

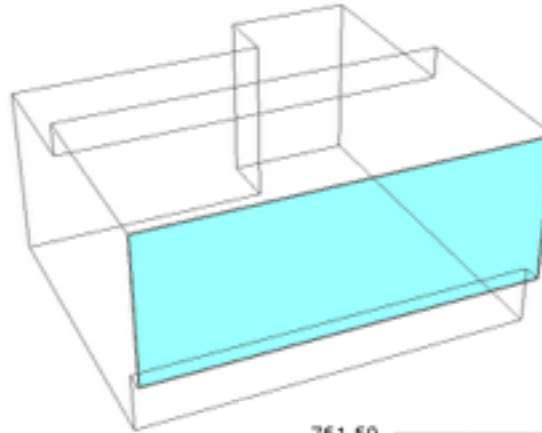
o) Baseline conditions

Based on the experience made in the previous simulations, I started from a slightly different design: considering the **worst situation of a whole glazed facade**, I increased the depth of the shading device while reducing the width of each panel to provide enough daylight.

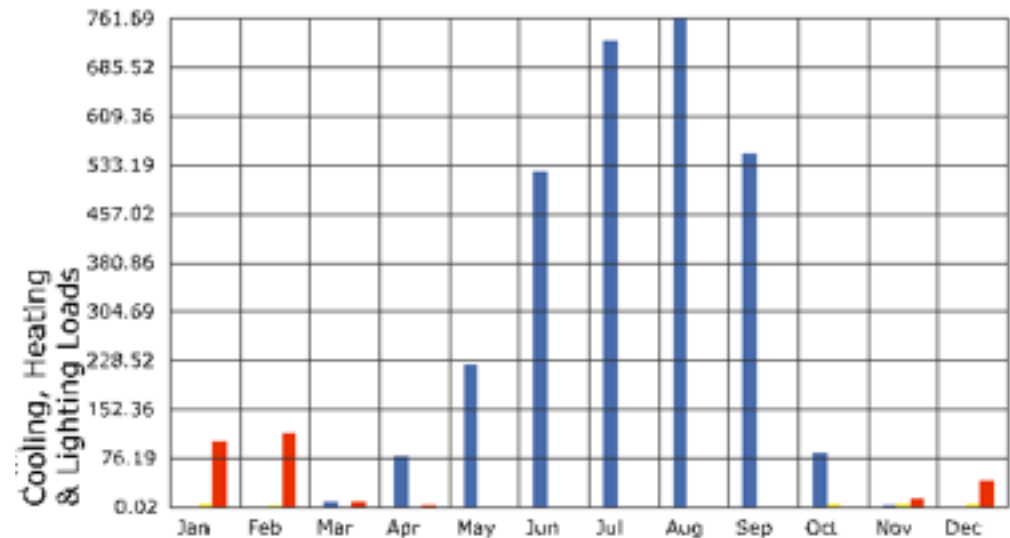
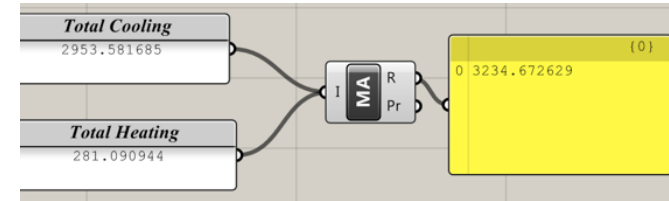
Moreover, I added vertical louvers on the south west corner, to reduce the impact of hot summer sun on the facade.

Total cooling: 2953 kWh

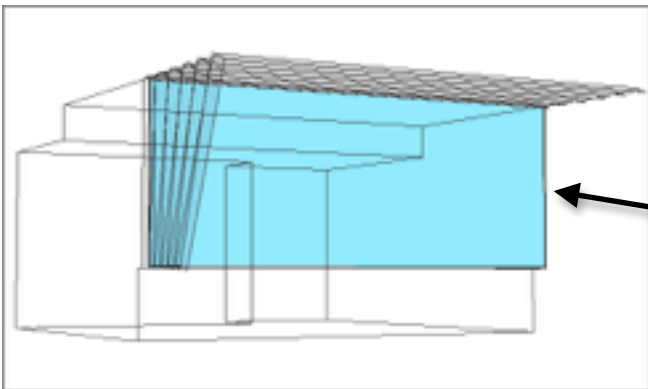
Total: 3234 kWh



Total Heating: 281 kWh



Philadelphia International Ap PA USA TMY3



This solution did not prove itself very helpful for the energy consumption, the only actual effect is to significantly decrease daylight in the south-west corner.

Total cooling: 1314 kWh

Total Heating: 599 kWh

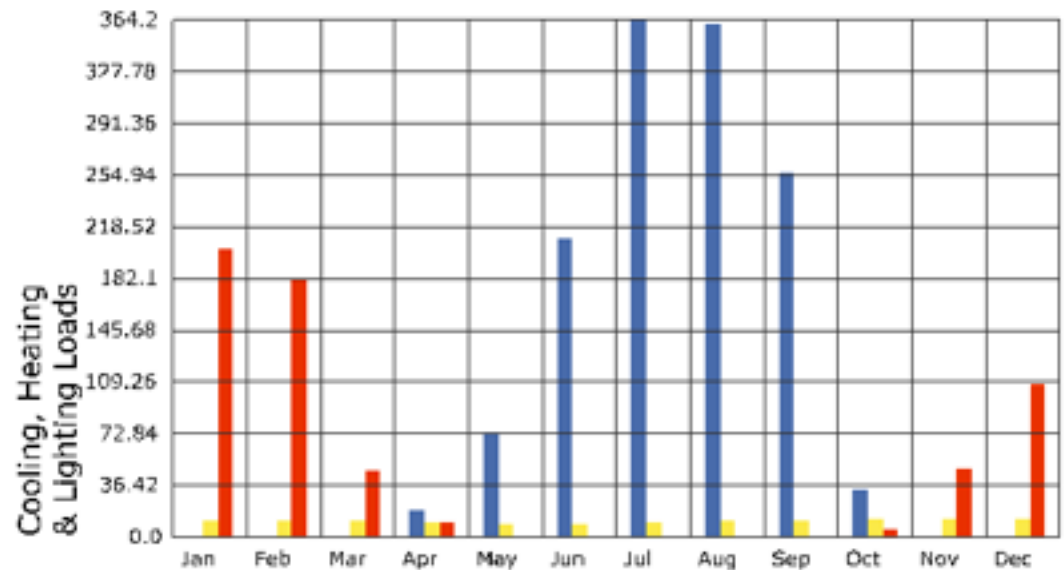
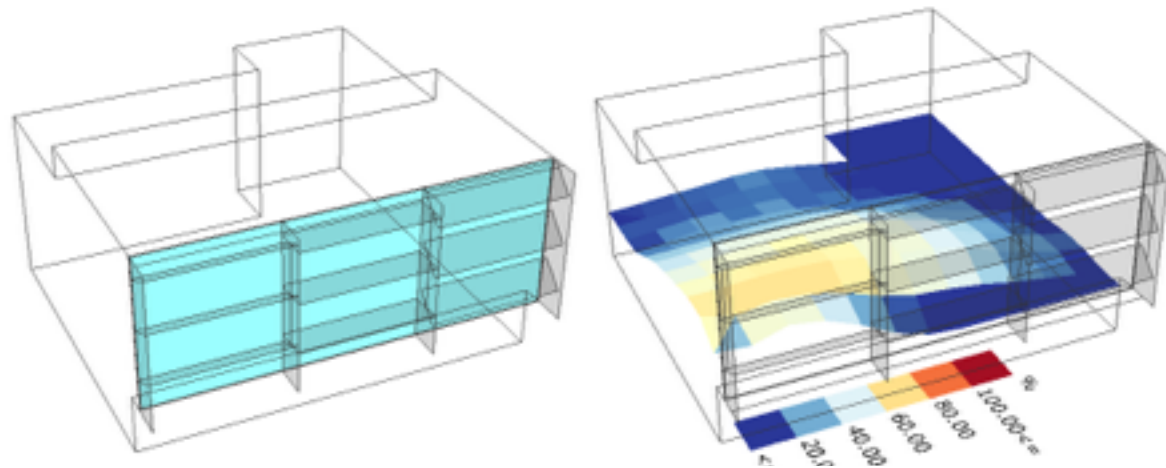
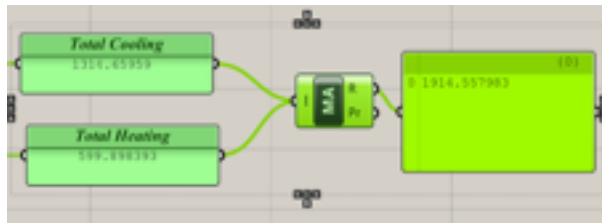
Total: 1914 kWh

1) First Design

The designed GH definition allows to manage the settings of the shading devices (number of fins, angle, width) to find the best shading performance obtaining immediate energy simulation results.

The horizontal devices were added to further protect the wide glazed facade while allowing daylighting, while the vertical fins help protecting the hot summer sun during the afternoon, when it is higher and hits the facade from the side (west).

The first design shown significant energy savings but poor daylight.

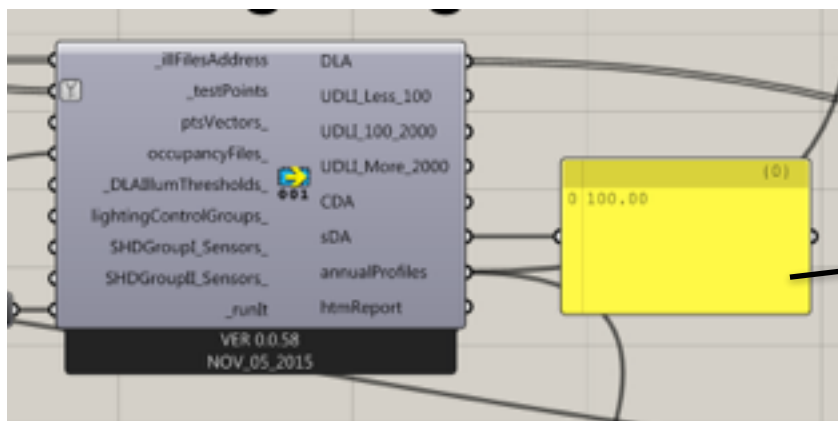
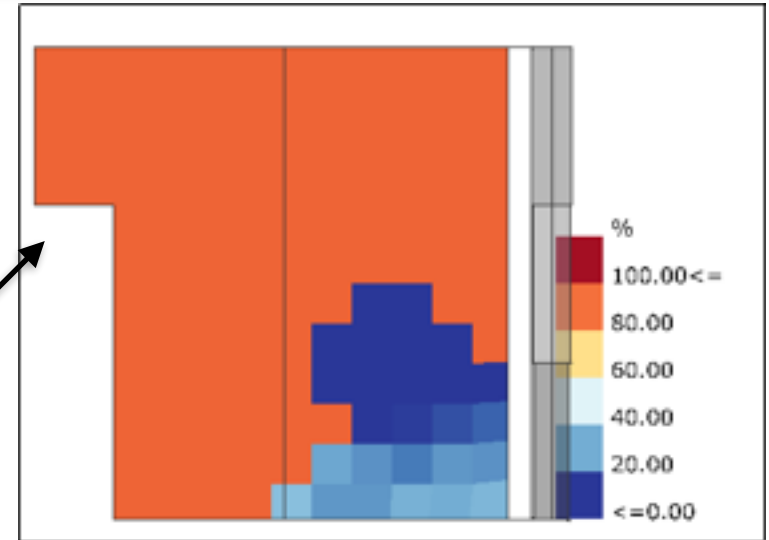


Philadelphia International Ap PA USA TMY3

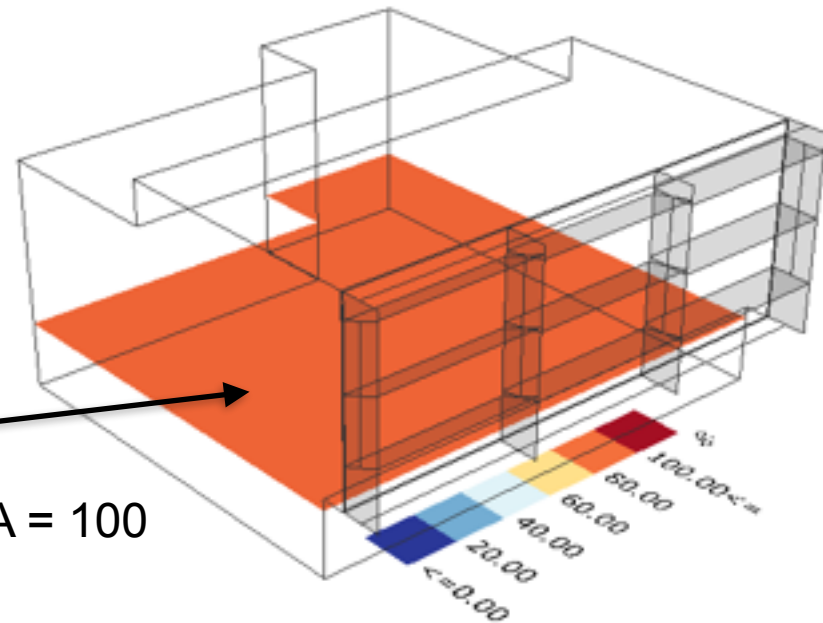
2) Daylighting improvements

Analyzing several combination of panel angle and depth, a good daylighting performance was found.

sDA = 80.15



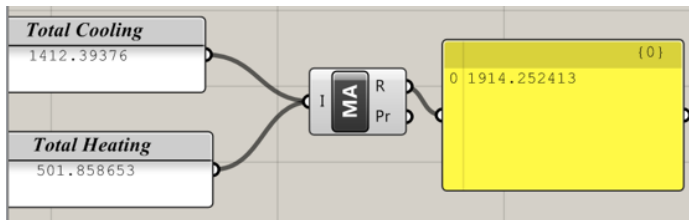
sDA = 100



3) Energy Simulation

Surprisingly, the final result does not significantly change, the total energy consumption for heating and cooling is still the same, even though cooling has decreased and heating has increased.

What has dramatically decreased is the lighting energy consumption, due to the good daylighting conditions. No more artificial lighting is required during the summer season, also in the winter is less used.

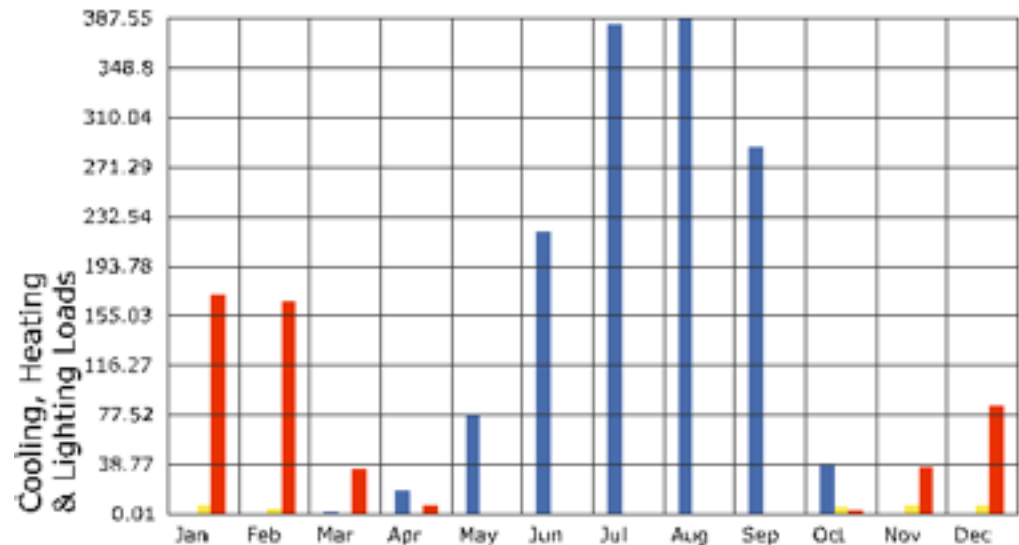
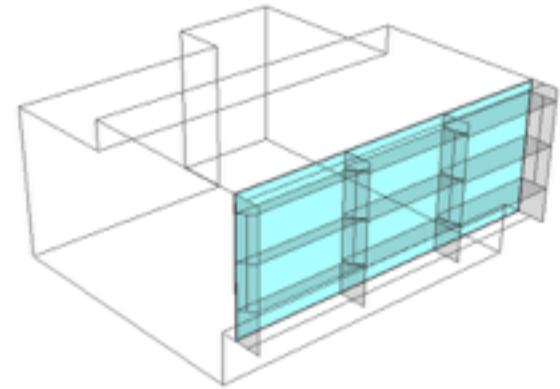


Total cooling: 1413 kWh

Total Heating: 501 kWh

Total: 1914 kWh

Total energy savings: 40%
(compared with baseline with no shading)



Philadelphia International Ap PA USA TMY3