Impact of the new European standard on building design

Bernard PAULE / Estia, Lausanne

- Daylight provision
- View out
- Exposure to sunlight
- Protection from glare

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- Protection from glare

Reference case-study

Walls reflection

- Ceiling : 0.80
- Walls : 0.60
- Floor : 0.30

Openings

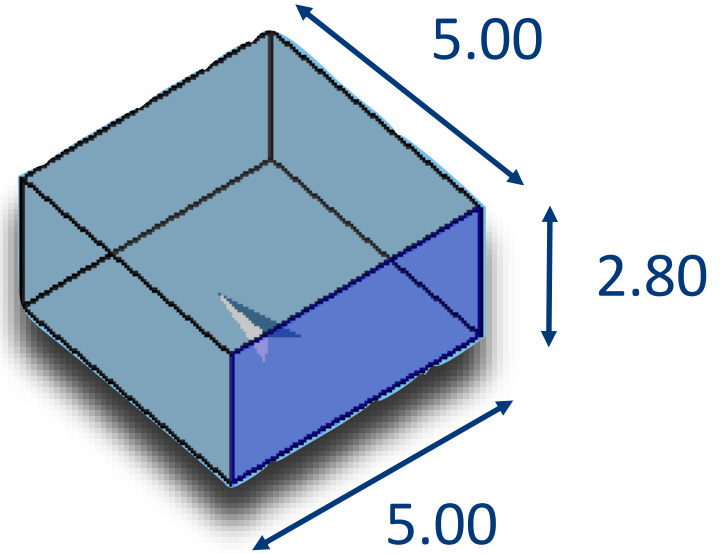
- Tl : 0.80
- g : 0.62
- Frame : 25%

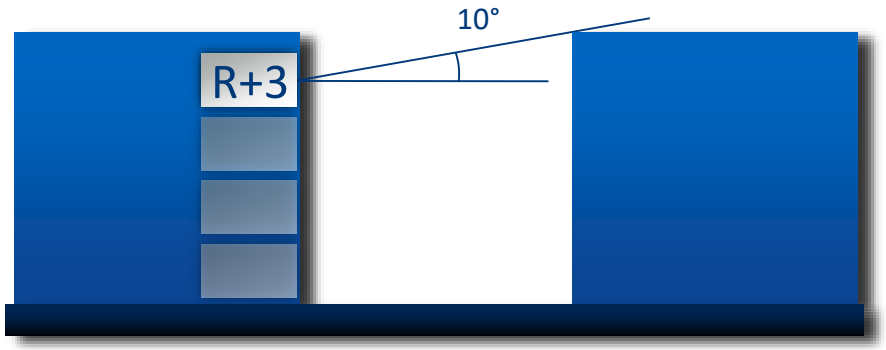
Orientation

- South

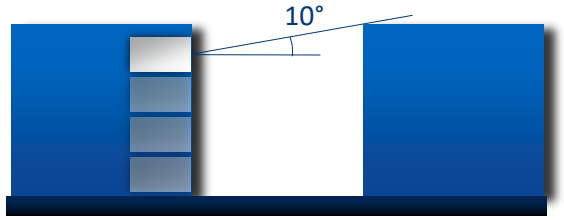
Localization

- Paris



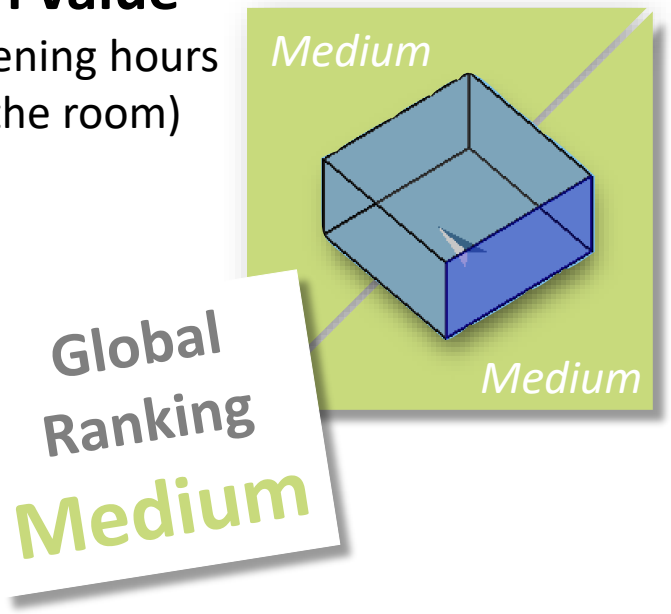


Global ranking - Upper floor (α = 10°)



(Maximum performance)

Ranking on Median value
(50% of opening hours
100% of the room)

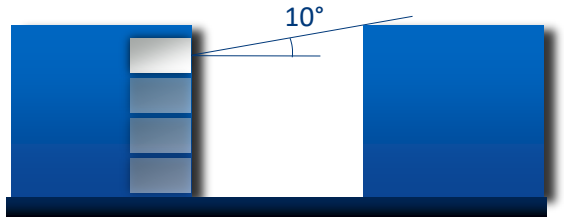


Ranking on Minimum value
(50% of opening hours
95% of the room)

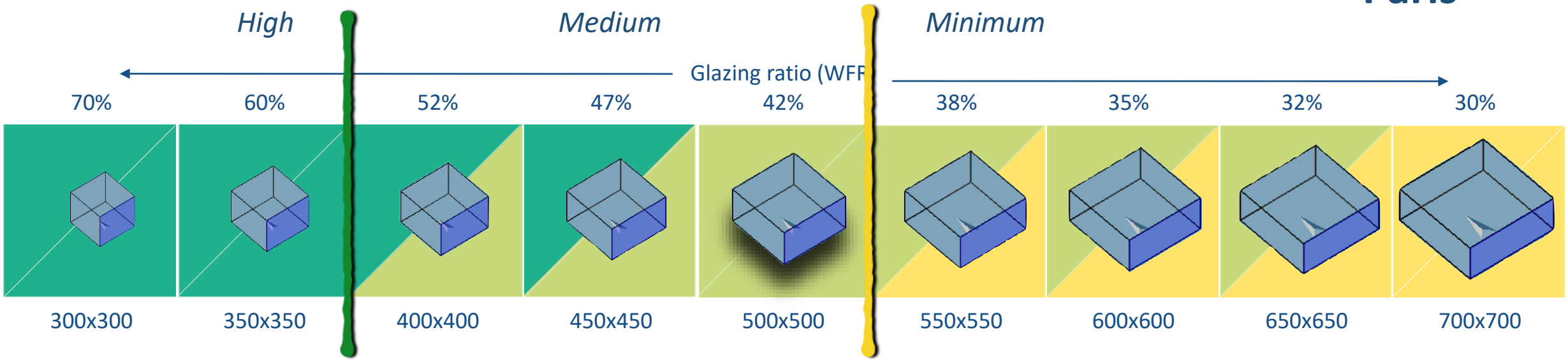
Simulations : DIAL+

Influence of window to floor ratio

(fully glazed façades / simplified method)



Paris



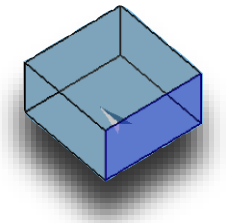
In an unobstructed environment (obstruction angle = 10°)

- The glazing ratio (WFR) should be over 55% to reach « *HIGH* » level
- A glazing ratio below 40%, leads to « *MINIMUM* » level

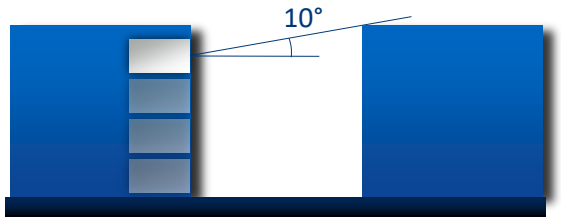
Simulations : DIAL+

Influence of outdoor environment

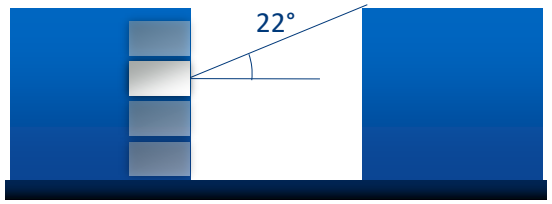
(fully glazed façades / simplified method)



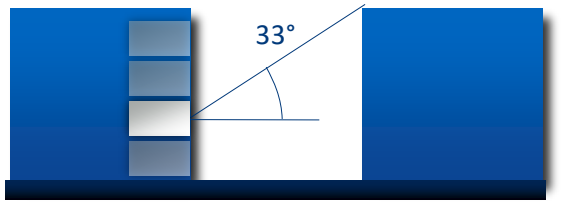
500x500



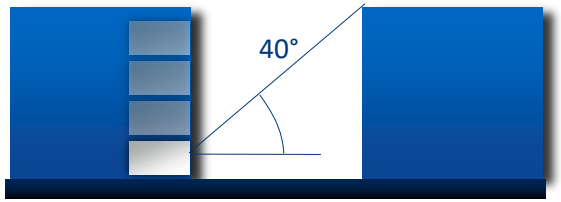
Medium



Minimum



Minimum



No Ranking

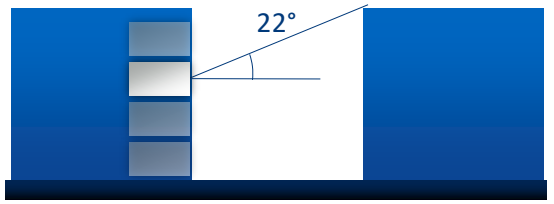
In a dense urban environment (obstruction angle = 40°)

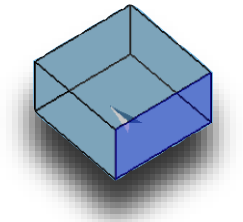
- Even a fully glazed façade can lead to « NO RANKING »

Simulations : DIAL+

Influence of Indoor photometry

(fully glazed façades / simplified method)





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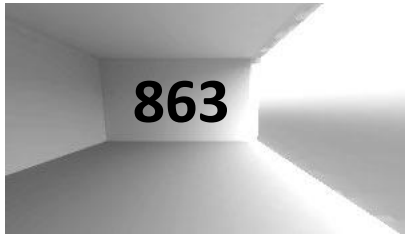
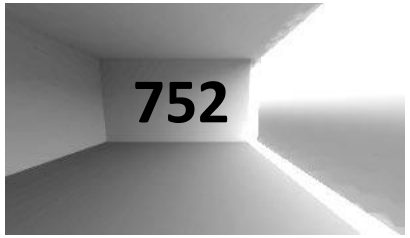
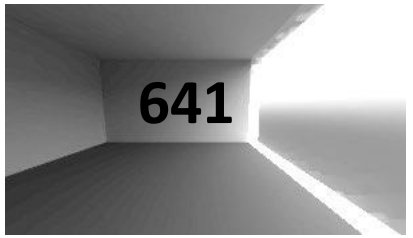


Minimum



Minimum



No Ranking

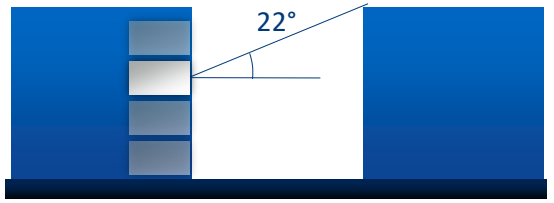
In a moderately obstructed environment (α= 22°)

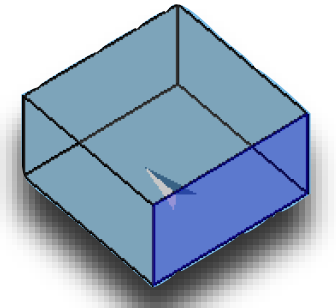
- A small decrease of the reflection coeficient leads to « *No ranking* ».

Simulations : DIAL+

Influence of Additional Layer

(fully glazed façades / simplified method)





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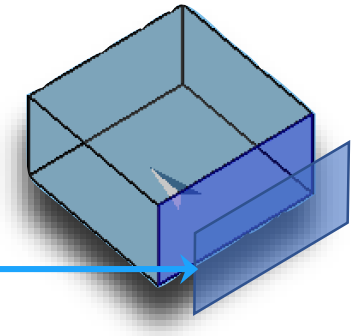


Double skin (Tv = 0.7)

Minimum

No Ranking

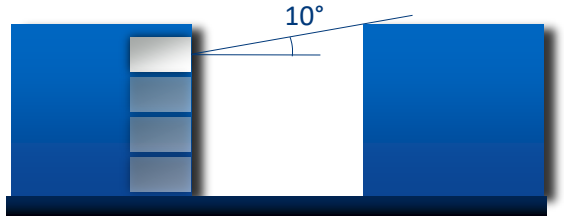
With a moderately obstructed environment (α= 22°)

- Any additional skin leads to « No Ranking »

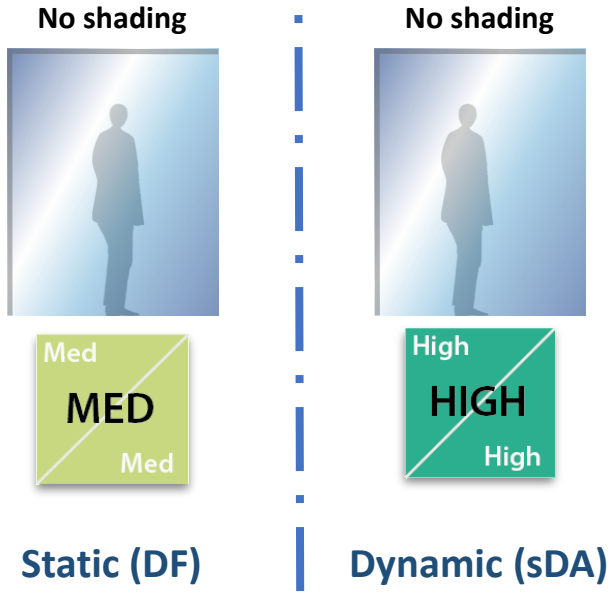
Simulations : DIAL+

Influence of calculation method

(fully glazed façades / Simplified & Detailed methods)



South Orientation

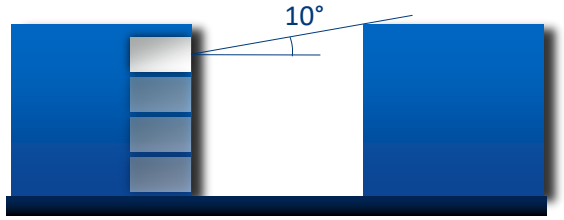


Without shading device, the detailed method (based on dynamic simulations) is more optimistic than the simplified one (based on Daylight Factor values).

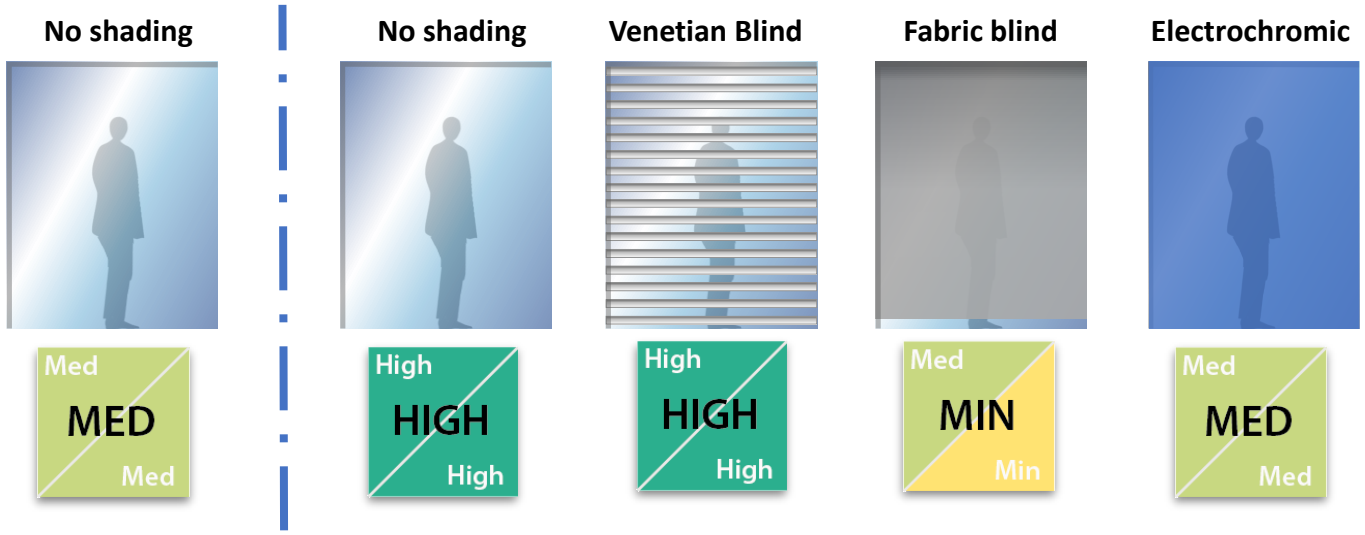
Simulations : DIAL+

Influence & Shading device

(fully glazed façades / Simplified & Detailed methods)



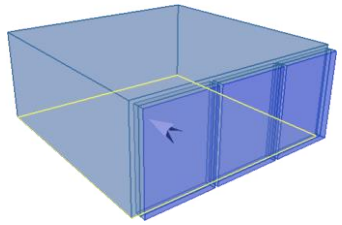
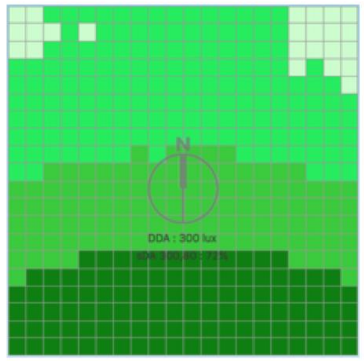
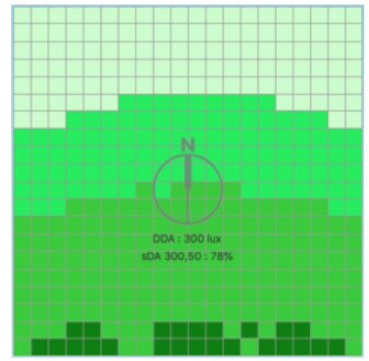
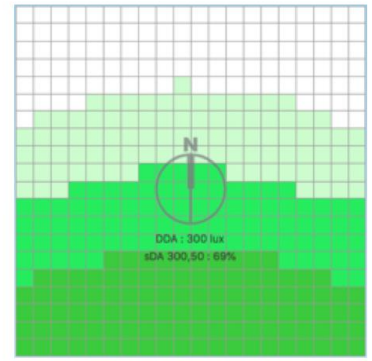
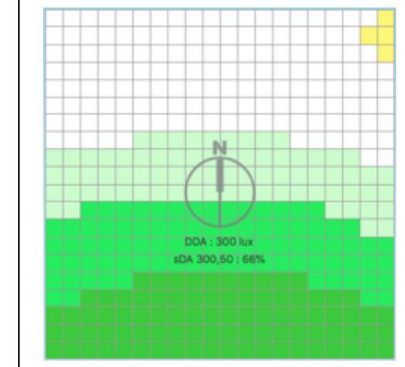
South Orientation



The type of shading devices significantly influences the final ranking (detailed method)

Simulations : DIAL+

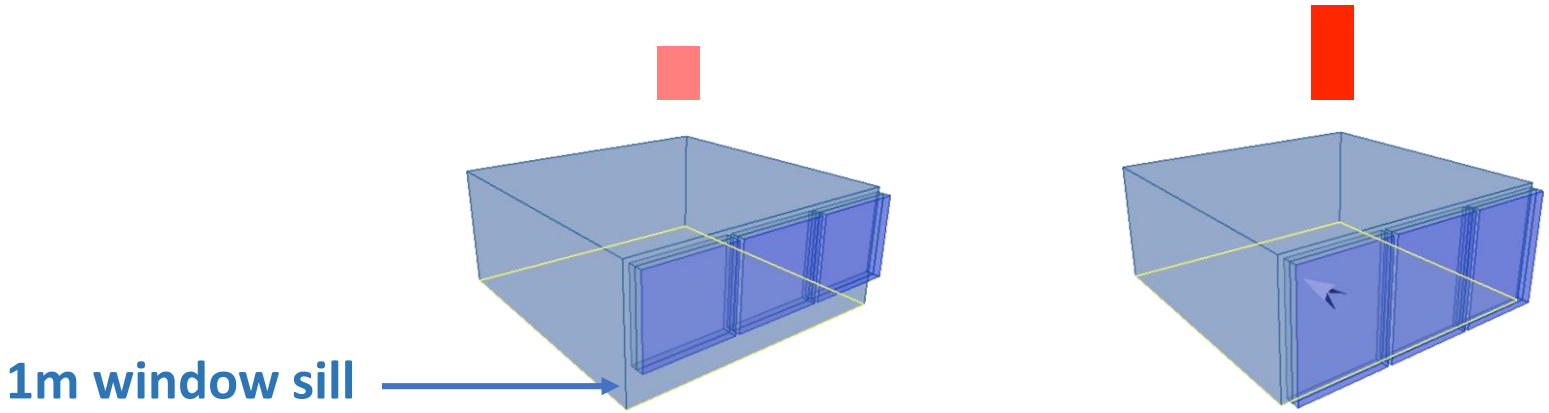
Influence of Room localization

	Athens	Lausanne	Berlin	Oslo
					
Med. Ranking	High	High	High	Medium	
Min. Ranking	High	High	Medium	Medium	

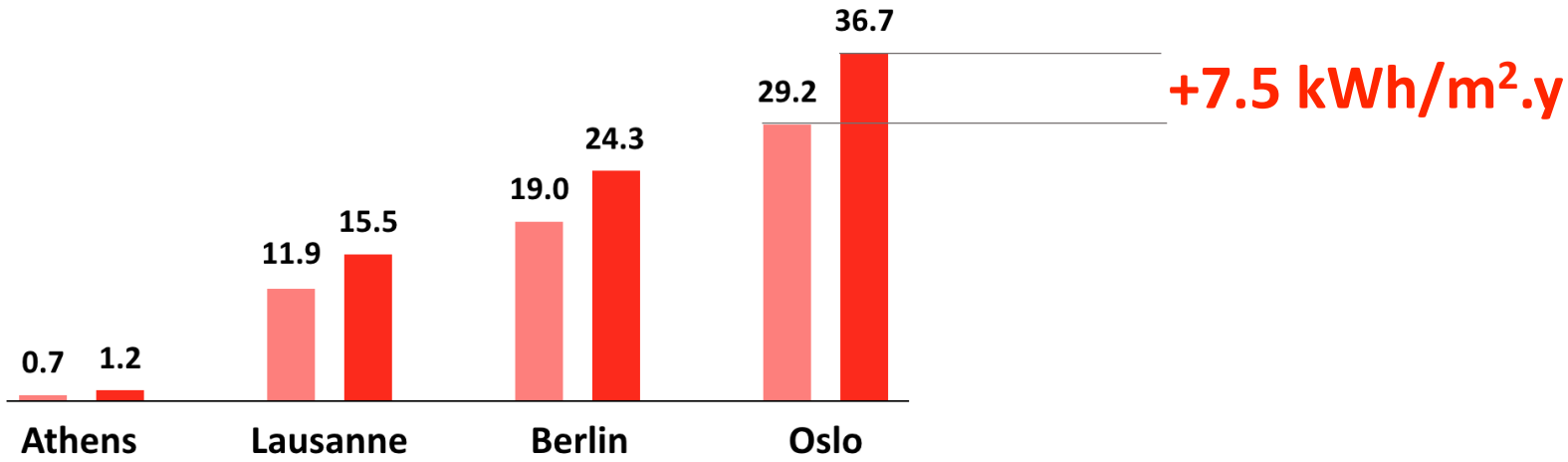
The final classification strongly depends on the building location.

Simulations : DIAL+

Impact on Heating loads



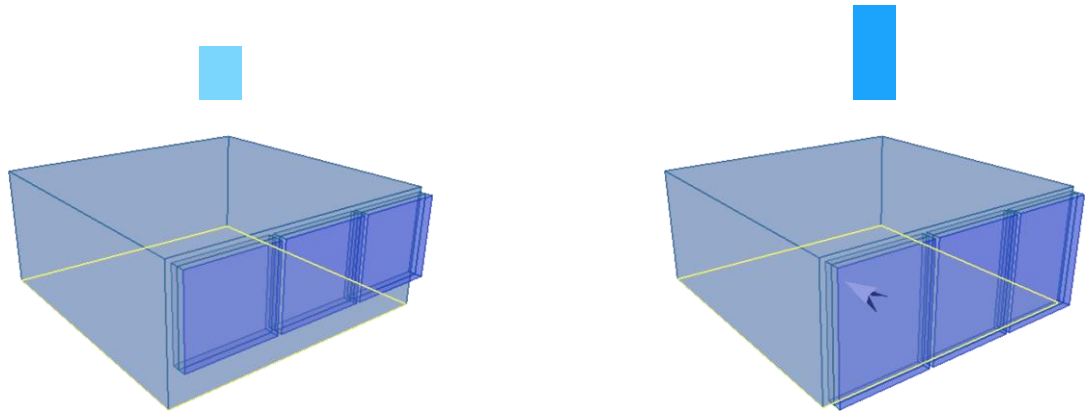
Heating loads [kWh/m²]



+7.5 kWh/m².y

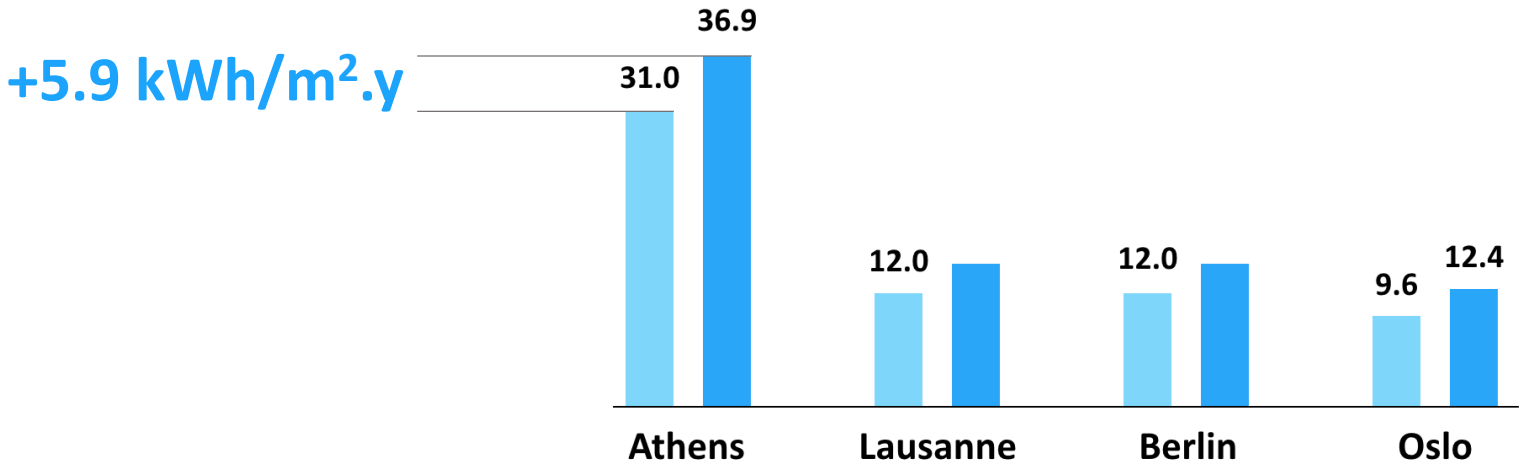
Simulations : DIAL+

Impact on Cooling loads



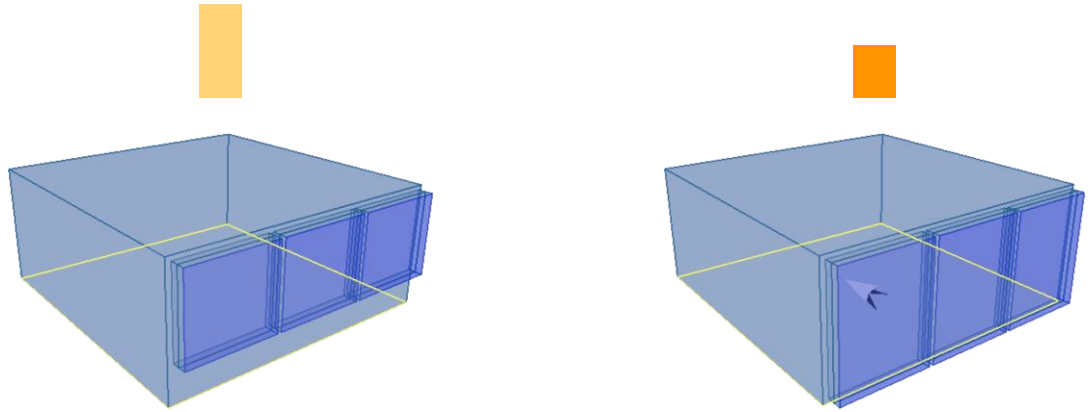
Cooling loads [kWh/m²]

WFR = 24% WFR = 34%



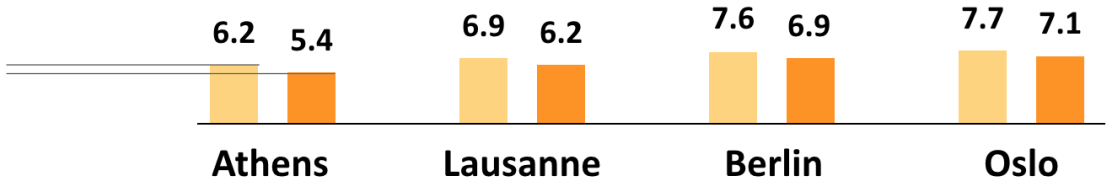
Simulations : DIAL+

Impact on Electric Lighting Loads



Electric lighting loads [kWh/m²]

-0.8 kWh/m².y



Simulations : DIAL+

General feeling

- EN-17037 addresses a very broad scope of issues 
- The requirements are extremely demanding 
- It encourages the realization of facade entirely glazed 
- It is not really suitable for urban environments 
- It eliminates rooms with a Depth / Height ratio > 2 
- It eliminates buildings with double skin 
- It could result in an overal increase of energy consumption 

Daylight Symposium / Paris 2019