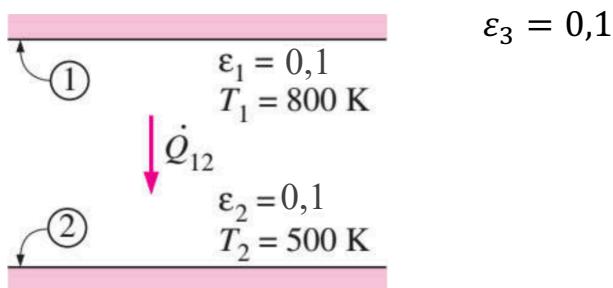


- 1. Considering the same example you solved in the previous assignment (radiative heat transfer between two parallel plates), how many shields with epsilon = 0,1 should you add in order to have the new heat transfer rate to be 1% of the case without shields?**



$$\dot{Q}_{12} = \frac{1 \cdot 5,67 \cdot 10^{-8} (800^4 K - 500^4 K)}{\frac{1}{0,1} + \frac{1}{0,1} - 1} = 1036 \frac{W}{m^2}$$

$$\dot{Q}_{12} = 1036 \frac{W}{m^2} \rightarrow 1\% = 10,36$$

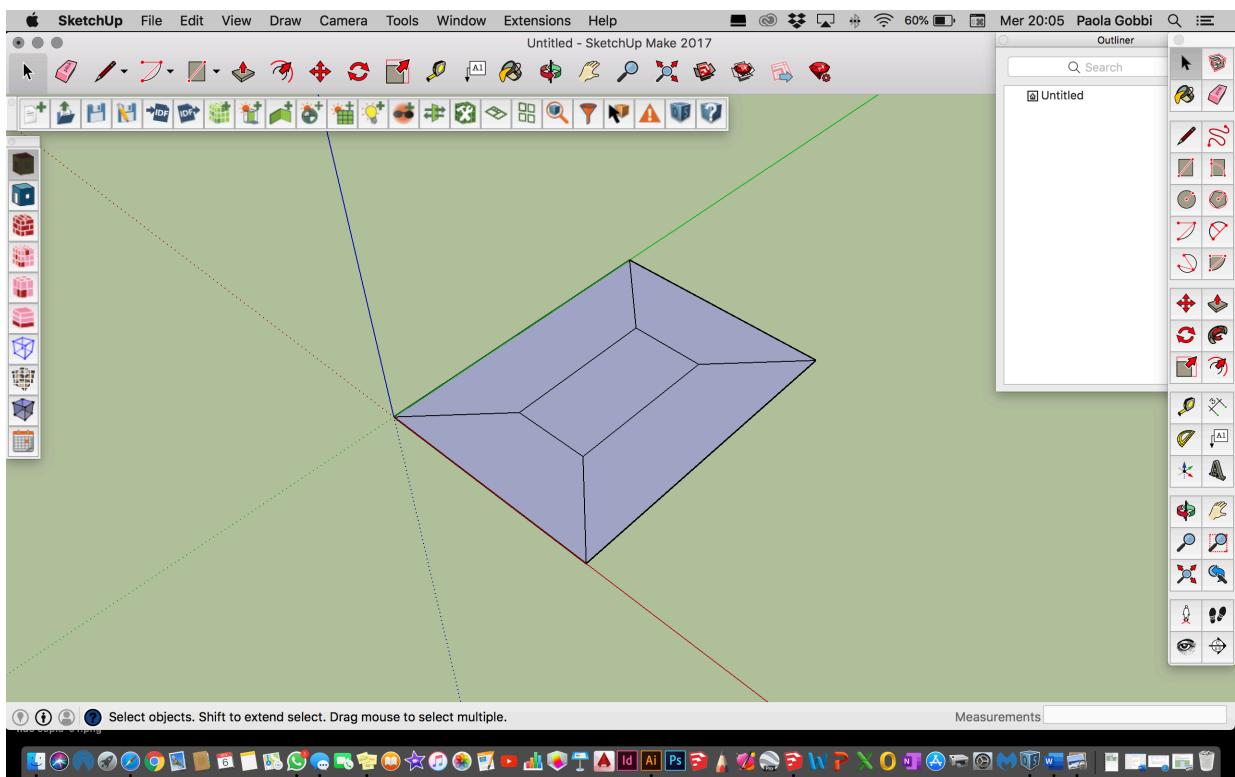
$$\dot{Q}_{12 \text{ N SHIELDS}} = \frac{A\sigma (T_1^4 - T_2^4)}{\left(\frac{1}{\varepsilon_1} + \frac{1}{\varepsilon_2} - 1\right) + \left(\frac{1}{\varepsilon_3} + \frac{1}{\varepsilon_3} - 1\right) \cdot N}$$

$$N = \frac{\frac{A\sigma (T_1^4 - T_2^4)}{1\% \dot{Q}_{12}} - \left(\frac{1}{\varepsilon_1} + \frac{1}{\varepsilon_2} - 1\right)}{\left(\frac{1}{\varepsilon_3} + \frac{1}{\varepsilon_3} - 1\right)} = 1036 \frac{W}{m^2}$$

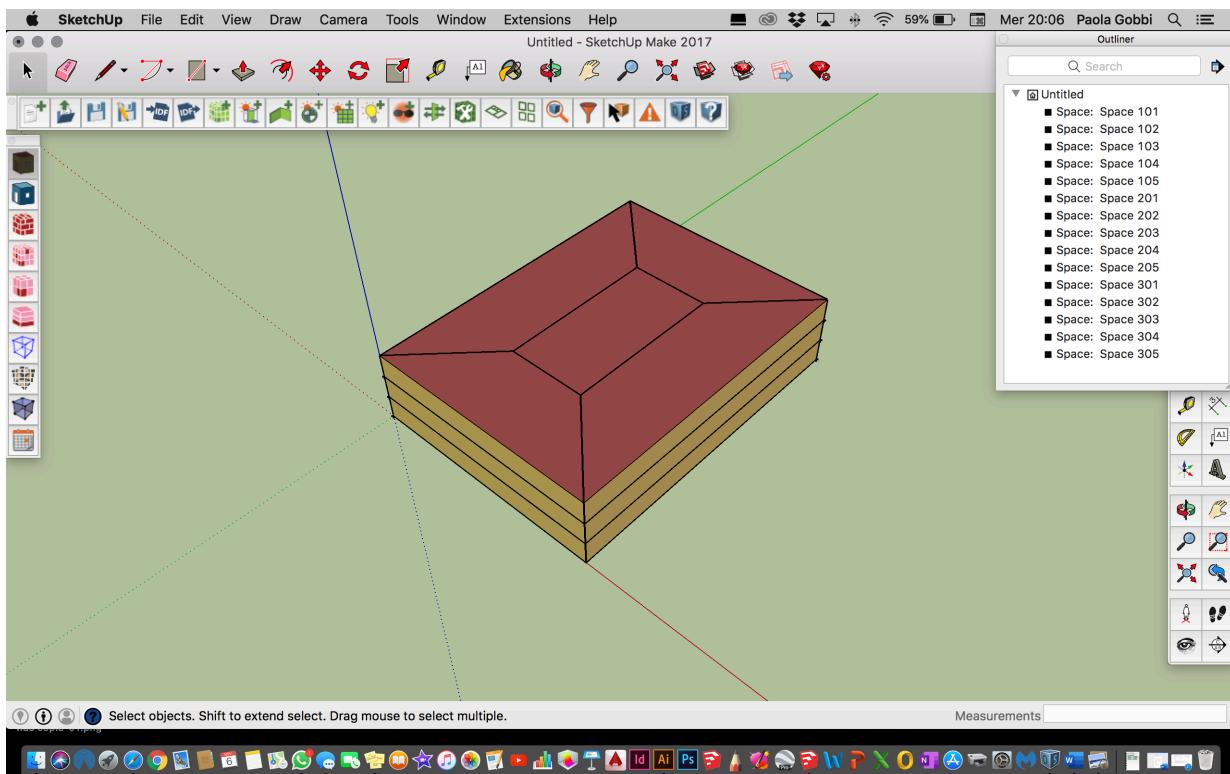
$$\begin{aligned}
 N &= \frac{\frac{1 \cdot 5,67 \cdot 10^{-8} (800^4 K - 500^4 K)}{10,36} - \left(\frac{1}{0,1} + \frac{1}{0,1} - 1 \right)}{\left(\frac{1}{0,1} + \frac{1}{0,1} - 1 \right)} \\
 &= \frac{\frac{1 \cdot 5,67 \cdot 10^{-8} (800^4 K - 500^4 K)}{10,36} - 19}{19} = \frac{\frac{19680,57}{10,36} - 19}{19} \\
 &= \frac{1880,66}{19} = 99
 \end{aligned}$$

2. Considering create a pdf file with screenshots of all of the steps we went through and explain briefly the reason behind the use of each step.

Start by drawing the diagram with a rectangle 40x30.

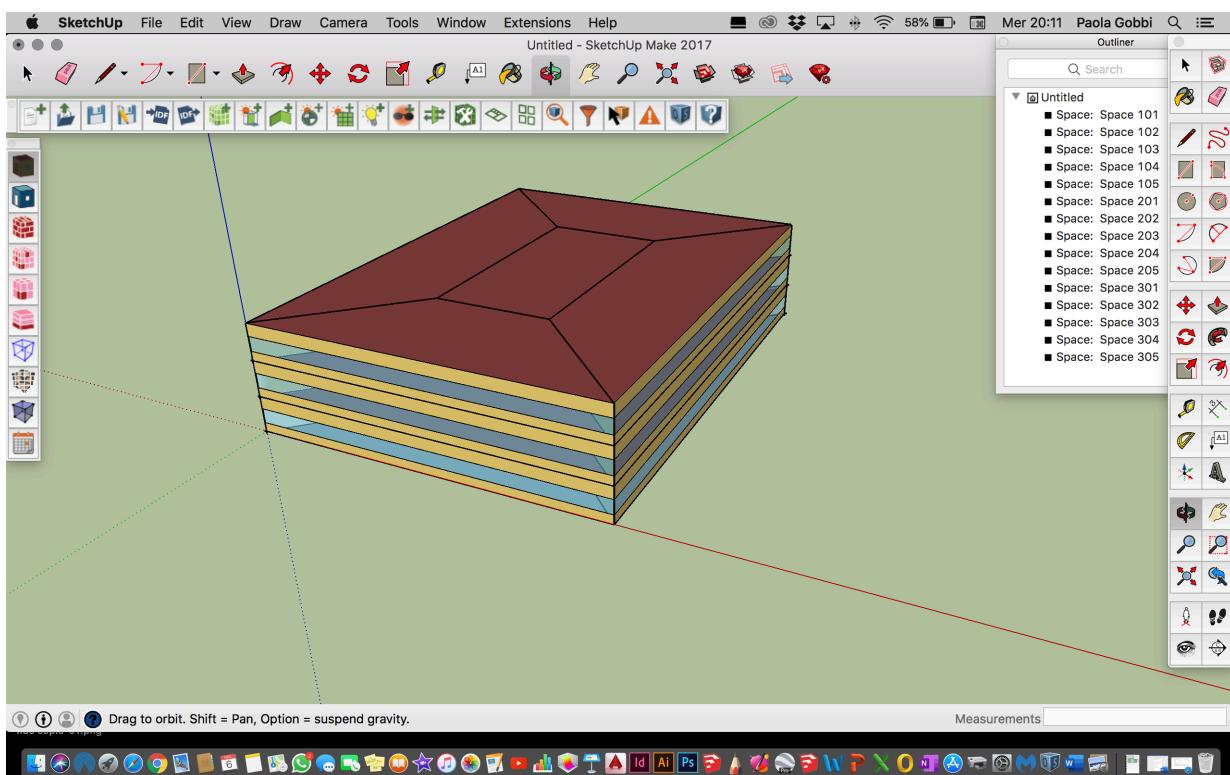


The building is created with the tool “create spaces from diagram”.



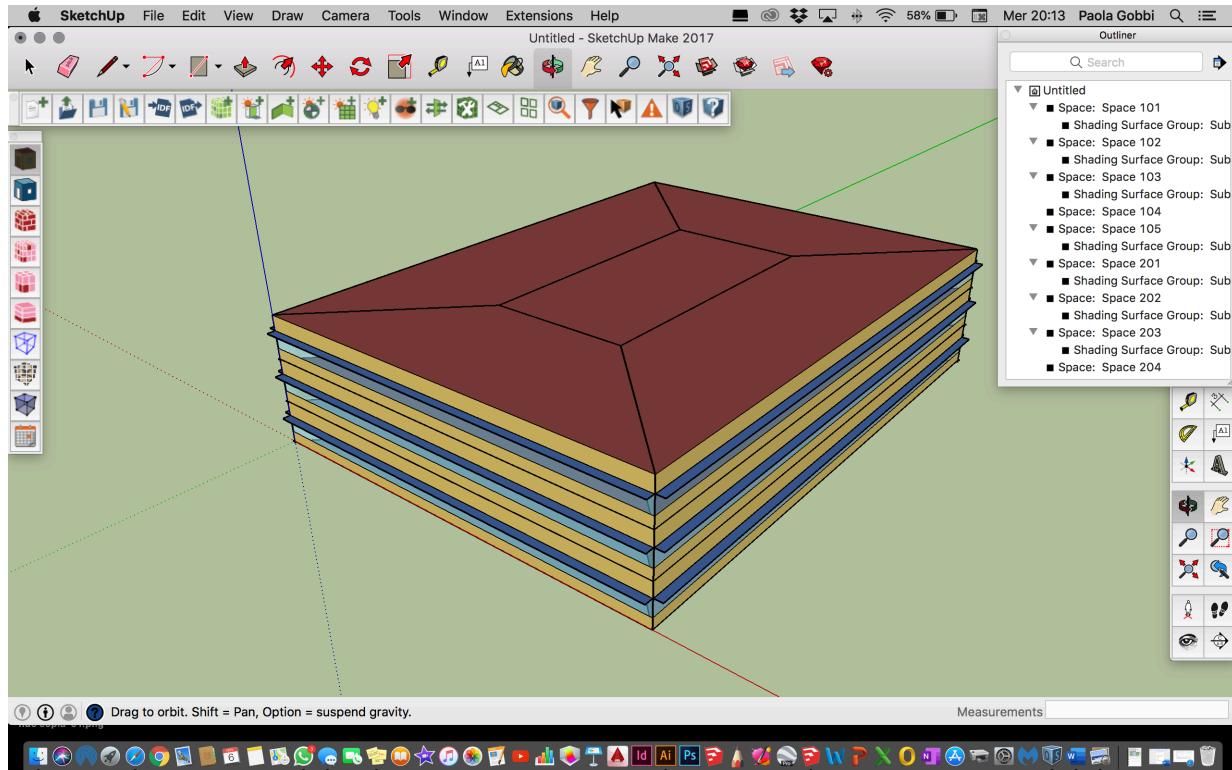
The windows in the building are created by the tool “set window to wall ratio”.

Extensions → Open studio user scripts → alter or add model elements → set window to wall ratio.

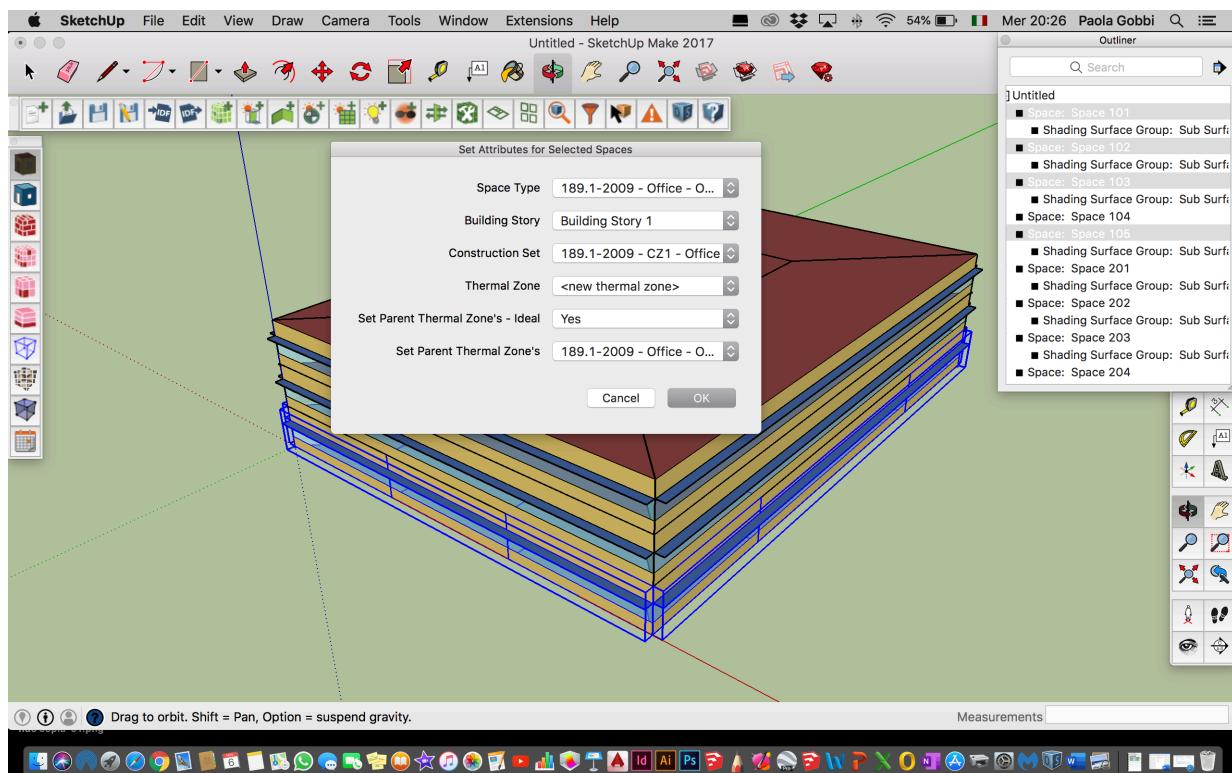


The Overhangs in the building except in the north surface are created by:

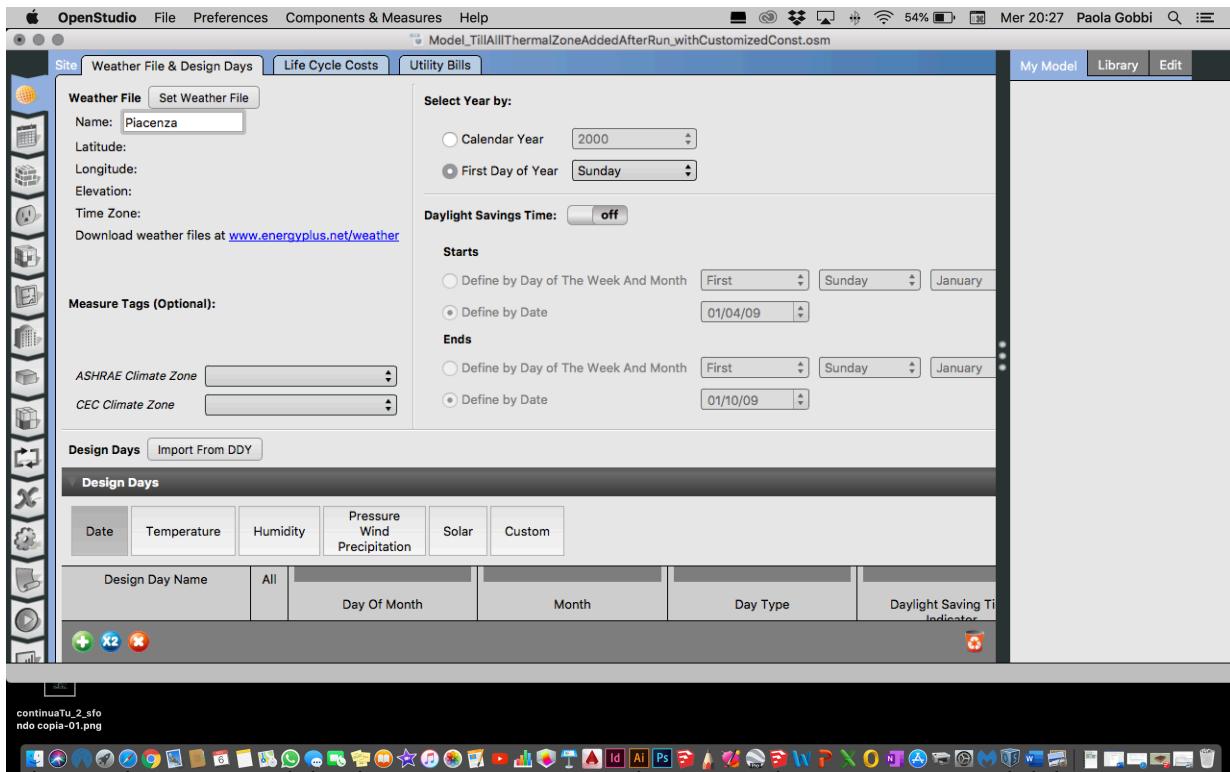
Extensions → Open studio user scripts → alter or add model elements → add overhangs by projection factor



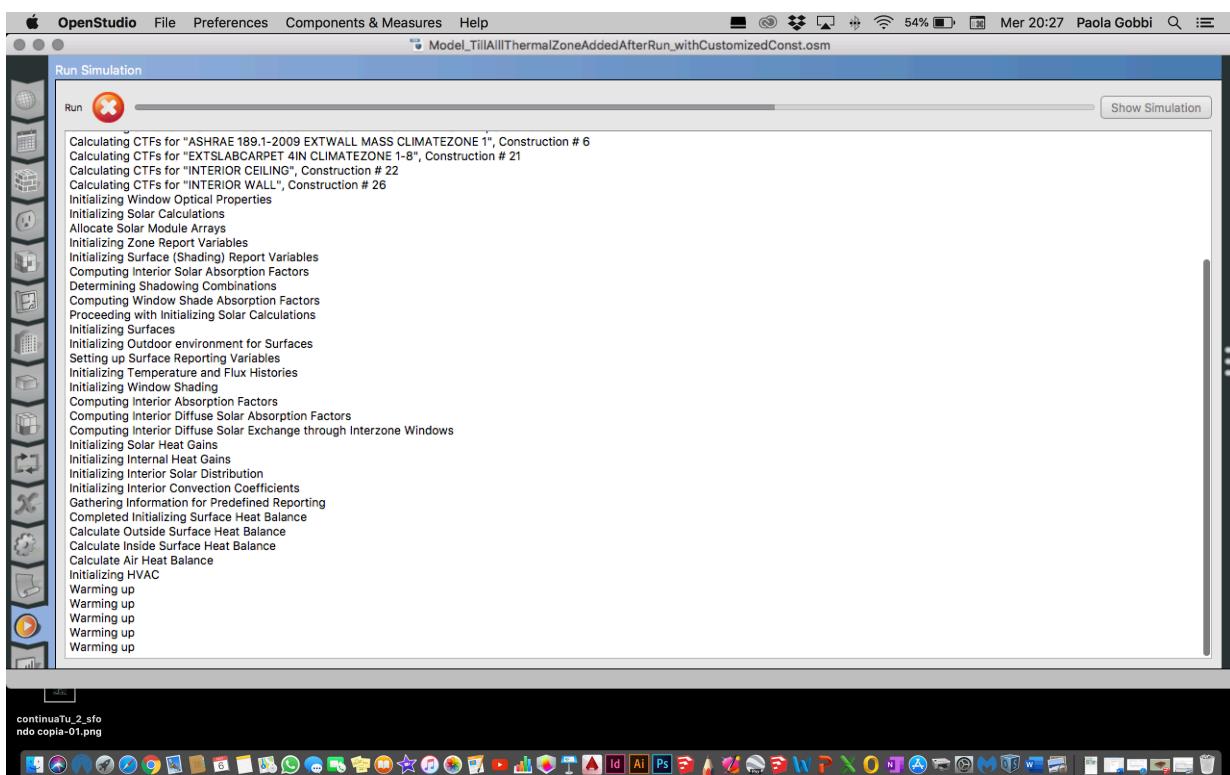
Select the spaces of each thermal zone and add the specific information.



Start Openstudio using sketchUp by entering the specific weather data of the place.



Run the model.



Now is possible review the results in the last tab.

The screenshot shows the OpenStudio software interface. The title bar reads "OpenStudio File Preferences Components & Measures Help Model_TillAllThermalZoneAddedAfterRun_withCustomizedConst.osm 54% Mer 20:27 Paola Gobbi". The main window displays a "Results Summary" report for "EnergyPlus Results". The report header includes:

- Program Version: EnergyPlus, Version 9.1.0-08d2e308bb, YMD=2019.11.10 16:18
- Tabular Output Report in Format: HTML
- Building: Building 1
- Environment: RUN PERIOD 1 ** Piacenza - ITA IGDG WMO#=160840
- Simulation Timestamp: 2019-11-10 16:18:29

The report content includes:

- A section titled "Report: Annual Building Utility Performance Summary" with a "Table of Contents" link.
- A section titled "For: Entire Facility" with a timestamp of 2019-11-10 16:18:29.
- A statement: "Values gathered over 8760.00 hours".
- A section titled "Site and Source Energy" containing a table:

	Total Energy [GJ]	Energy Per Total Building Area [MJ/m ²]	Energy Per Conditioned Building Area [MJ/m ²]
Total Site Energy	2372.16	658.93	658.93
Net Site Energy	2372.16	658.93	658.93
Total Source Energy	6133.14	1703.65	1703.65
Net Source Energy	6133.14	1703.65	1703.65

Below the table is a section titled "Site to Source Energy Conversion Factors". The bottom of the screen shows a Mac OS X-style dock with various application icons.