Energy savings by intelligent controlled windows in Southern Europe

Outline

- Background
- What is a Intelligent Window
- Theory – Simulation study
- Control strategy
- Results
- Conclusion

Background

40% of the total energy consumption used in buildings.

20% of that is used for cooling

With Intelligent Windows, the potential savings for heating and cooling would be even higher

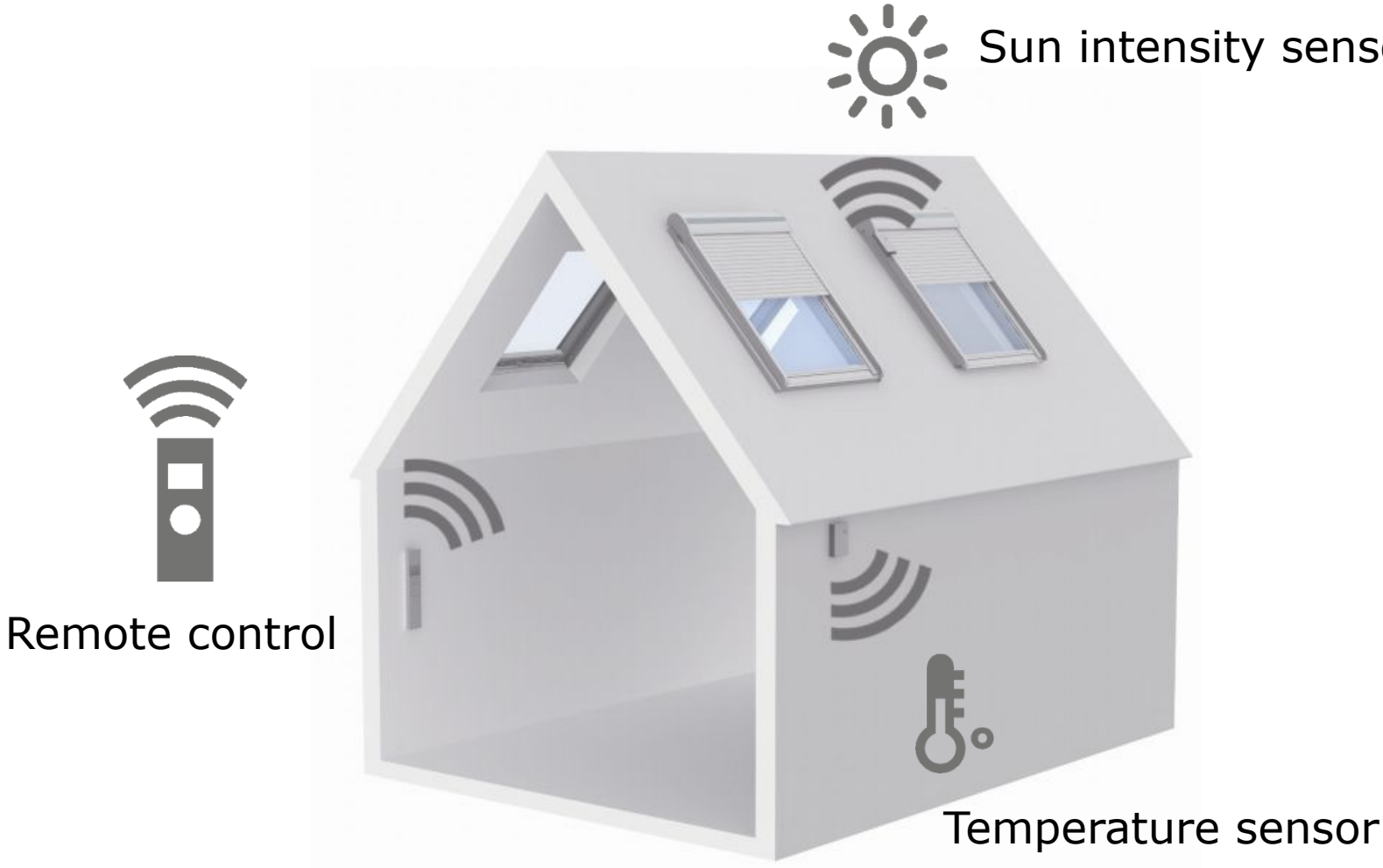


Several studies show, that the use of solar controlled glass have a potential of saving up to 85 million tonnes of CO_2 annually by 2020

What is an intelligent window

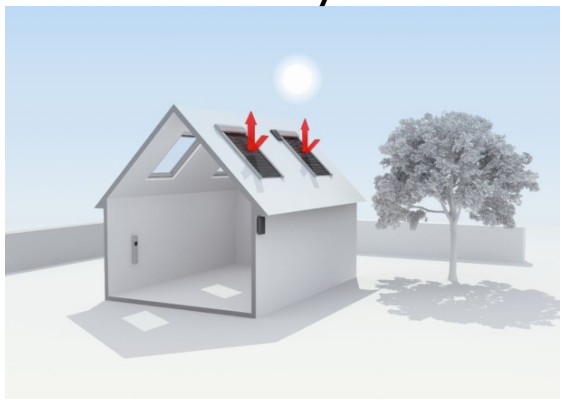
- Automatic adjustment of optical and thermal characteristics and automatic natural ventilation through a window.
- Manual solar shading devices are only used as intended in 50% of the time.
- Intelligent systems work close to 100% as intended.

What is an intelligent window?



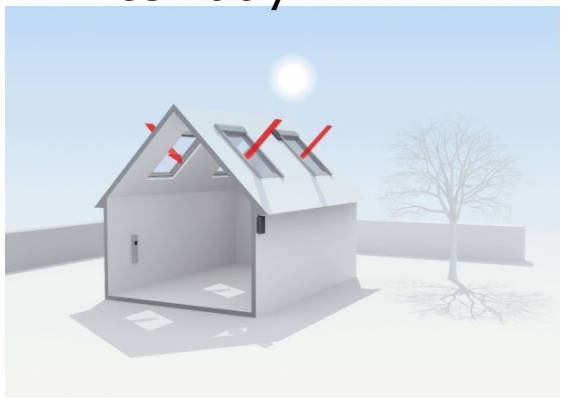
What is an intelligent window?

Summer day



Summer night

Winter day

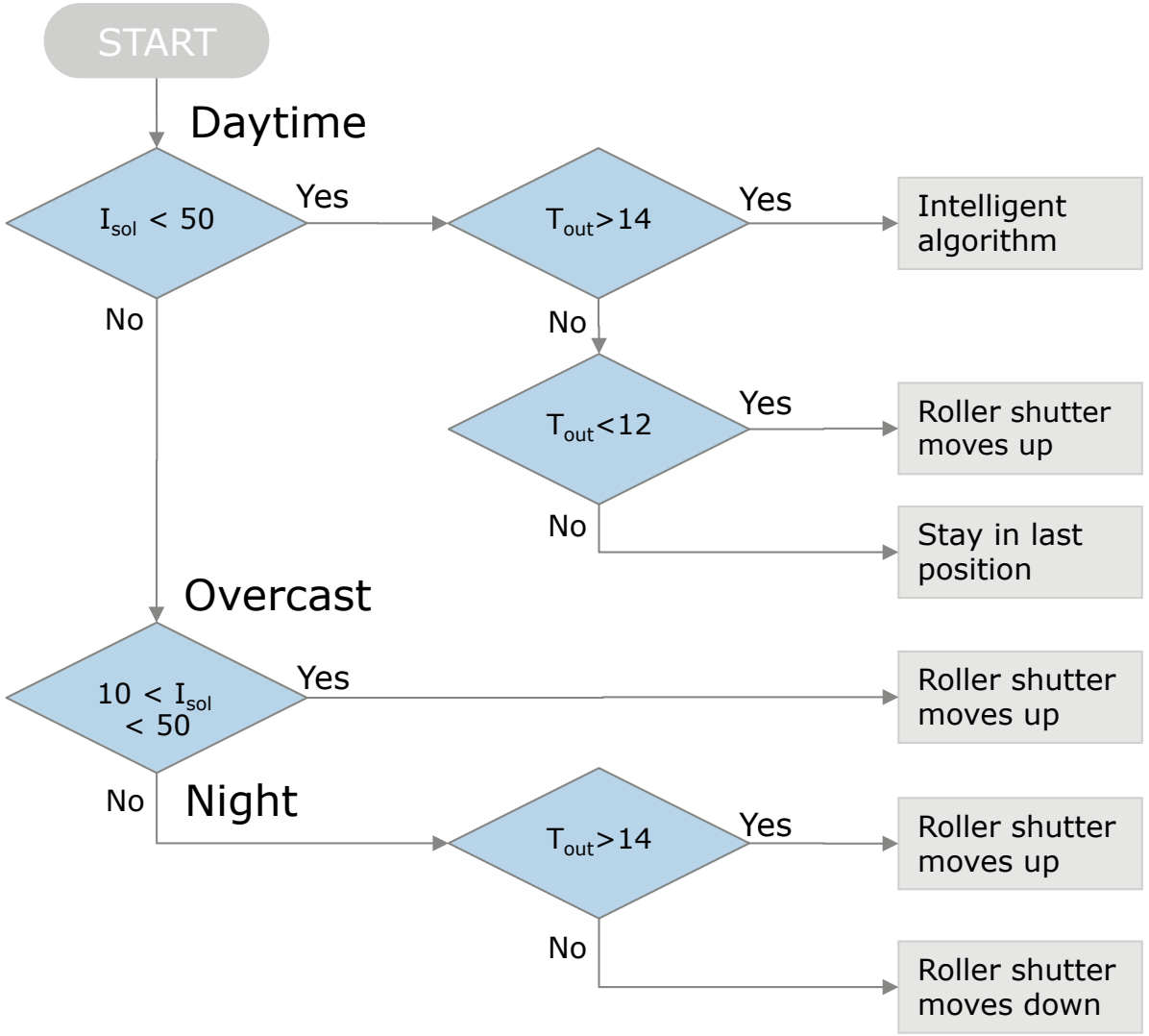


Winter night

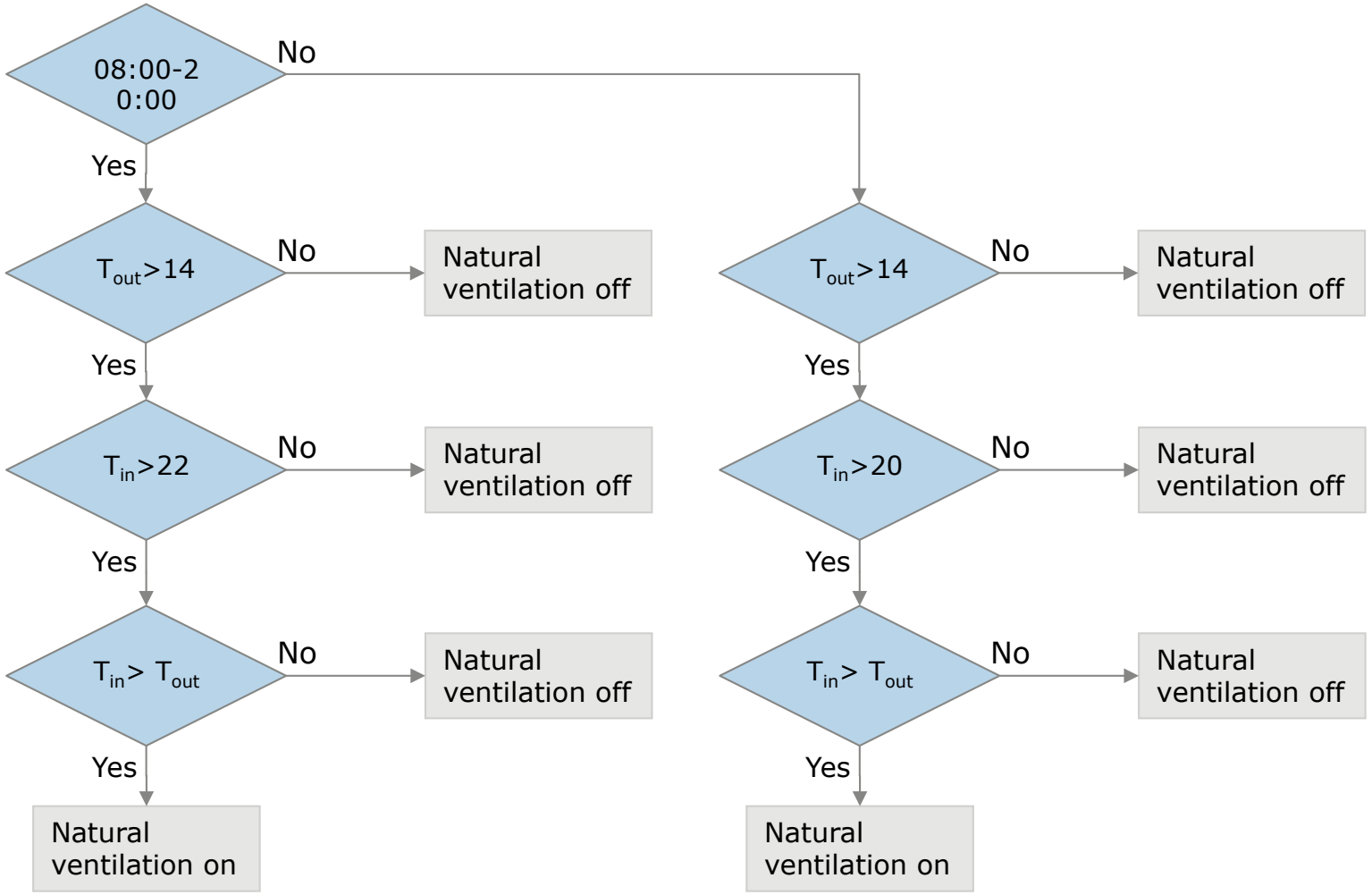
Simulations done by VELUX and CSTB

	Existing buildings	New residential building (room level)		Low energy residential buildings
Location	Spain	Germany	France	Italy
Climate	Madrid Malaga	Munich Hamburg Stuttgart	Paris Marseilles Lyon	Rome Palermo
Floor area [m²]	120	20	20	182
Window to floor ratio	15%	10%	10%	15%
U-façade [W/m²K]	0.66	0.36	0.40	0.36
U-floor [W/m²K]	0.49	n/a	n/a	0.32
U-roof [W/m²K]	0.30	0.32	0.40	0.32
U-façade windows [W/m²K]	2.0	1.2	1.2	2.0
U-roof windows [W/m²K]	1.7	1.4	1.4	1.8

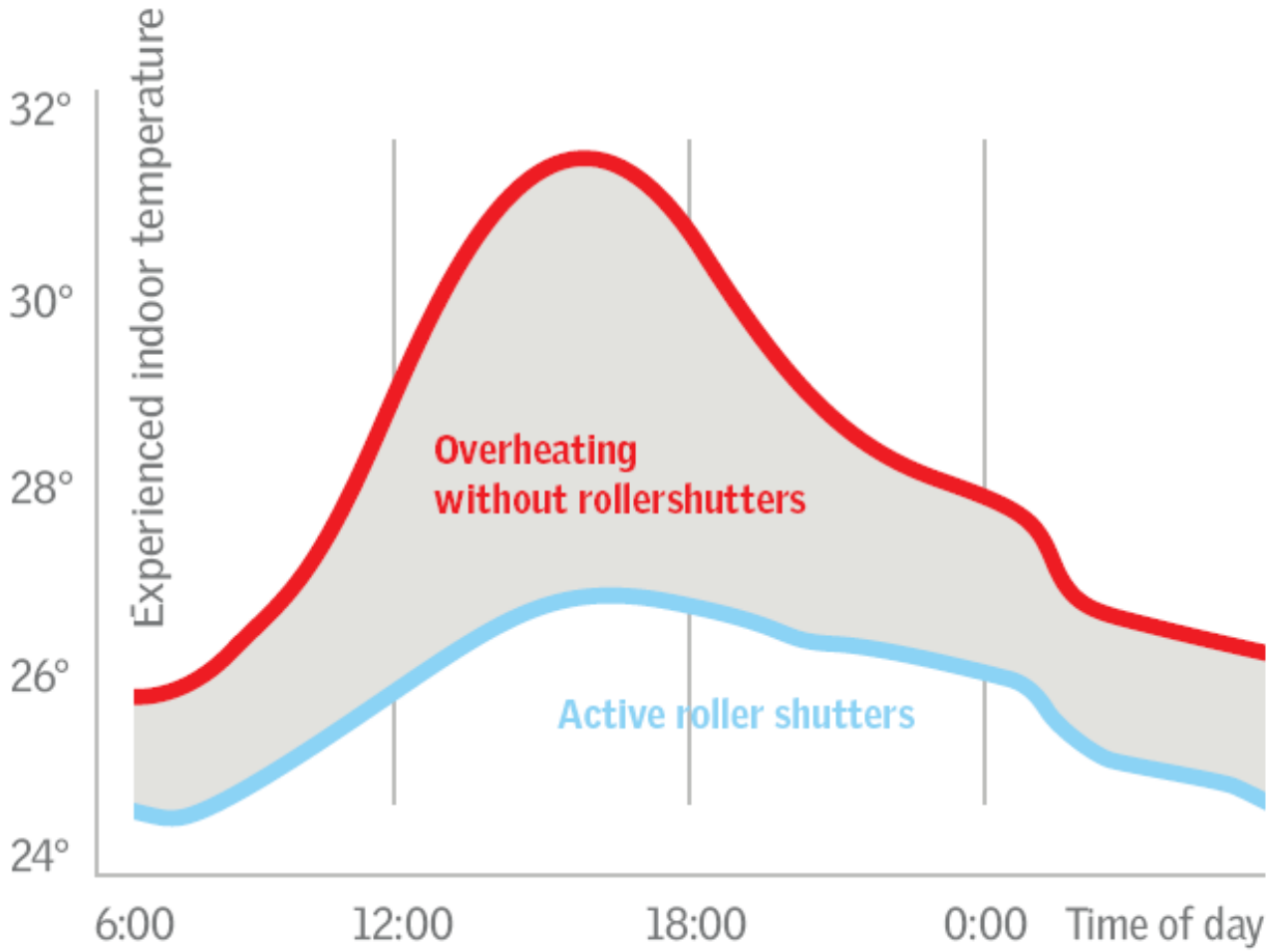
Control strategy – solar shading



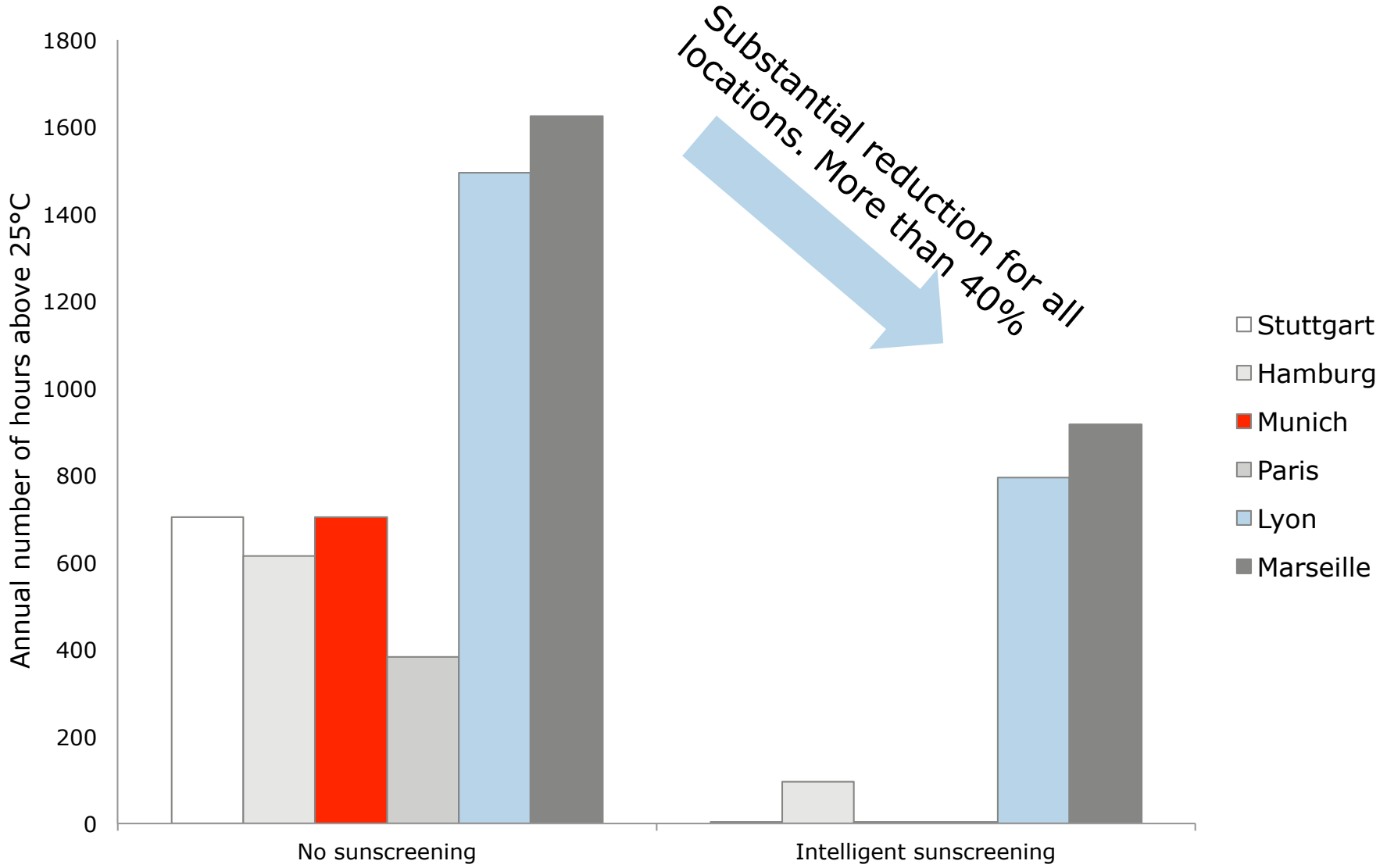
Control Strategy “Natural Ventilation” Summer Comfort



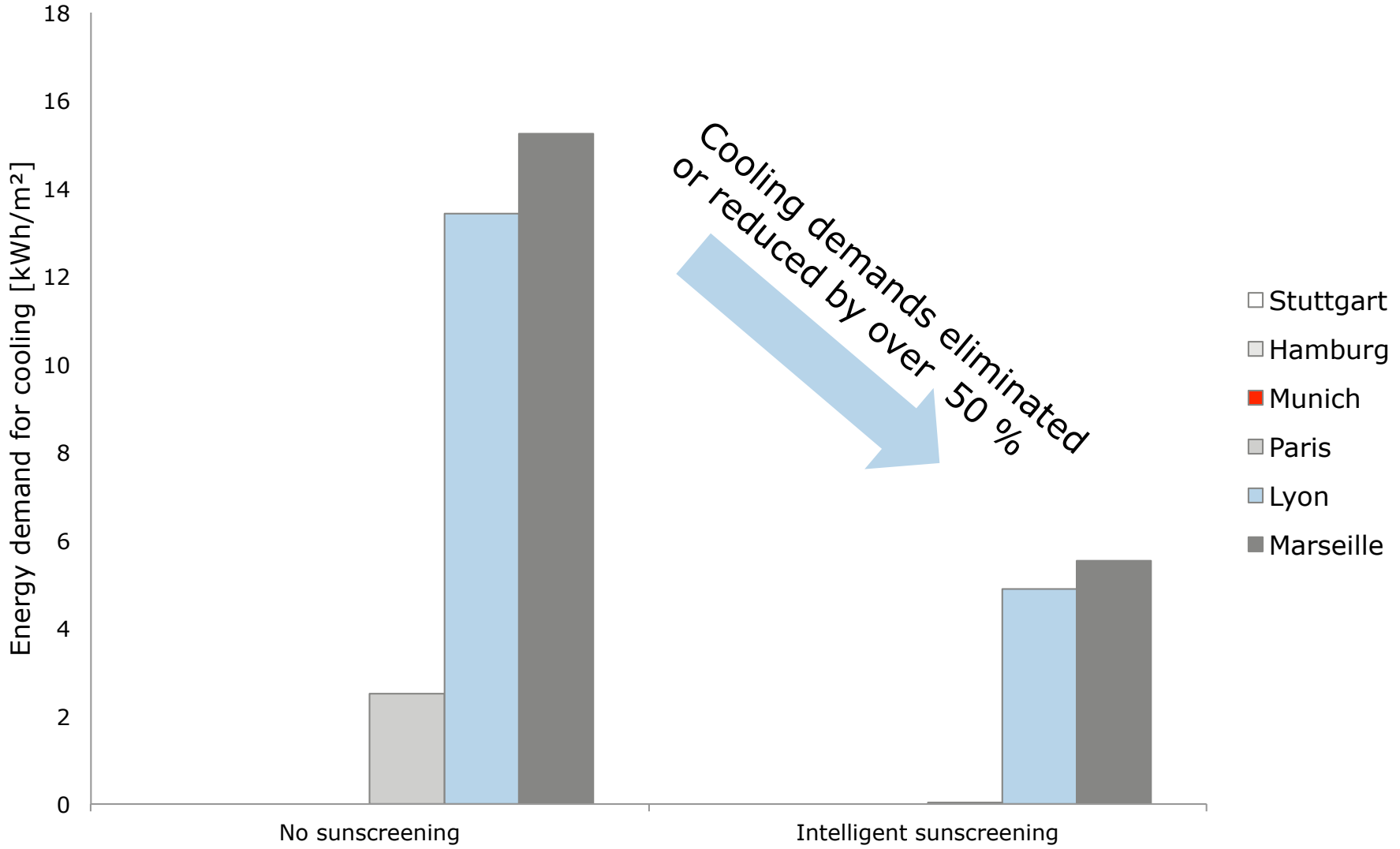
Experienced temperature – ISO 7730



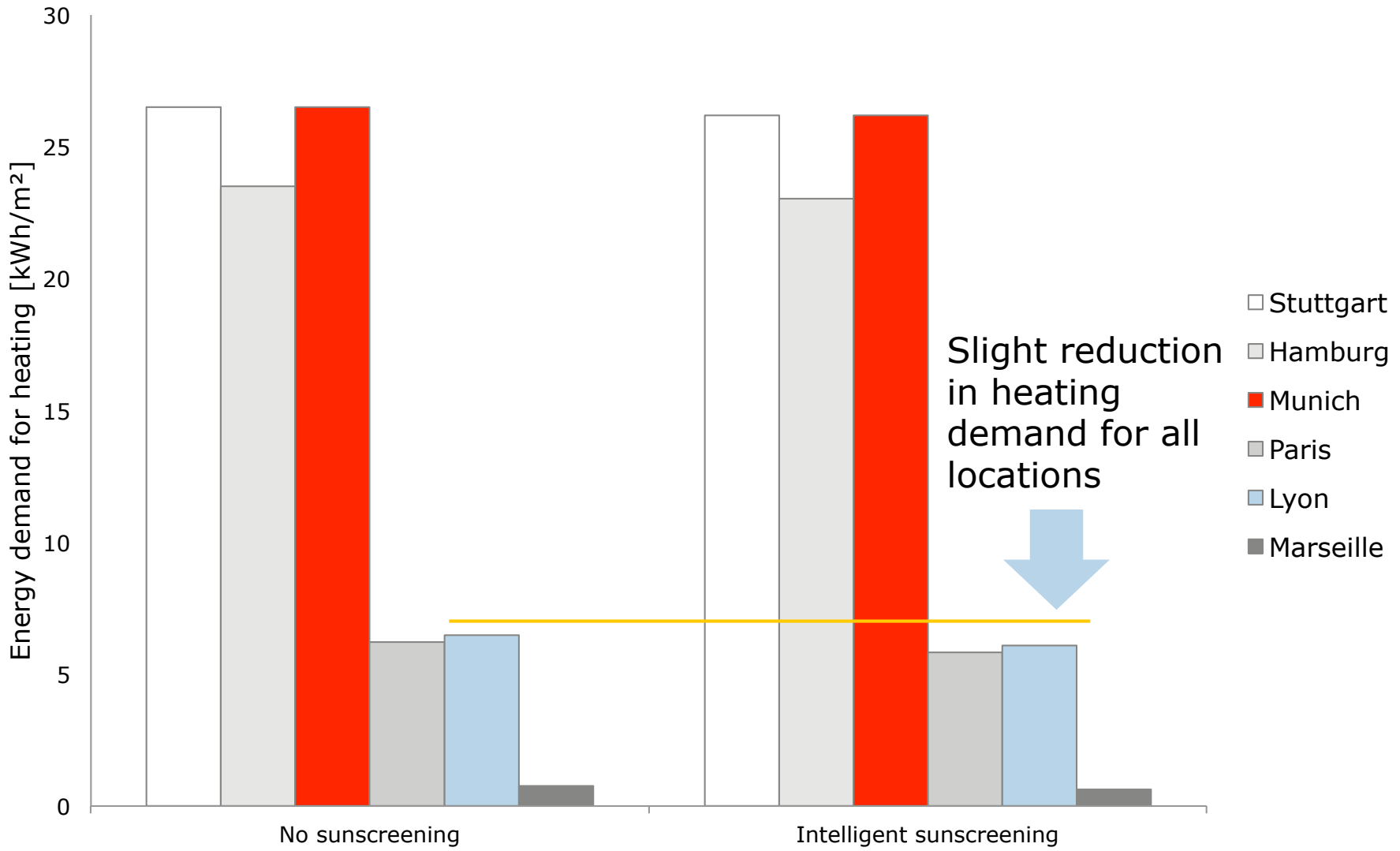
Risk of overheating



Demand for cooling



Demand for heating



Conclusion

- Use of energy for heating and cooling will be reduced significantly by installation of active roof windows with the use of "active" strategies and technologies
- By using an intelligent controller, the system provides a more balanced indoor climate and protects before overheating occurs.
- Automatically minimizes the risk of overheating by over 40%
- Experienced temperature is reduced by up to 7°C during hot summer days.
- Energy demand for cooling is reduced by over 50%
- Manual solar shading devices are only used as intended in 50% of the time

THANK YOU FOR YOUR ATTENTION

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