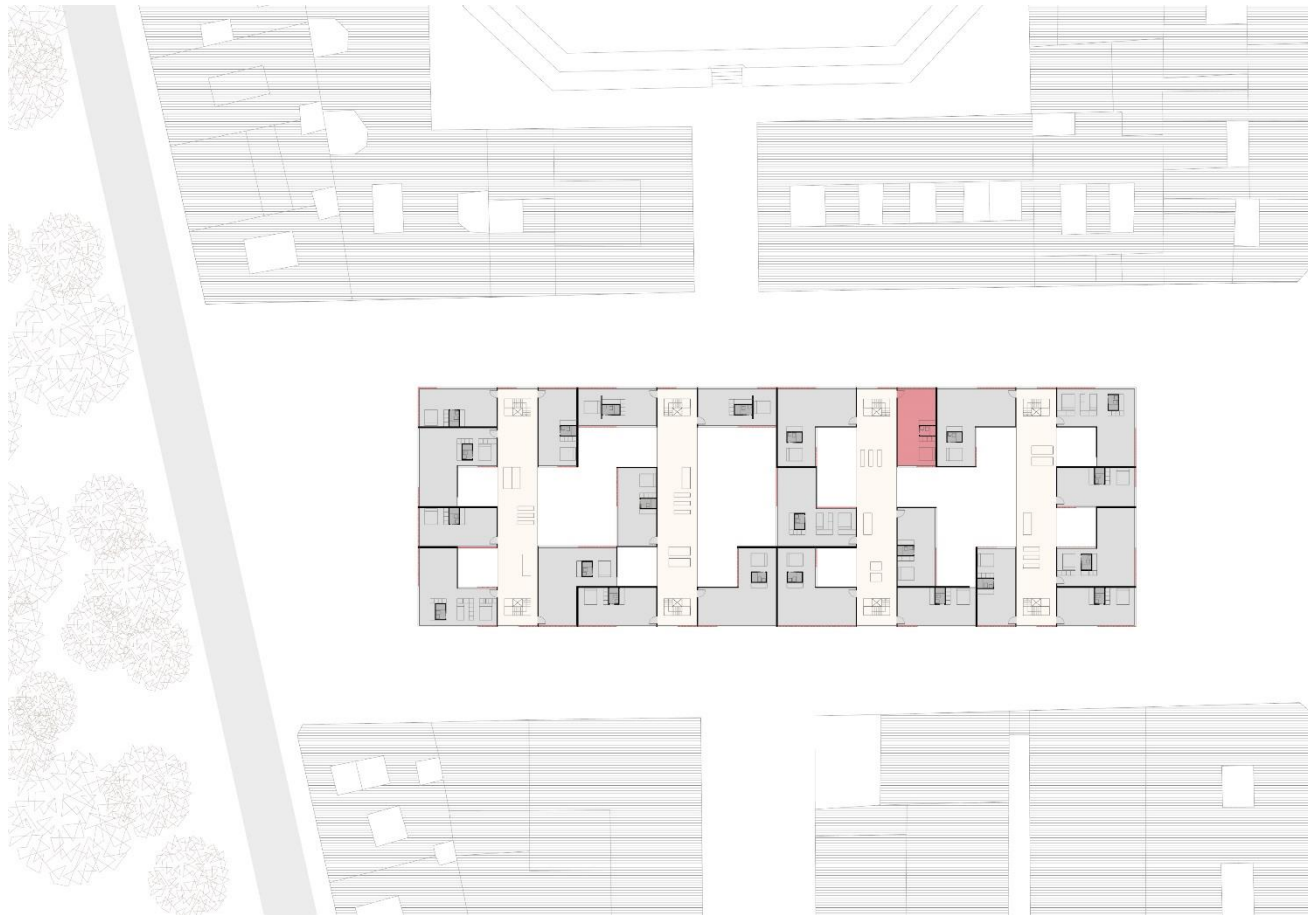


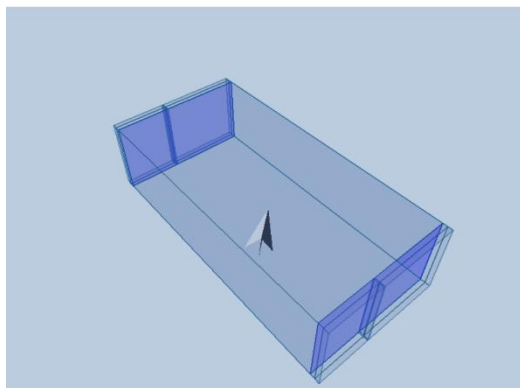


LIGHTING ANALYSIS  
RESIDENTIAL COMPLEX



One apartment of the residential complex is chosen to be analysed. This apartment has the worst orientation in the building for its function, so we are going to check if the design works in its original location (Spain) and also see if it will work in Czech Republic.

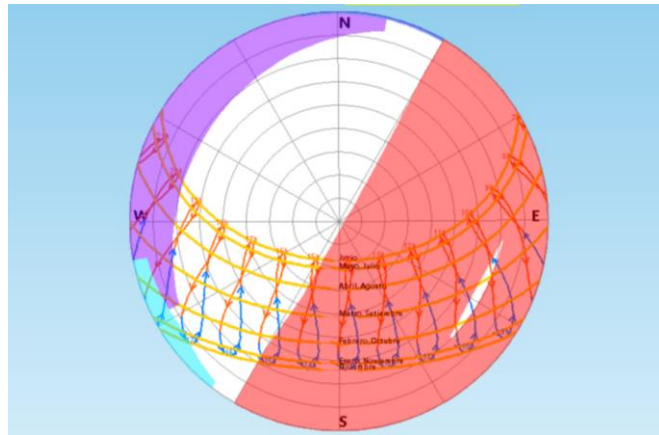
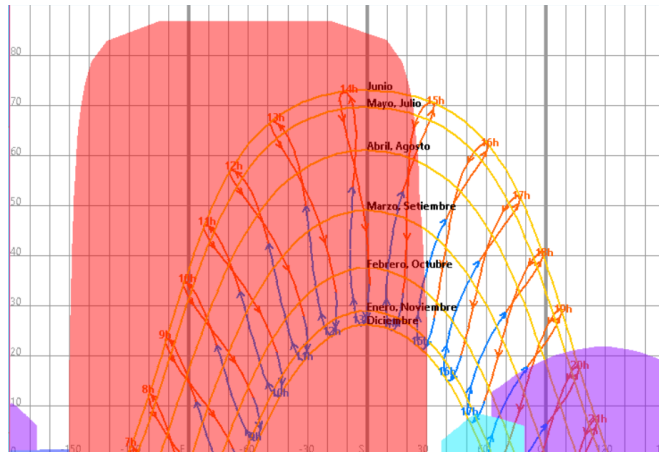
Once we verify that it works, the design is going to be modified to improve the lighting condition and also to reduce the energy loss.



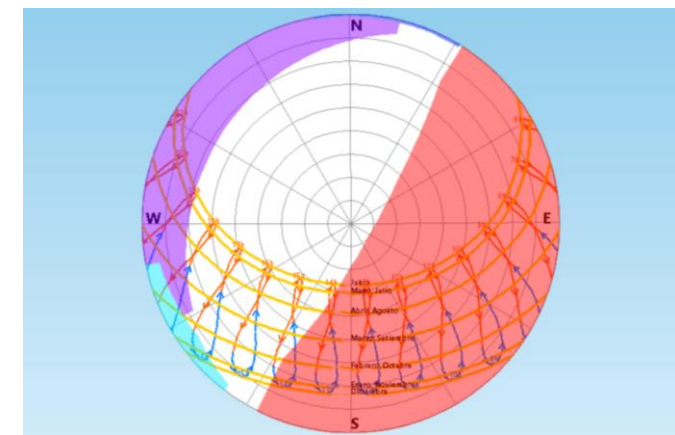
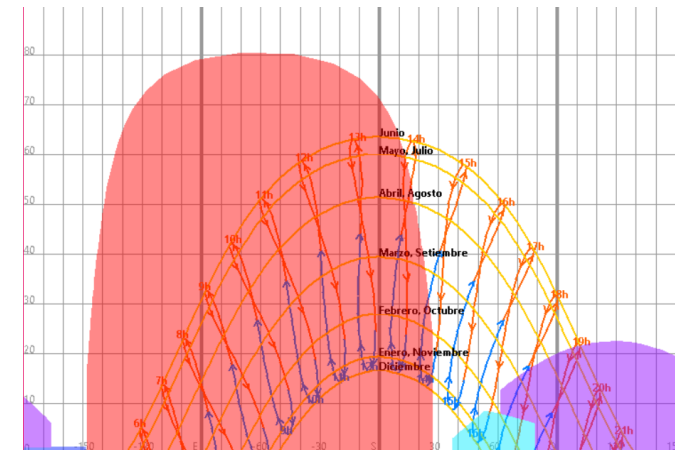
NAME	ORIENTATION	WIDTH [m]	HIGH [m]	THICKNESS [m]	CLARITY
FLOOR		5	10		0,5
WALL 1	S-E (130°)	5	2,7	0,35	0,3
WALL 2	N-E (40°)	10	2,7	0,35	0,3
WALL 3	N-O (310°)	5	2,7	0,35	0,3
WALL 4	S-O (220°)	10	2,7	0,35	0,3
COVER		5	10	0,35	0,7

NAME	ORIENTATION	WIDTH [m]	HIGH [m]	DISTANCE (LEFT) [m]	SILL [m]	SURFFACE [m2]
1.1	S-E (130°)	2	2,7	0	0	5,4
1.2	S-E (130°)	3	2,7	2	0	8
3.1	N-O (310°)	2	2,7	3	0	5,4
3.2	N-O (310°)	3	2,7	0	0	8

# HOURS OF LIGHT INSIDE SPAIN



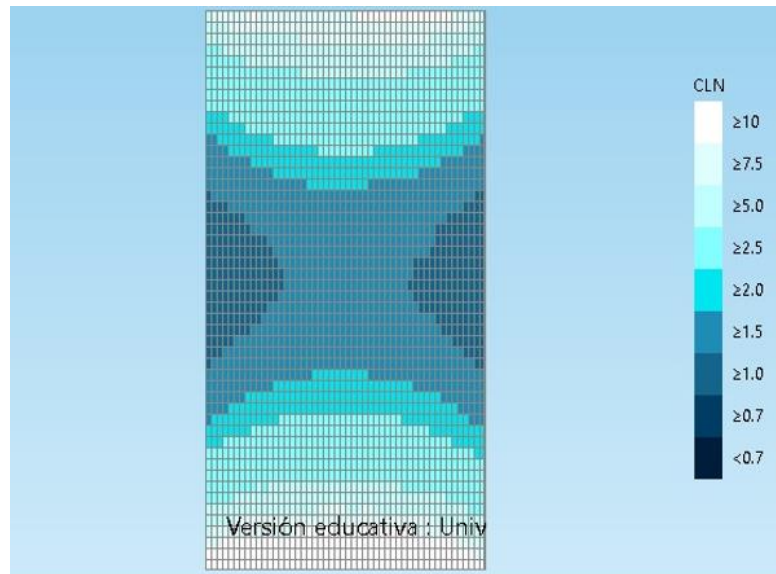
# CZECH REPUBLIC



The light inside the apartment is very different in each country because of the light condition. A residential building must comply some hours of sunlight during March. If this requirement is fulfilled, the light of the building works.

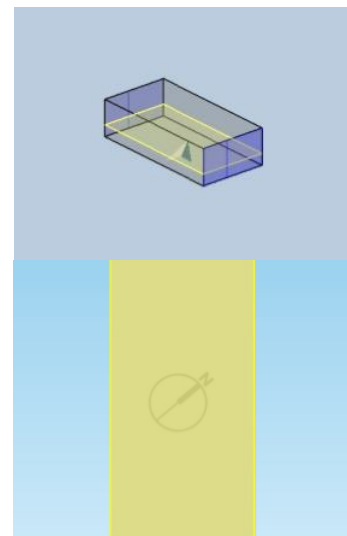
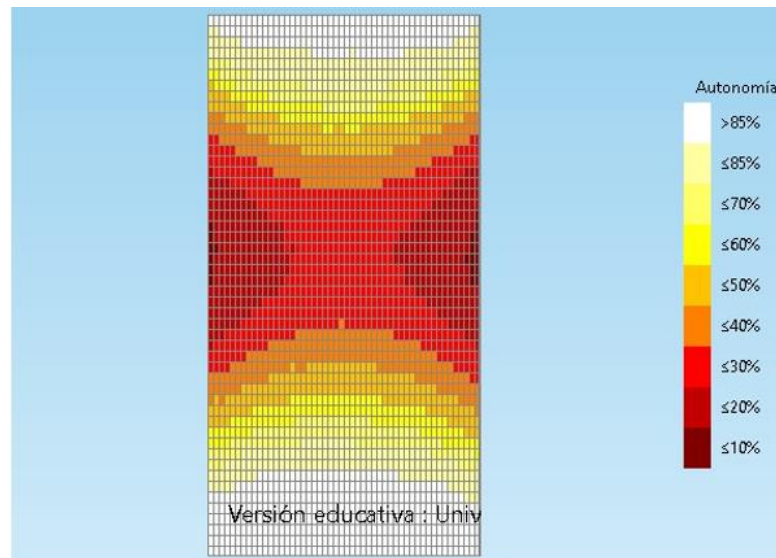
The building works in Spain. However, the same building in the same surroundings but different light conditions (Czech Republic) does not work. As we can see in the graph, the light condition is not very good because during the winter, the surrounding buildings shade the residential complex.

## NATURAL LIGHT



Due to the existence of windows in the two walls facing, there is a quite homogeneous condition of light inside. The middle part is the darker part in the apartment, and this is the reason why the rooms that does not need natural light are located there, such as the bathroom.

## AUTONOMY



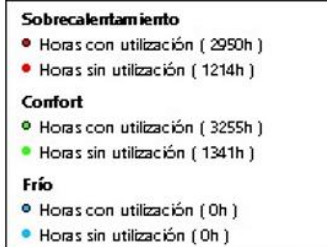
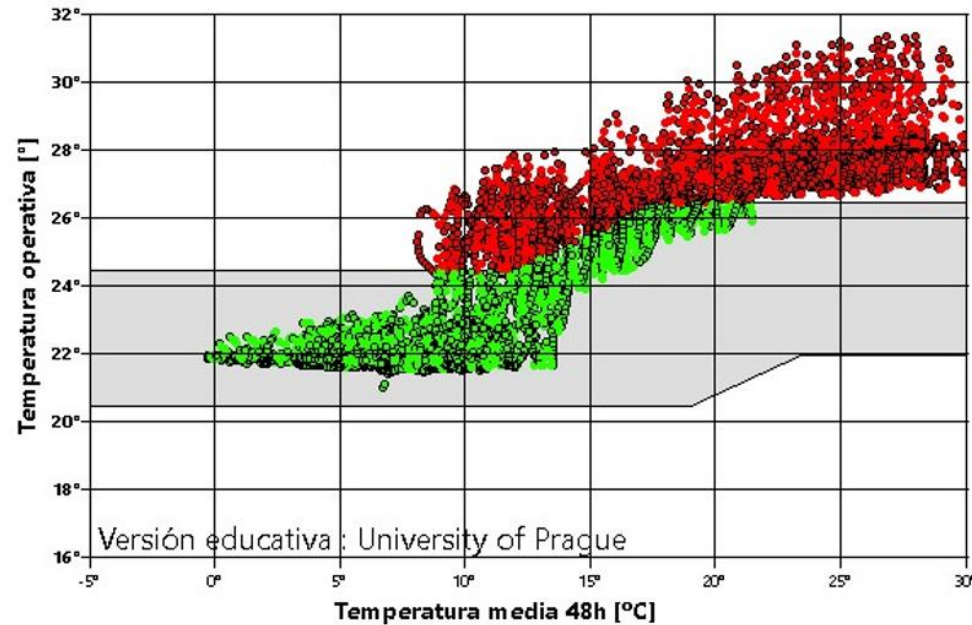
Nevertheless, as we can see the percentage of natural light inside, the dark part of the apartment does not have a very low percentage of natural light. So the light in the interior is working due the location of the windows.

## HEATING

Zona de confort: SIA 382/1:

Número de horas de sobrecalentamiento:

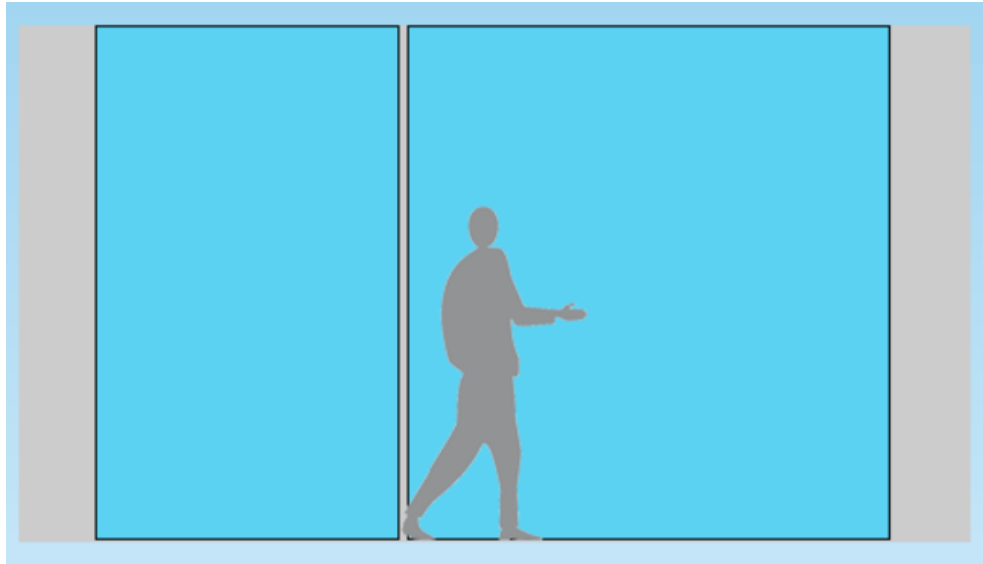
2950 [h]



However, even though the light is working, the overheating in the room is very high. Because of that, a lot of refrigeration systems will be needed to regulate the temperature. It is important to try to make the apartment as efficient as possible. The key of the problem is in the windows, so the size of the windows can be changed, and new sun protections can be introduced.

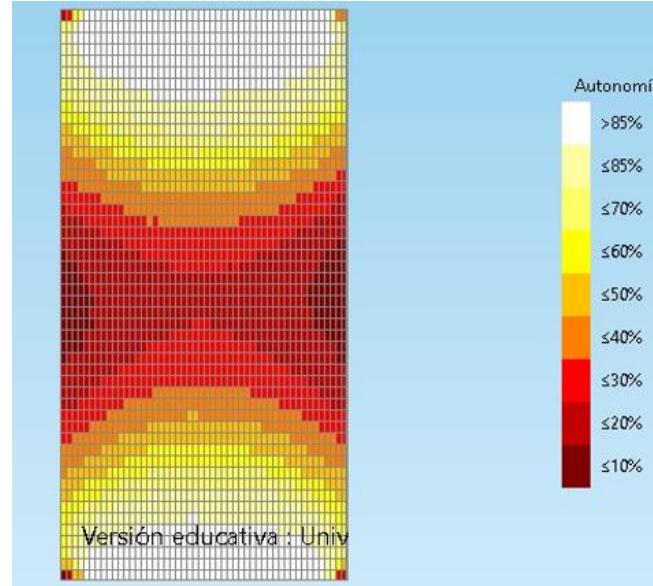
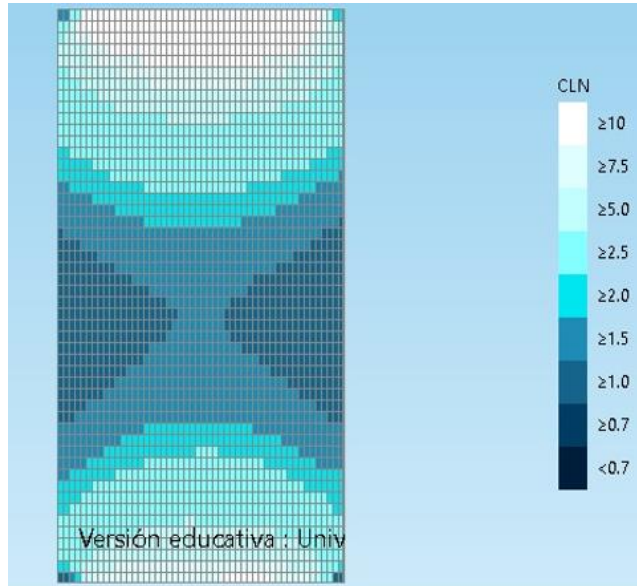


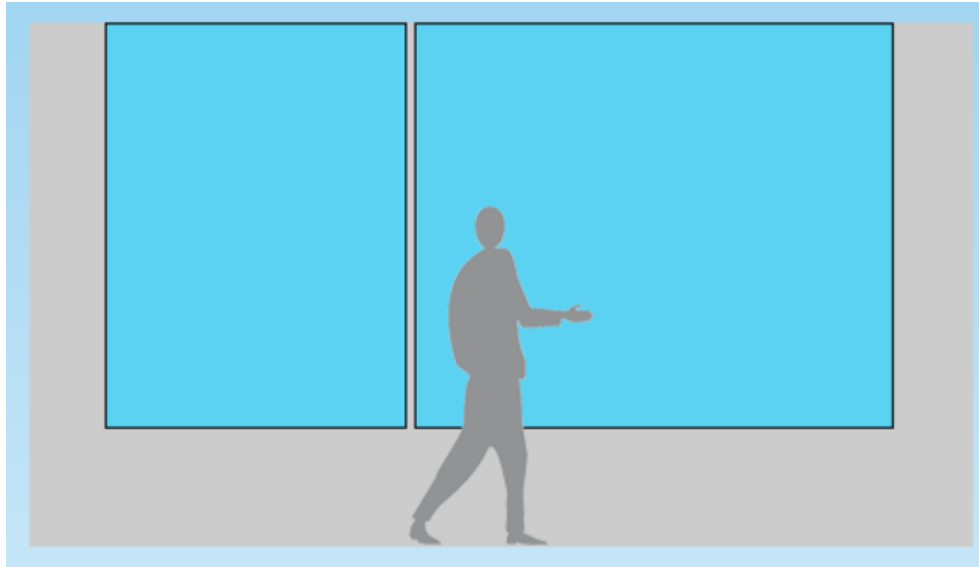
## WINDOW MODIFIED



### 1. REDUCE THE WIDTH

The side area of the room doesn't contribute to the lighting of the room, it just improve the appearance of the room. So if the window is reduced, the amount of light that enters in the room would not change, but the loss of energy will be decreased.



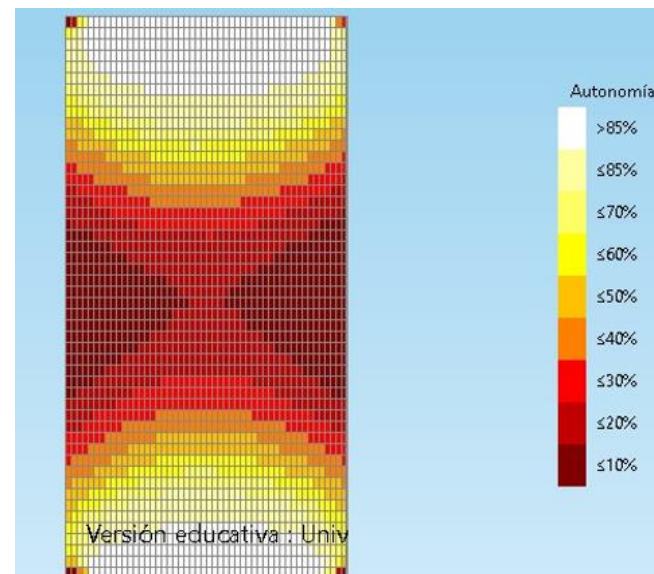
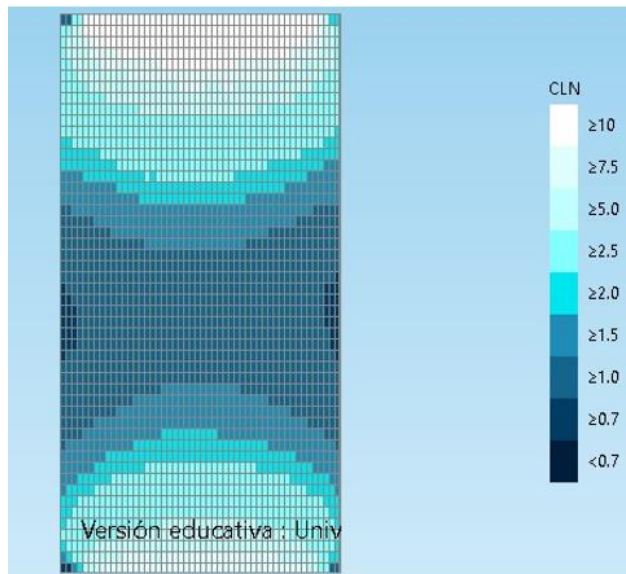


## 2. REDUCE THE WIDTH AND THE HIGH

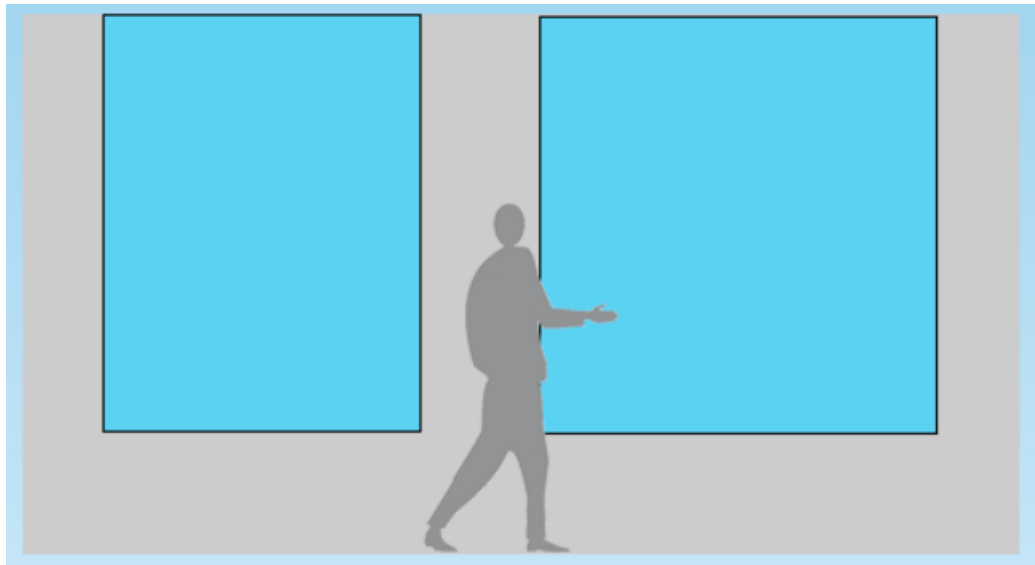
The bottom part of the window is not efficient. This part is also related to the appearance of the room, it just gives a better view. The upper parts are the ones that provides better light to the room.

- It produces a glare
- It also have a big loss of energy

Reducing the size of the window the loss of energy will be decreased, and the glare produced by the lower parts will be avoided.

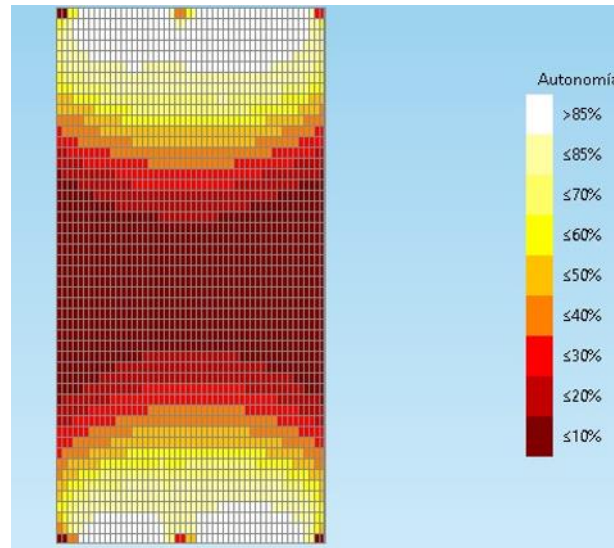
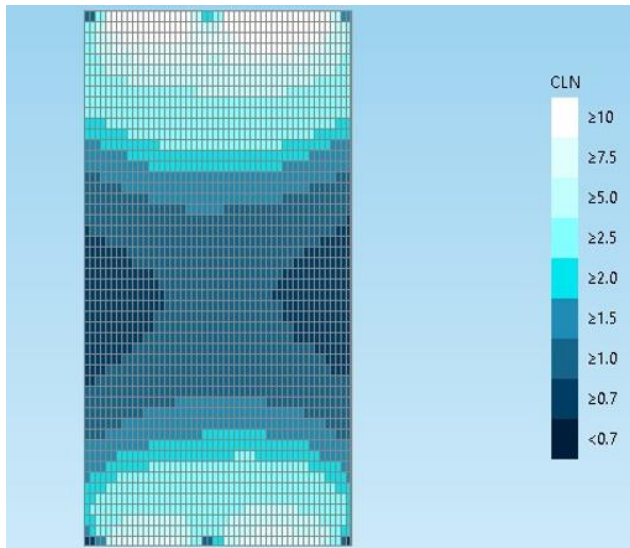






### 3. MINIMISE THE SURFACE WALL

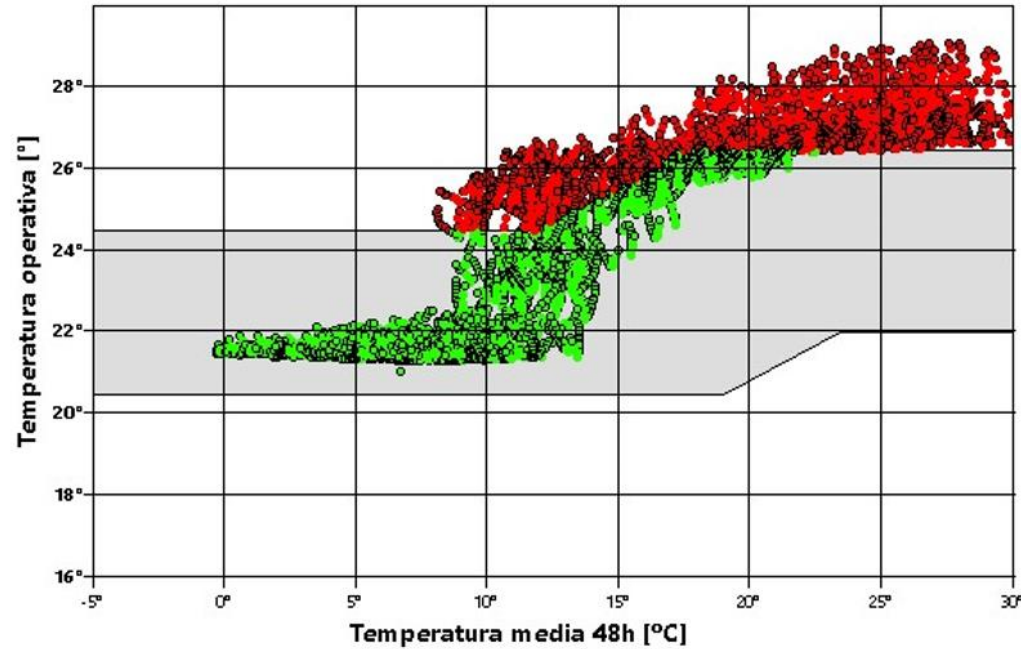
It provides a very similar light and the size of the window has been reduced. So the loss of energy will be reduced.



Zona de confort: SIA 382/1:

Número de horas de sobrecalentamiento:

2583 [h]



After all these changes, we have reduced the amount of overheating hours having a very similar quantity of light inside the room.

However, the solution has improved the efficiency of the apartment, but it still have a lot of hours of overheating. So the addition of sun protections and the use of special windows will be needed to help having better temperature condition without the use or, at least, the minimum use, of any conditioning equipment.