SIMULATION OF BUILDING PERFORMANCE

2019.12.16

Group:T3
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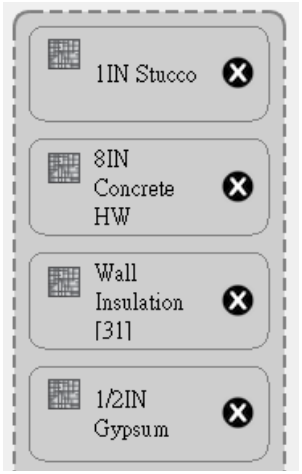
CONTENT

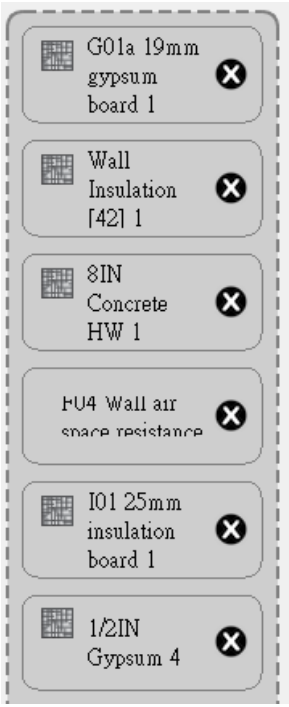
WALLS

Base wall



Wall 1

Wall 2

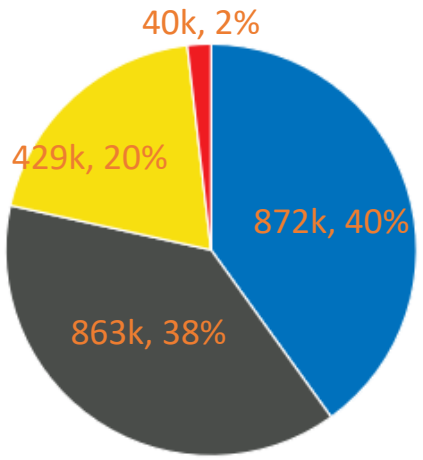


CITY LOCATIONS

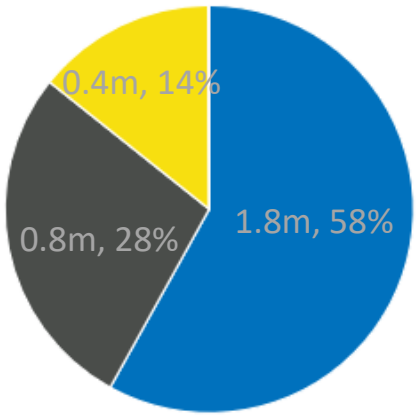
	ROMA	TAIPEI	TORONTO
LATITUDE	**41.29**	**25.03**	**43.40**
LONGITUDE	**12.29**	**121.31**	**79.25**
CLIMATE	Mediterranean climate	Humid subtropical climate	Humid continental climate
CHARACTERISTIC	During summer, regions of Mediterranean climate are strongly influenced by the subtropical ridge which keeps atmospheric conditions very dry with minimal cloud coverage. In winter, the subtropical ridge migrates towards the equator, making rainfall much more likely.	In a humid subtropical climate, summers are typically long, hot and humid. Monthly mean summer temperatures are normally between 25 and 27 °C; monthly mean temperatures in winter are often mild, typically averaging 7.5 to 16 °C.	Precipitation is relatively well distributed year-round in many areas with this climate, Snowfall occurs in all areas with a humid continental climate and in many such places is more common than rain during the height of winter. In places with sufficient wintertime precipitation, the snow cover is often deep.

COMPARISON OF ANNUAL ENERGY CONSUMPTION

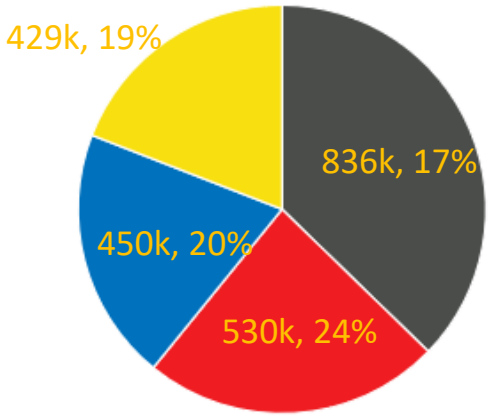
Site and Source Energy	ROMA Base Wall	TAIPEI Base Wall	TORONTO Base Wall
Total Site Energy	2177316.0	3021697.9	2244156.0
Net Site Energy	2177316.0	3021697.9	2244156.0
Total Source Energy	5071760.2	5867386.0	6394675.9
Net Source Energy	5071760.2	5867386.0	6394675.9



Roma

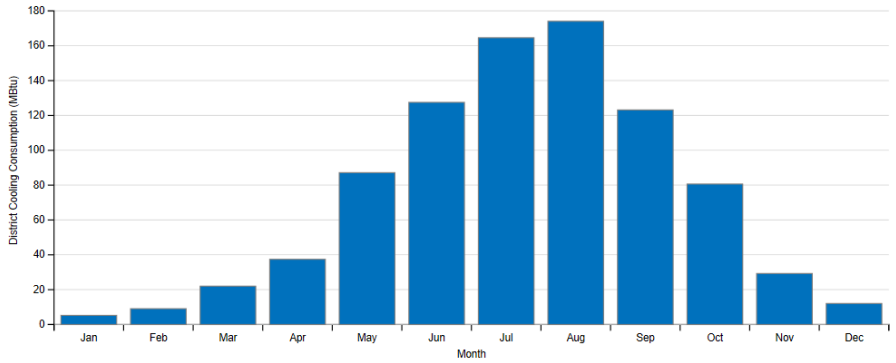


Taipei

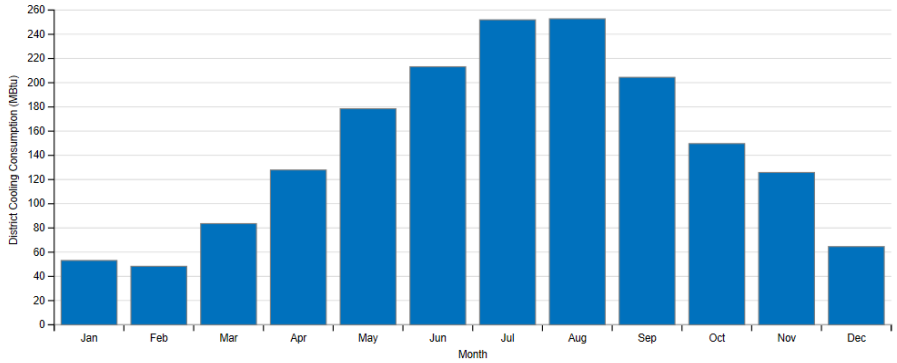


Toronto

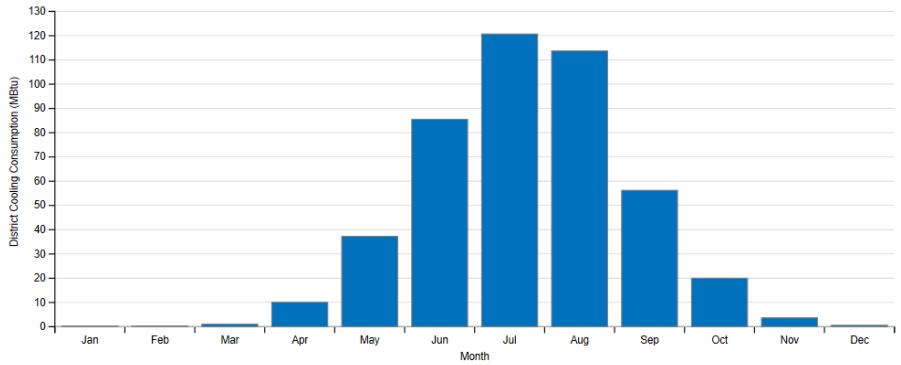
Heating
Interior Equipment
Interior Lighting
Cooling



ROMA

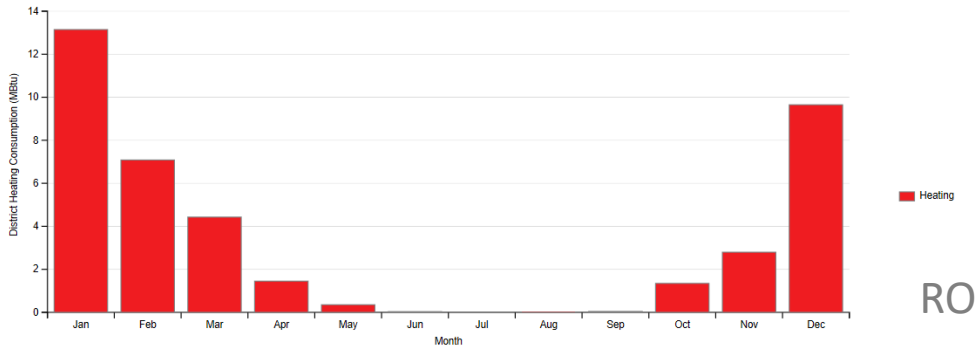


TAIPEI

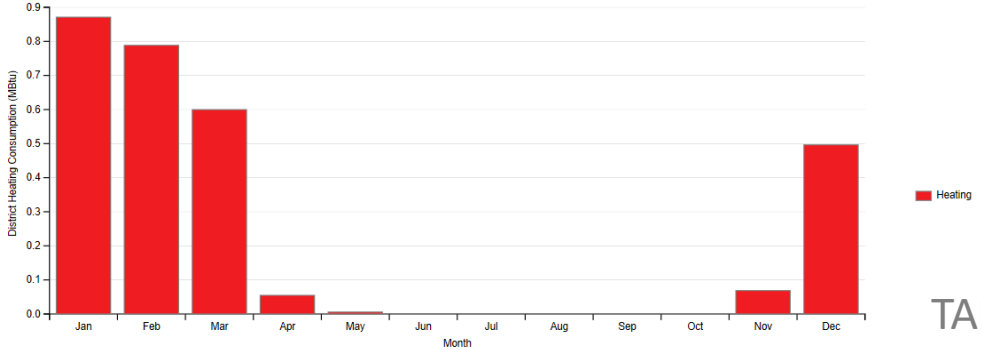


TORONTO

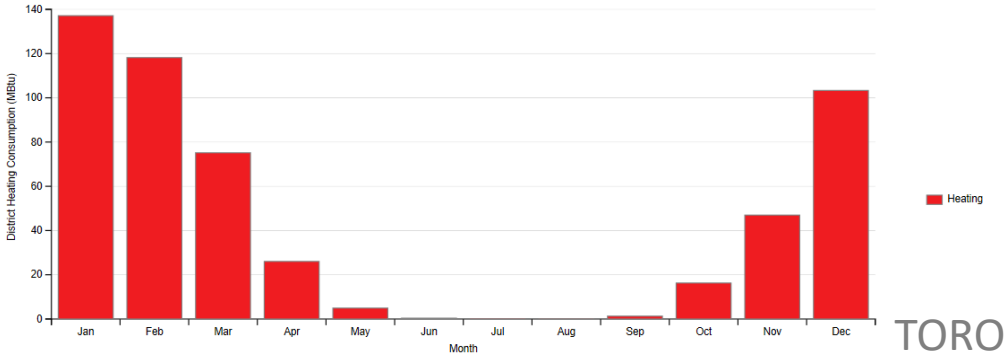
	CRITICAL MONTH	COMSUMPTION
ROMA	August	174
TAIPEI	August	253
TORONTO	July	121



ROMA



TAIPEI

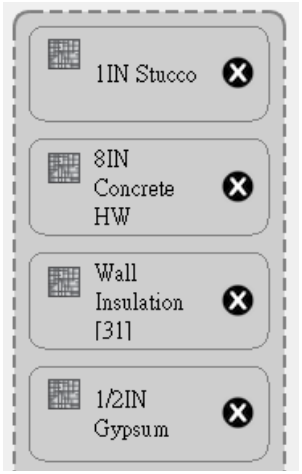


TORONTO

	CRITICAL MONTH	COMSUMPTION
ROMA	January	13
TAIPEI	January	0.9
TORONTO	January	137

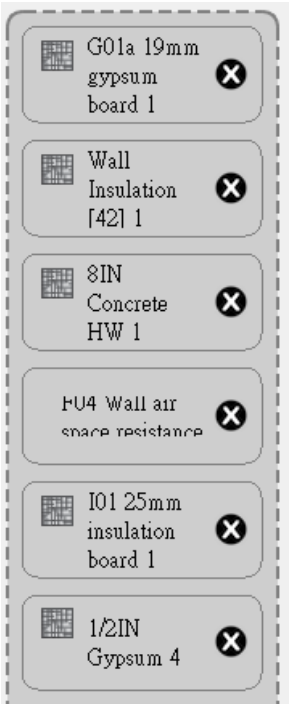
SENSITIVITY ANALYSIS OF THE WALL CONFIGURATIONS

Base wall



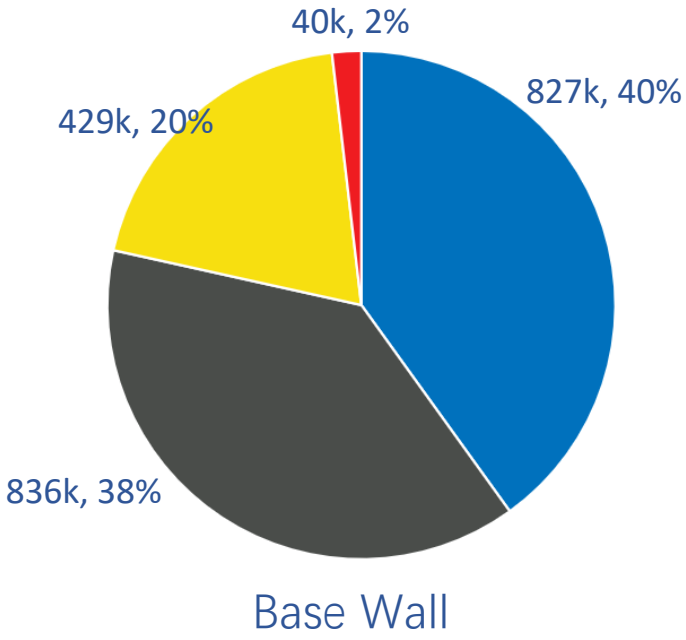
Wall 1

Wall 2

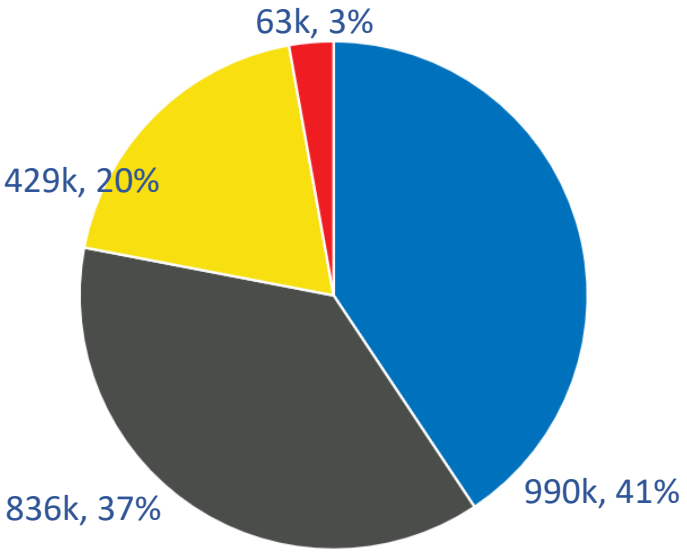


	Base wall	Wall 1	Wall 2
R Value(ft^2*h*R/Btu):	5.76	1.75	19.47

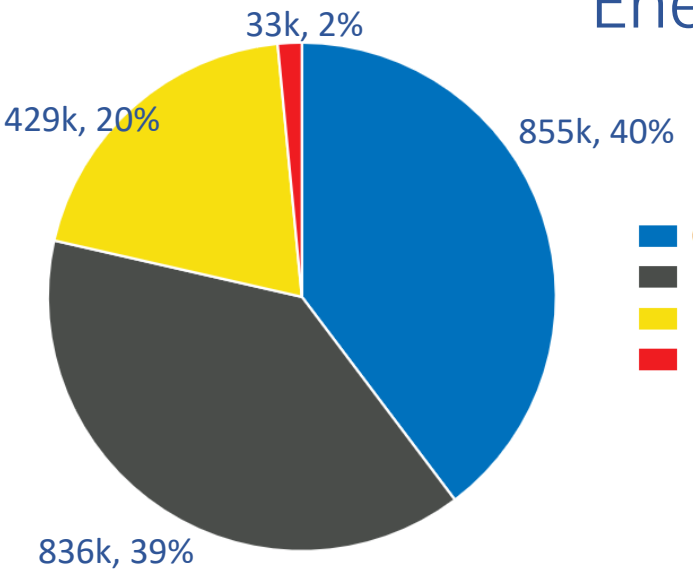
Energy Use Roma



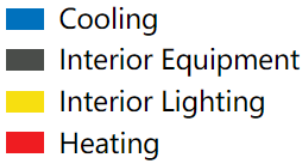
Base Wall



Wall1



Wall2



Site and Source Energy	Base Wall	Wall1	Wall2
Total Site Energy	2177316.0	2236744.0	2152208.3
Net Site Energy	2177316.0	2236744.0	2152208.3
Total Source Energy	5071716.2	5192606.8	5026151.1
Net Source Energy	5071716.2	5192606.8	5026151.1

CONCLUSION

ANNUAL HEATING AND COOLING CONSUMPTION

1.The cooling consumption and heating consumption of the same material wall in different cities will be reflected differently due to the difference in the latitude of the city. Normally the higher the latitude, the less sun radiation the city receives, thus the higher the heating consumption is and the lower the amount of cooling is.

2. The cooling consumption and heating consumption of the same material wall in different cities will be reflected differently due to the difference in climate types. In humid subtropical area (Taipei), the cooling consumption has the highest value.

3. The influence of climatic conditions on the cooling consumption and heating consumption of the wall is greater than that of latitude.

4. The same material wall had the highest cooling consumption in Taipei in August and the highest heating consumption in Toronto in January, which corresponds the weather characters.

1. The thickness of the wall effect the total thermal resistance of the wall.

2. Wall 1, which has no insulation or air gap and the lowest thermal resistance value, has the highest value for the heating and cooling consumption, as well as the total energy consumption between the 3 different wall configurations.

2. Introducing an air gap in the wall greatly affects the total thermal resistance of the wall. But it dose not effect the total energy use very much.

3. Simple adding the thickness of the wall and increase the tota thermal resistance of the wall is not an economic way to reduce the total energy consumption.

SENSITIVITY ANALYSIS