{eq} = -0,2 \text{ W/m}^2\text{K}$$

Measures



Windows:

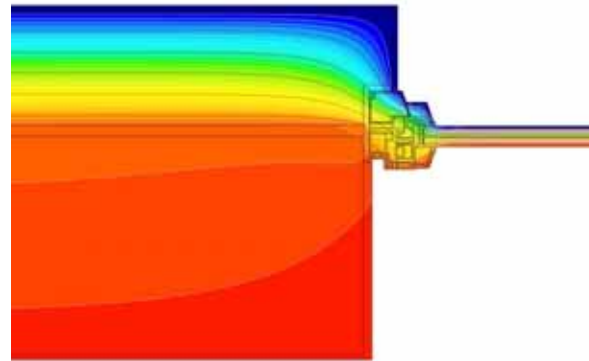
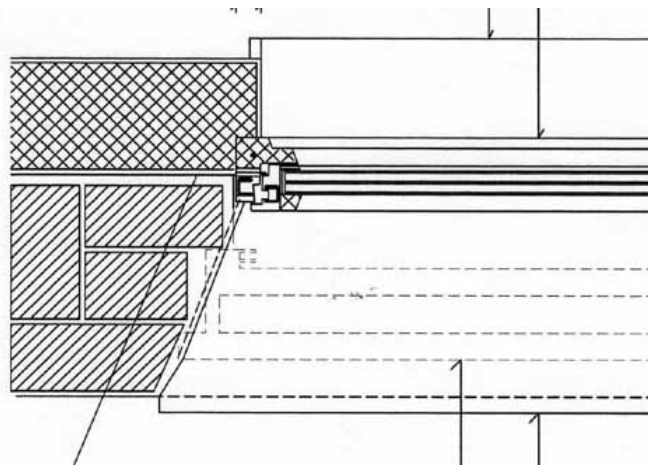
$$U_w = 0,8 \text{ W}/(\text{m}^2\text{K})$$



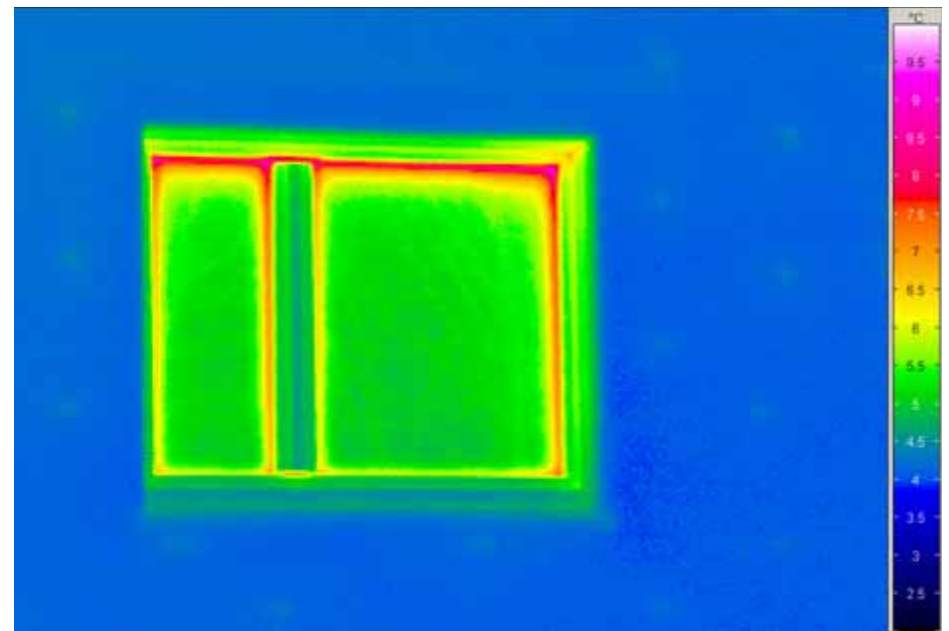
**Insulation Ext. Wall
(external 20 cm)**



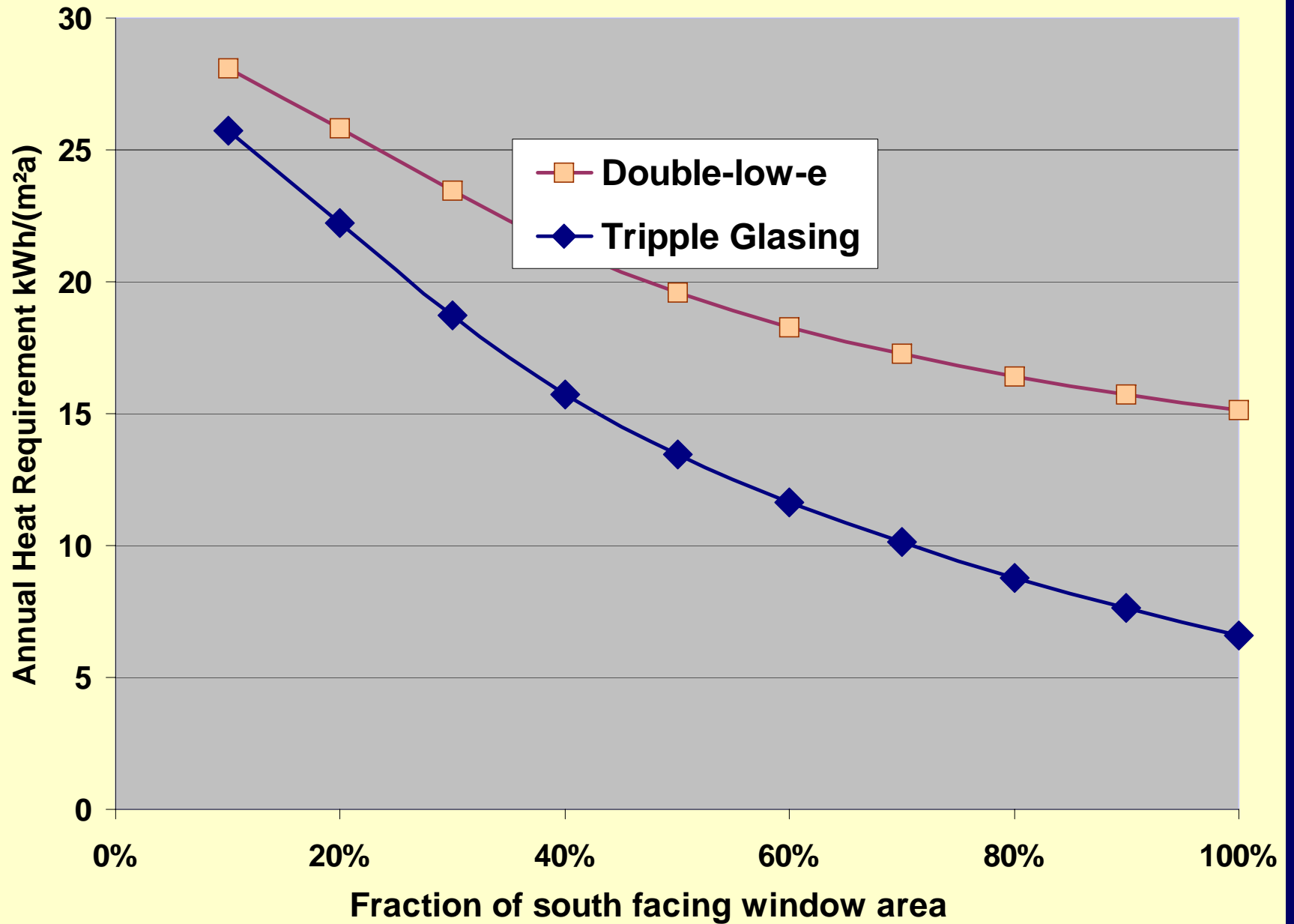
**Airtightness and
insulation roof**



Window installation (almost) without thermal bridging: $\Psi_a = 0.017 \text{ W/(mK)}$



Heat Requirement London Passive House



Window exchange – When?

*... If the old is gone or done!
... Or if there is a retrofit anyhow,
... Or if I get one for free.*

consequence:

Not more often than every 30 years.

If you do it, do it right!



Best thermal comfort – not only in theory

