

WEEK ASSIGNMENT 6

Fatemeh Jafari (10663637)

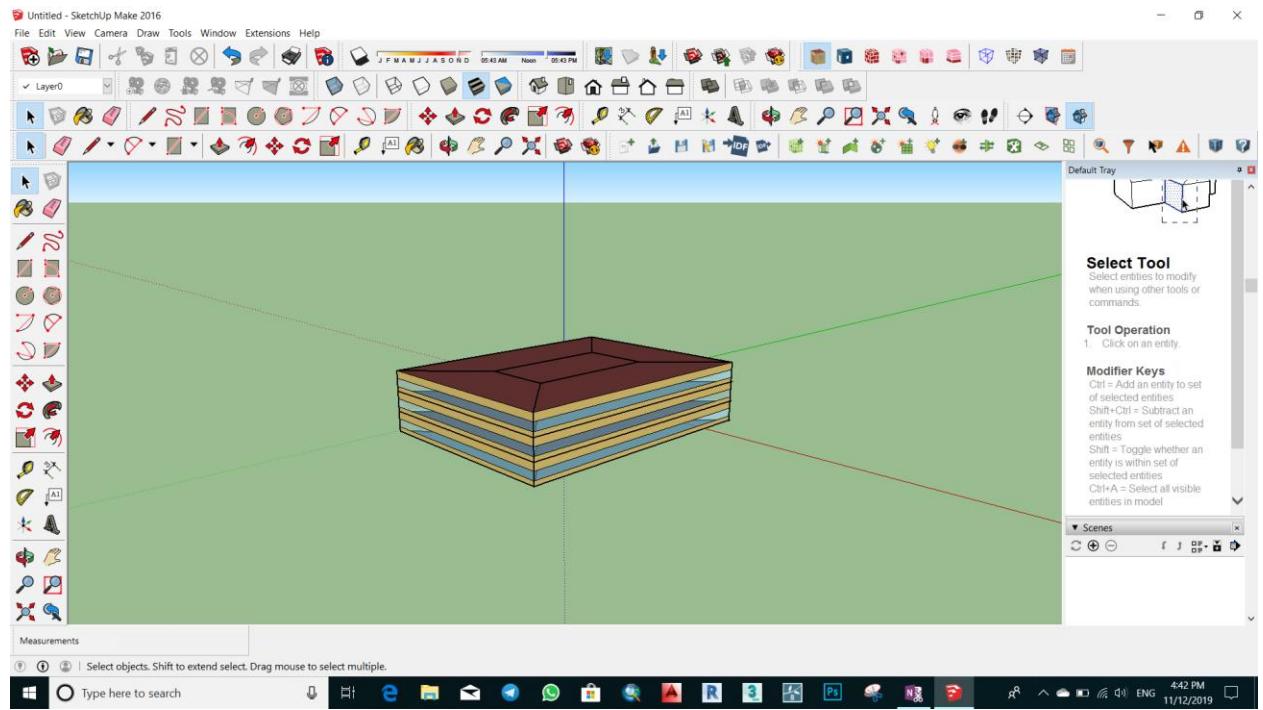
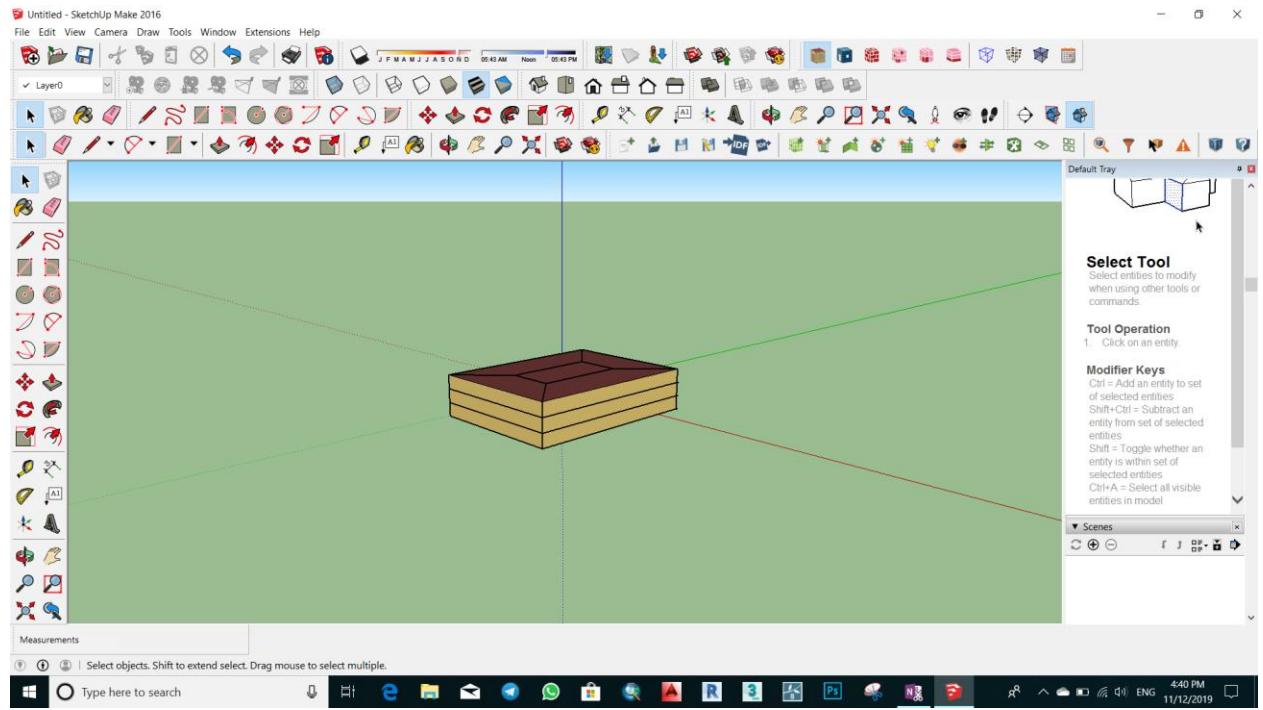
Task 1:

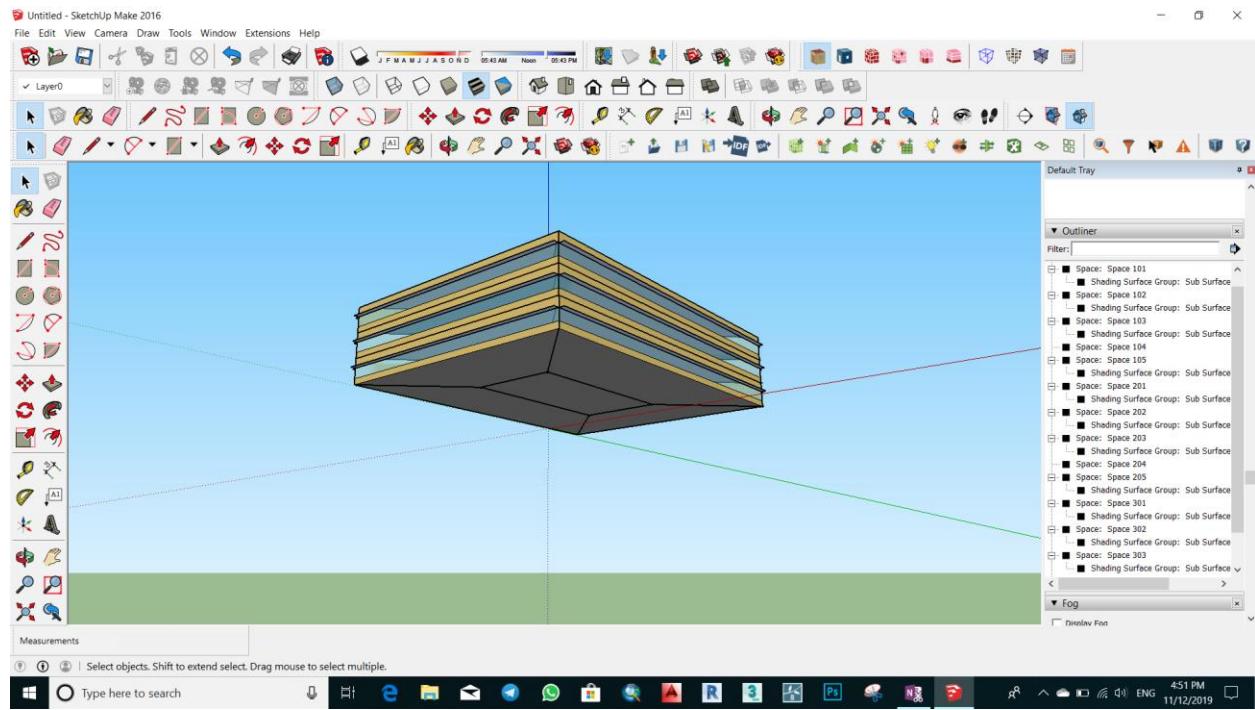
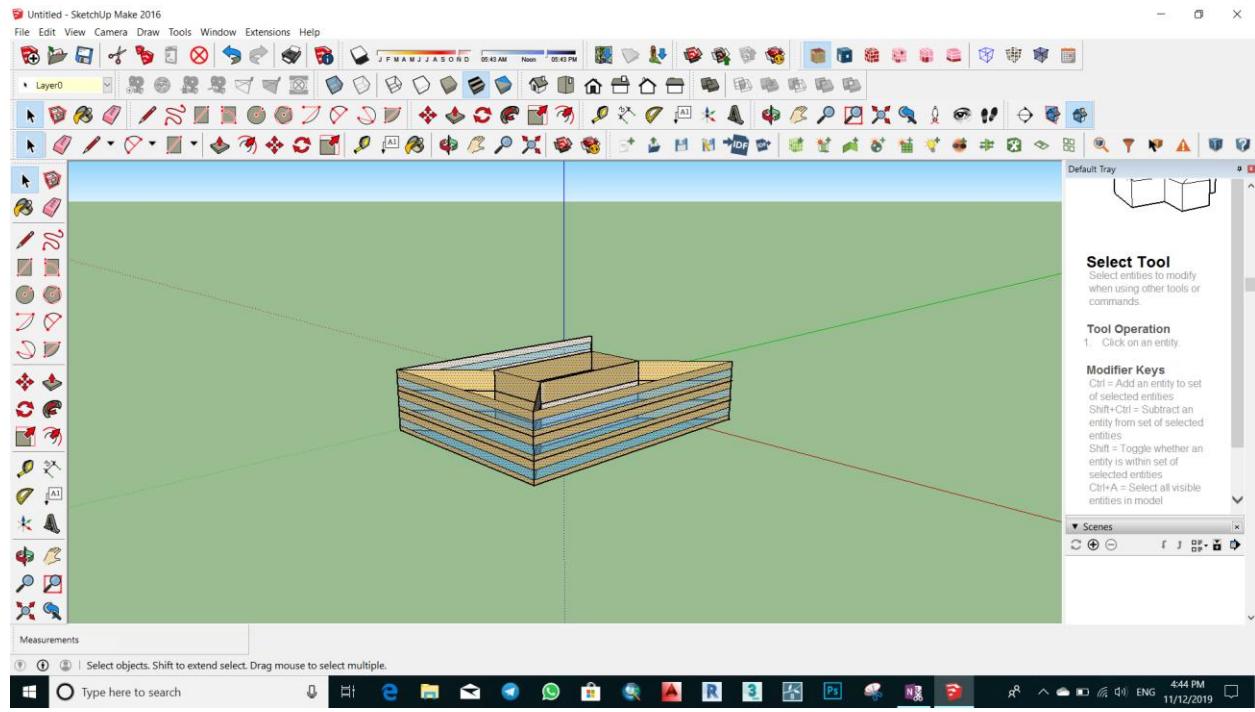
Considering the same example you solved in the previous assignment (radiative heat transfer between two parallel plates), how many shields with $\epsilon = 0.1$ should you add in order to have the new heat transfer rate to be 1% of the case without shields?

1.
$$\dot{Q}_{N \text{ shields}} = \frac{A\sigma(T_1^4 - T_2^4)}{(N+1)\left(\frac{1}{\epsilon} + \frac{1}{\epsilon} - 1\right)} = \frac{1}{N+1} \dot{Q}_{\text{No shields}}$$
2.
$$\dot{Q}_{N \text{ shields}} = \frac{1}{N+1} \dot{Q}_{\text{No shields}}$$
3.
$$N = 1 * \left(\frac{\dot{Q}_{N \text{ shields}}}{\dot{Q}_{\text{No shields}}} \right) - 1$$
4.
$$N = 1 * \left(\frac{100\%}{1\%} \right) - 1$$
5.
$$N = 100 - 1 \quad N = 99$$

Task2:

You should create a pdf file with screenshots of all of the steps we went through (clearly from your own file) and explain briefly the reason behind the use of each step





Untitled11.osm

File Preferences Components & Measures Help

Run Simulation Output Tree

Run

Warnings: 15
Errors: 0

Output:

```
Warming up (2)  
Warming up (3)  
Warming up (4)  
Warming up (5)  
Warming up (6)  
Starting Simulation at 08/21 for PIACENZA ANN CLG .4% CONDENS WB=>MD8  
Installing New Environment Parameters  
Warming up (1)  
Warming up (2)  
Warming up (3)  
Warming up (4)  
Warming up (5)  
Warming up (6)  
Starting Simulation at 01/21 for PIACENZA ANN HTG 99.6% CONDENS D8  
Installing New Environment Parameters  
Warming up (1)  
Warming up (2)  
Warming up (3)  
Warming up (4)  
Warming up (5)  
Warming up (6)  
Starting Simulation at 01/21 for PIACENZA ANN HTG WIND 99.6% CONDENS WS=>MCDB  
Installing New Environment Parameters  
Warming up (1)  
Warming up (2)  
Warming up (3)  
Warming up (4)  
Warming up (5)  
Warming up (6)  
Starting Simulation at 01/01 for RUN PERIOD 1  
Updating Shadowing Calculations, Start Date=01/21  
Continuing Simulation at 01/21 for RUN PERIOD 1  
Updating Shadowing Calculations, Start Date=02/19  
Continuing Simulation at 02/19 for RUN PERIOD 1  
Updating Shadowing Calculations, Start Date=02/20  
Continuing Simulation at 03/02 for RUN PERIOD 1  
Updating Shadowing Calculations, Start Date=03/22  
Continuing Simulation at 03/22 for RUN PERIOD 1  
Updating Shadowing Calculations, Start Date=04/11  
Continuing Simulation at 04/11 for RUN PERIOD 1
```

5:08 PM 11/12/2019 ENG

Untitled11.osm

File Preferences Components & Measures Help

Run Simulation Output Tree

Run

Finished

Warnings: 24
Errors: 0

Output:

```
Warming up (4)  
Warming up (5)  
Warming up (6)  
Starting Simulation at 01/01 for RUN PERIOD 1  
Updating Shadowing Calculations, Start Date=01/21  
Continuing Simulation at 01/21 for RUN PERIOD 1  
Updating Shadowing Calculations, Start Date=02/10  
Continuing Simulation at 02/10 for RUN PERIOD 1  
Updating Shadowing Calculations, Start Date=02/10  
Continuing Simulation at 02/10 for RUN PERIOD 1  
Updating Shadowing Calculations, Start Date=02/10  
Continuing Simulation at 03/02 for RUN PERIOD 1  
Updating Shadowing Calculations, Start Date=03/22  
Continuing Simulation at 03/22 for RUN PERIOD 1  
Updating Shadowing Calculations, Start Date=04/11  
Continuing Simulation at 04/11 for RUN PERIOD 1  
Updating Shadowing Calculations, Start Date=05/01  
Continuing Simulation at 05/01 for RUN PERIOD 1  
Updating Shadowing Calculations, Start Date=05/01  
Continuing Simulation at 05/21 for RUN PERIOD 1  
Updating Shadowing Calculations, Start Date=05/10  
Continuing Simulation at 06/10 for RUN PERIOD 1  
Updating Shadowing Calculations, Start Date=06/19  
Continuing Simulation at 06/30 for RUN PERIOD 1  
Updating Shadowing Calculations, Start Date=07/20  
Continuing Simulation at 07/20 for RUN PERIOD 1  
Updating Shadowing Calculations, Start Date=08/09  
Continuing Simulation at 08/09 for RUN PERIOD 1  
Updating Shadowing Calculations, Start Date=08/29  
Continuing Simulation at 08/29 for RUN PERIOD 1  
Updating Shadowing Calculations, Start Date=09/19  
Continuing Simulation at 09/18 for RUN PERIOD 1  
Updating Shadowing Calculations, Start Date=10/08  
Continuing Simulation at 10/08 for RUN PERIOD 1  
Updating Shadowing Calculations, Start Date=10/28  
Continuing Simulation at 10/28 for RUN PERIOD 1  
Updating Shadowing Calculations, Start Date=11/17  
Continuing Simulation at 11/17 for RUN PERIOD 1  
Updating Shadowing Calculations, Start Date=12/07  
Continuing Simulation at 12/07 for RUN PERIOD 1  
Updating Shadowing Calculations, Start Date=12/27  
Continuing Simulation at 12/27 for RUN PERIOD 1  
Writing tabular output file results using HTML format.  
Computing Life Cycle Costs and Reporting  
Writing final SQL report  
Energy Use Report:00hr 00min 2.82sec  
Script executing from: C:/Users/Apache/AppData/Local/Temp/OpenStudio.y16524/resources/run/6-UserScript-0  
Found UserScript 'OpenStudio Results'.  
result = true  
Processed 1 base script and 0 merged scripts
```

5:09 PM 11/12/2019 ENG

Untitled11.osm

File Preferences Components & Measures Help

Results Summary

Reports: OpenStudio Results

OpenStudio Results

Model Summary

Building Summary

Information	Value	Units
Building Name	Building 1	building_name
Net Site Energy	1,340,953	kBtu
Total Building Area	32,292	ft ²
EUI (Based on Net Site Energy and Total Building Area)	41.53	kBtu/ft ²
OpenStudio Standards Building Type		

Weather Summary

	Value
Weather File	Piacenza - ITAIGDG WMO#=160840
Latitude	44.92
Longitude	9.73
Elevation	440 (ft)
Time Zone	1.00
North Axis Angle	0.00
ASHRAE Climate Zone	

Type here to search

Untitled11.osm

File Preferences Components & Measures Help

Results Summary

Reports: OpenStudio Results

Sizing Period Design Days

	Maximum Dry Bulb (F)	Daily Temperature Range (R)	Humidity Value	Humidity Type	Wind Speed (mph)	Wind Direction
PIACENZA ANN CLG .4% CONDENS DB=>MBW	91.58	21.42	72.86	Wetbulb [F]	5.14	90.0
PIACENZA ANN CLG .4% CONDENS DP=>MDB	81.32	21.42	73.4	Dewpoint [F]	5.14	90.0
PIACENZA ANN CLG .4% CONDENS ENTH=>MDB	86.54	21.42	32.2	Enthalpy [Btu/lb]	5.14	90.0
PIACENZA ANN CLG .4% CONDENS WB=>MDB	86.18	21.42	76.28	Wetbulb [F]	5.14	90.0
PIACENZA ANN HTG 99.6% CONDENS DB	21.02	0.0	21.02	Wetbulb [F]	4.47	250.0
PIACENZA ANN HTG WIND 99.6% CONDENS WS=>MCDB	42.44	0.0	42.44	Wetbulb [F]	19.91	250.0
PIACENZA ANN HUM_N 99.6% CONDENS DP=>MCDB	38.3	0.0	11.66	Dewpoint [F]	4.47	250.0

Unmet Hours Summary

Time Setpoint Not Met	Time (hr)
During Heating	0.0
During Cooling	0.0
During Occupied Heating	0.0
During Occupied Cooling	0.0

Unmet Hours Tolerance

Tolerance for Time Setpoint Not Met	Temperature (F)
Heating	0.36
Cooling	0.36

Type here to search

Untitled11.osm

File Preferences Components & Measures Help

Results Summary

Reports: OpenStudio Results

Model Summary

- Annual Overview
- Monthly Overview
- Utility Bills/Rates
- Envelope
- Space Type Breakdown
- Space Type Summary
- Interior Lighting Summary
- Plug Loads Summary
- Exterior Lighting
- Water Use Equipment
- HVAC Load Profiles
- Zone Conditions
- Zone Overview
- Zone Equipment Detail
- Air Loops Detail
- Plant Loops Detail
- Outdoor Air
- Cash Flow
- Site and Source Summary
- Schedule Overview

Unmet Hours Summary

Time Setpoint Not Met	Time (hr)
During Heating	0.0
During Cooling	0.0
During Occupied Heating	0.0
During Occupied Cooling	0.0

Unmet Hours Tolerance

Tolerance for Time Setpoint Not Met	Temperature (F)
Heating	0.36
Cooling	0.36

Annual Overview

EUI Use - view table

Interior Equipment
Interior Lighting
Heating
Cooling

Untitled11.osm

File Preferences Components & Measures Help

Results Summary

Reports: OpenStudio Results

Model Summary

- Annual Overview**
- Monthly Overview
- Utility Bills/Rates
- Envelope
- Space Type Breakdown
- Space Type Summary
- Interior Lighting Summary
- Plug Loads Summary
- Exterior Lighting
- Water Use Equipment
- HVAC Load Profiles
- Zone Conditions
- Zone Overview
- Zone Equipment Detail
- Air Loops Detail
- Plant Loops Detail
- Outdoor Air
- Cash Flow
- Site and Source Summary
- Schedule Overview

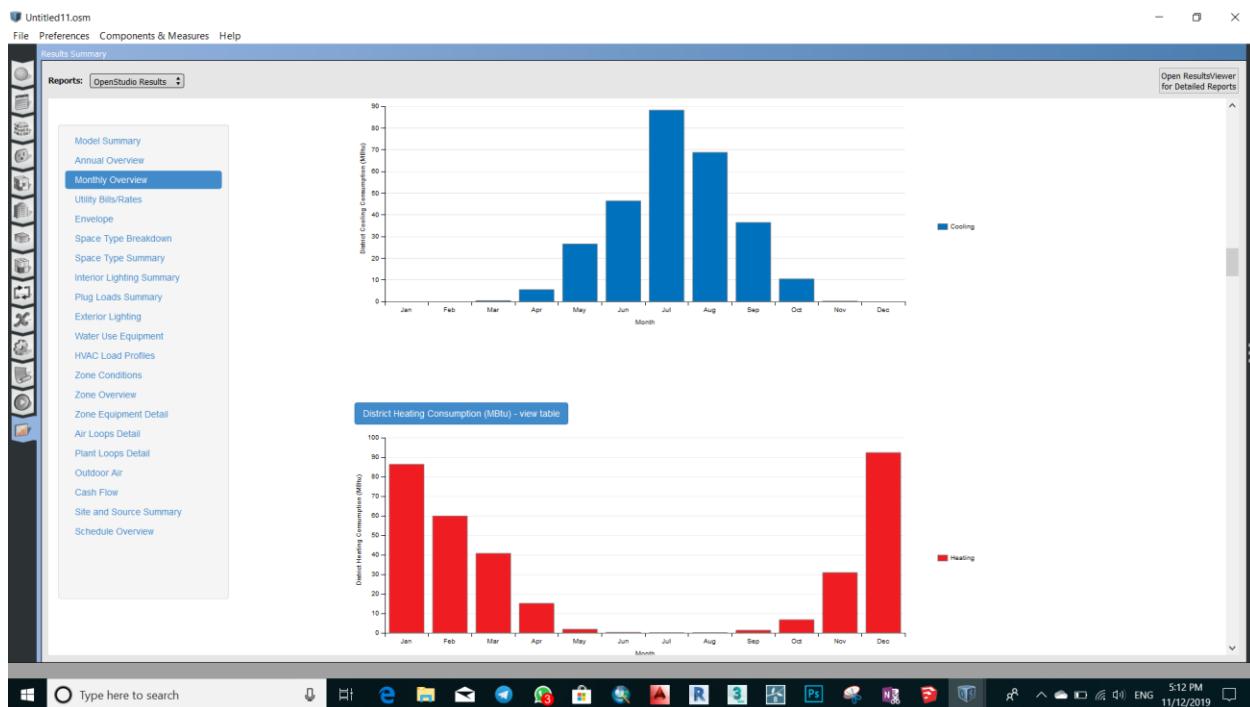
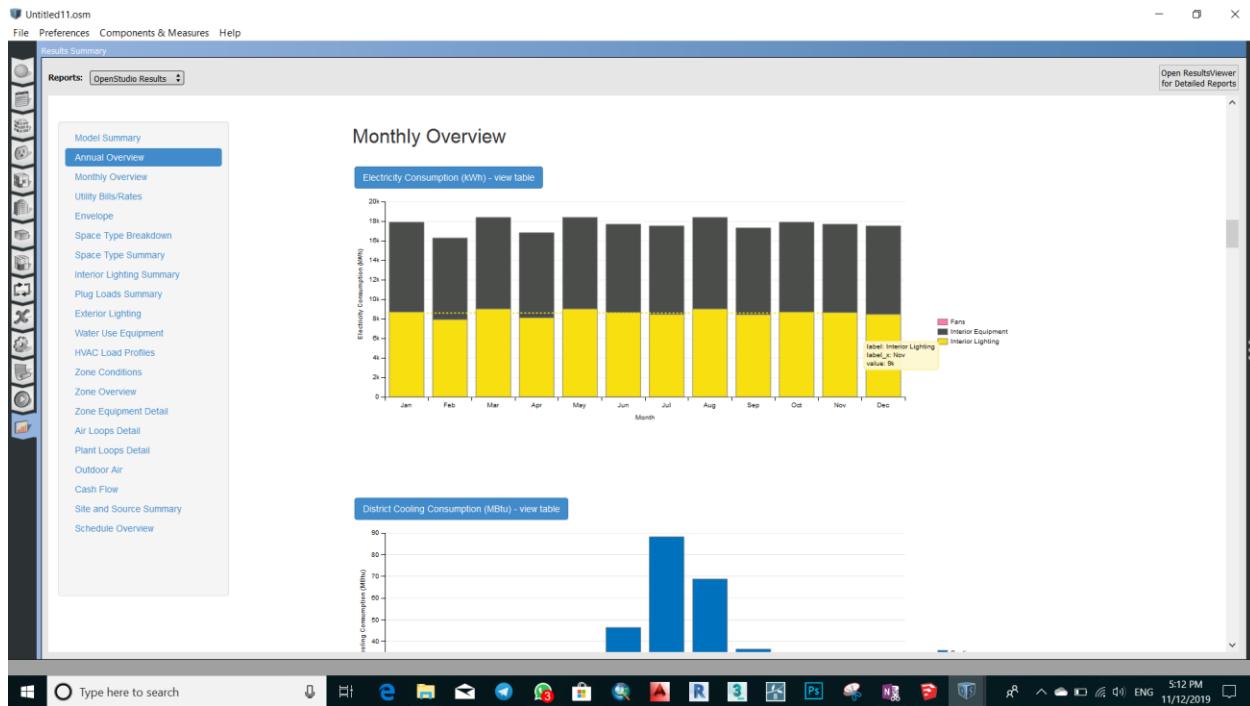
Energy Use - view table

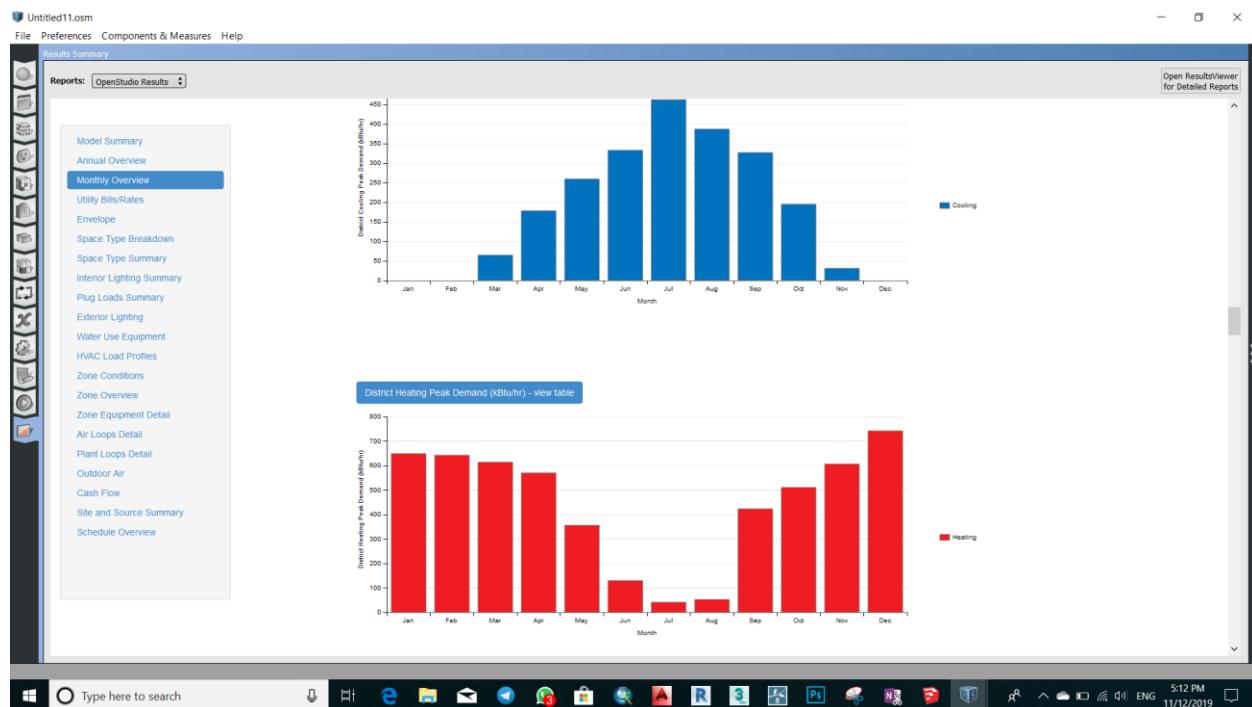
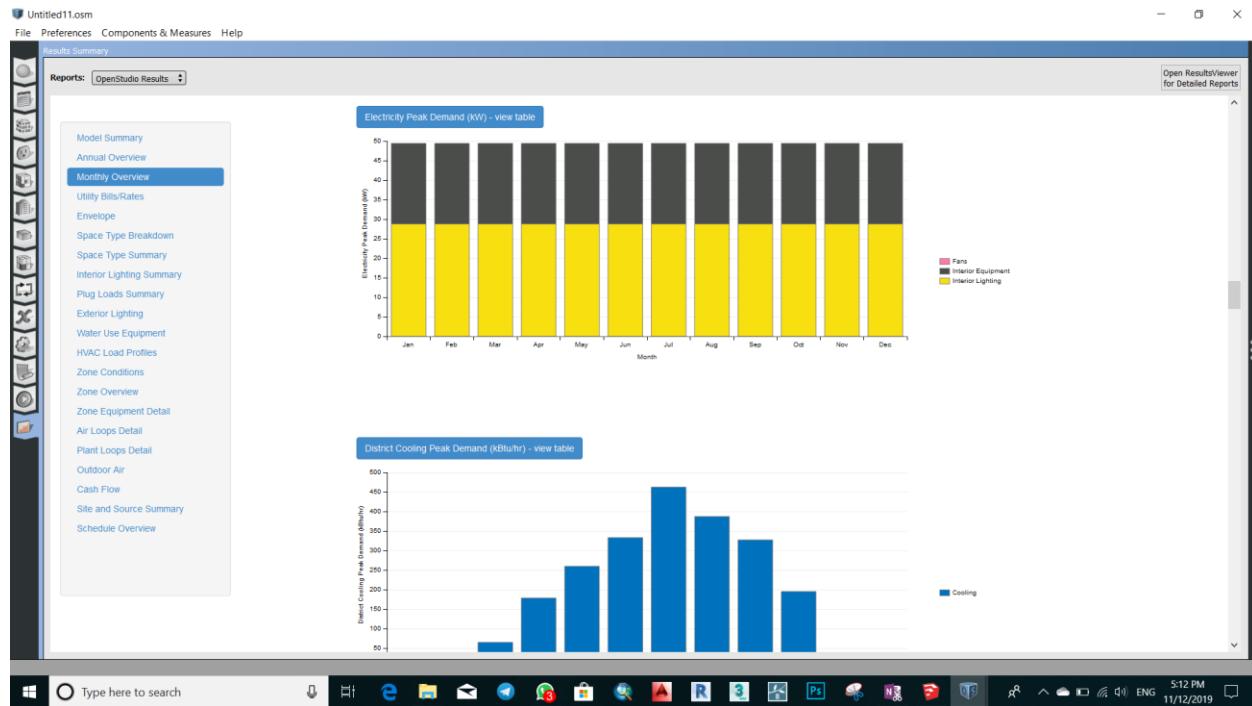
Electricity
District Heating
District Cooling

EUI - Electricity - view table

Interior Equipment
Interior Lighting

EUI - Gas - view table





Untitled11.osm

File Preferences Components & Measures Help

Results Summary

Reports: OpenStudio Results

Model Summary
Annual Overview
Monthly Overview
Utility Bills/Rates
Envelope
Space Type Breakdown
Space Type Summary
Interior Lighting Summary
Plug Loads Summary
Exterior Lighting
Water Use Equipment
HVAC Load Profiles
Zone Conditions
Zone Overview
Zone Equipment Detail
Air Loops Detail
Plant Loops Detail
Outdoor Air
Cash Flow
Site and Source Summary
Schedule Overview

Utility Bills/Rates

No Data to Show for Utility Bills/Rates

Envelope

Base Surface Constructions

Construction	Net Area (ft ²)	Surface Count	R Value (ft ² h/R/Btu)
ASHRAE 189.1-2009 ExtRoof IEAD ClimateZone 1	10,764	4	19.96
ASHRAE 189.1-2009 ExtRoof IEAD ClimateZone 2-5	2,153	1	24.73
ASHRAE 189.1-2009 ExtWall Mass ClimateZone 1	8,268	12	5.76

Sub Surface Constructions

Construction	Area (ft ²)	Surface Count	U-Factor (Btu/ft ² h/R)
ASHRAE 189.1-2009 ExtWindow ClimateZone 1	5,512	12	

WWR & Skylight Ratio

Description	Total (%)	North (%)	East (%)	South (%)	West (%)
Gross Window-Wall Ratio	40.0	40.0	40.0	40.0	40.0
Gross Window-Wall Ratio (Conditioned)	40.0	40.0	40.0	40.0	40.0
Skylight-Roof Ratio	0.0				

5:12 PM 11/12/2019 ENG

Untitled11.osm

File Preferences Components & Measures Help

Results Summary

Reports: OpenStudio Results

Model Summary
Annual Overview
Monthly Overview
Utility Bills/Rates
Envelope
Space Type Breakdown
Space Type Summary
Interior Lighting Summary
Plug Loads Summary
Exterior Lighting
Water Use Equipment
HVAC Load Profiles
Zone Conditions
Zone Overview
Zone Equipment Detail
Air Loops Detail
Plant Loops Detail
Outdoor Air
Cash Flow
Site and Source Summary
Schedule Overview

WWR & Skylight Ratio

Description	Total (%)	North (%)	East (%)	South (%)	West (%)
Gross Window-Wall Ratio	40.0	40.0	40.0	40.0	40.0
Gross Window-Wall Ratio (Conditioned)	40.0	40.0	40.0	40.0	40.0
Skylight-Roof Ratio	0.0				

Space Type Breakdown

Space Type Breakdown - view table

Space Type Summary

189.1-2009 - Office - OpenOffice - CZ1-3 (12 spaces and 3 thermal zones)

Definition	Value	Unit	Inst. Multiplier
189.1-2009 - Office - OpenOffice - CZ1-3 People Definition	0.0052	people/ft ²	1.0

5:12 PM 11/12/2019 ENG

Untitled11.osm

File Preferences Components & Measures Help

Results Summary

Reports: OpenStudio Results

Space Type Summary

189.1-2009 - Office - OpenOffice - CZ1-3
(12 spaces and 3 thermal zones)

Definition	Value	Unit	Inst. Multiplier
189.1-2009 - Office - OpenOffice - CZ1-3 People Definition	0.0052	people/ft ²	1.0
189.1-2009 - Office - OpenOffice - CZ1-3 Electric Equipment Definition	0.7100	W/ft ²	1.0
189.1-2009 - Office - OpenOffice - CZ1-3 Lights Definition	0.9900	W/ft ²	1.0
189.1-2009 - Office - OpenOffice - CZ1-3 Infiltration	0.0595	cfm/ext surf area ft ²	
189.1-2009 - Office - OpenOffice - CZ1-3 Ventilation (outdoor air method Sum)	20.0000	cfm/person	

189.1-2009 - Office - OpenOffice - CZ4-8
(3 spaces and 0 thermal zones)

Definition	Value	Unit	Inst. Multiplier
189.1-2009 - Office - OpenOffice - CZ4-8 People Definition	0.0052	people/ft ²	1.0
189.1-2009 - Office - OpenOffice - CZ4-8 Electric Equipment Definition	0.7100	W/ft ²	1.0
189.1-2009 - Office - OpenOffice - CZ4-8 Lights Definition	0.9900	W/ft ²	1.0
189.1-2009 - Office - OpenOffice - CZ4-8 Infiltration	0.0446	cfm/ext surf area ft ²	
189.1-2009 - Office - OpenOffice - CZ4-8 Ventilation (outdoor air method Sum)	20.0000	cfm/person	

Interior Lighting Summary

Interior Lighting Summary

Type here to search

5:12 PM 11/12/2019

Untitled11.osm

File Preferences Components & Measures Help

Results Summary

Reports: OpenStudio Results

Interior Lighting Summary

Interior Lighting Summary

Zone	Lighting Power Density (W/ft ²)	Total Power (W)	Schedule Name	Scheduled Hours/Week (hr)	Actual Load Hours/Week (hr)	Return Air Fraction	Consumption (kWh)
THERMAL ZONE 1 189.1-2009 - OFFICE - OPENOFFICE - CZ1-3 LIGHTS	0.99	10656.27	OFFICE BLDG LIGHT	61.85	61.85	0.0000	34369.45
THERMAL ZONE 2 189.1-2009 - OFFICE - OPENOFFICE - CZ1-3 LIGHTS	0.99	10656.27	OFFICE BLDG LIGHT	61.85	61.85	0.0000	34369.45
THERMAL ZONE 3 189.1-2009 - OFFICE - OPENOFFICE - CZ1-3 LIGHTS	0.99	10656.27	OFFICE BLDG LIGHT	61.85	61.85	0.0000	34369.45

Plug Loads Summary

Electric Plug Load Consumption

Electricity Annual Value (kWh)	
InteriorEquipment:Electricity Zone THERMAL ZONE 1	36200.0
InteriorEquipment:Electricity Zone THERMAL ZONE 2	36200.0
InteriorEquipment:Electricity Zone THERMAL ZONE 3	36200.0

No Data to Show for Exterior Lighting

Water Use Equipment

Type here to search

5:12 PM 11/12/2019

Untitled11.osm

File Preferences Components & Measures Help

Results Summary

Reports: OpenStudio Results

Model Summary
Annual Overview
Monthly Overview
Utility Bills/Rates
Envelope
Space Type Breakdown
Space Type Summary
Interior Lighting Summary
Plug Loads Summary
Exterior Lighting
Water Use Equipment
HVAC Load Profiles
Zone Conditions
Zone Overview
Zone Equipment Detail
Air Loops Detail
Plant Loops Detail
Outdoor Air
Cash Flow
Site and Source Summary
Schedule Overview

Exterior Lighting

No Data to Show for Exterior Lighting

Water Use Equipment

No Data to Show for Water Use Equipment

HVAC Load Profiles

Monthly Load Profiles - view table

Cooling/Heating Level (MWh)

Average Outdoor Ad-Dry Bulb (F)

Legend: Heating Load (Red), Cooling Load (Blue), Average Outdoor Ad-Dry Bulb (F) (Green)

Month

Zone Conditions

Temperature (Table values represent hours spent in each temperature range)

Month	Unmet Htg (hr)	Unmet Htg - Occ (hr)	< 56 (F)	56-61 (F)	61-66 (F)	66-70 (F)	68-70 (F)	70-72 (F)	72-74 (F)	74-76 (F)	76-78 (F)	78-83 (F)	>= 88 (F)	Unmet Clg (hr)	Unmet Clg - Occ (hr)	Mean Temp (F)
JAN	0	0	0	1060	1045	552	2394	1279	725	1705	0	0	0	0	0	69.1 (F)
FEB	0	0	0	1128	715	275	1969	872	703	2531	331	217	0	0	0	70.3 (F)
MAR	0	0	0	1568	528	219	2206	755	572	2361	257	294	0	0	0	69.9 (F)
APR	0	0	0	802	948	976	989	949	678	402	282	50.8 (%)	0	0	0	45.8 (%)
MAY	0	0	0	1417	1109	602	149	13	0	402	282	50.8 (%)	0	0	0	45.8 (%)
JUN	0	0	0	1578	1169	976	649	329	108	8	45.4 (%)	0	0	0	45.4 (%)	
JUL	0	0	0	902	703	2531	331	217	0	0	0	0	0	0	0	70.3 (F)
AUG	0	0	0	703	572	2361	257	294	0	0	0	0	0	0	0	69.9 (F)
SEP	0	0	0	872	755	2206	2394	1279	725	1705	331	217	0	0	0	69.1 (F)
OCT	0	0	0	948	528	1568	1578	1169	976	649	402	282	50.8 (%)	0	0	45.8 (%)
NOV	0	0	0	1109	755	2361	2394	1279	725	1705	331	217	0	0	0	69.1 (F)
DEC	0	0	0	149	13	0	402	282	50.8 (%)	0	0	0	0	0	0	45.8 (%)

Untitled11.osm

File Preferences Components & Measures Help

Results Summary

Reports: OpenStudio Results

Model Summary
Annual Overview
Monthly Overview
Utility Bills/Rates
Envelope
Space Type Breakdown
Space Type Summary
Interior Lighting Summary
Plug Loads Summary
Exterior Lighting
Water Use Equipment
HVAC Load Profiles
Zone Conditions
Zone Overview
Zone Equipment Detail
Air Loops Detail
Plant Loops Detail
Outdoor Air
Cash Flow
Site and Source Summary
Schedule Overview

Zone Conditions

Temperature (Table values represent hours spent in each temperature range)

Zone	Unmet Htg (hr)	Unmet Htg - Occ (hr)	< 56 (F)	56-61 (F)	61-66 (F)	66-70 (F)	68-70 (F)	70-72 (F)	72-74 (F)	74-76 (F)	76-78 (F)	78-83 (F)	>= 88 (F)	Unmet Clg (hr)	Unmet Clg - Occ (hr)	Mean Temp (F)
Thermal Zone 1	0	0	0	1060	1045	552	2394	1279	725	1705	0	0	0	0	0	69.1 (F)
Thermal Zone 2	0	0	0	1128	715	275	1969	872	703	2531	331	217	0	0	0	70.3 (F)
Thermal Zone 3	0	0	0	1568	528	219	2206	755	572	2361	257	294	0	0	0	69.9 (F)

Humidity (Table values represent hours spent in each Humidity range)

Zone	< 30 (%)	30-35 (%)	35-40 (%)	40-45 (%)	45-50 (%)	50-55 (%)	55-60 (%)	60-65 (%)	65-70 (%)	70-75 (%)	>= 80 (%)	Mean Relative Humidity (%)
Thermal Zone 1	834	832	797	802	948	976	989	949	678	402	282	50.8 (%)
Thermal Zone 2	839	843	829	1168	1791	1417	1109	602	149	13	0	45.8 (%)
Thermal Zone 3	1146	921	819	1057	1578	1169	976	649	329	108	8	45.4 (%)

Zone Overview

Zone Summary

Untitled11.osm

File Preferences Components & Measures Help

Results Summary

Reports: OpenStudio Results

Zone Overview

Model Summary
Annual Overview
Monthly Overview
Utility Bills/Rates
Envelope
Space Type Breakdown
Space Type Summary
Interior Lighting Summary
Plug Loads Summary
Exterior Lighting
Water Use Equipment
HVAC Load Profiles
Zone Conditions
Zone Overview
Zone Equipment Detail
Air Loops Detail
Plant Loops Detail
Outdoor Air
Cash Flow
Site and Source Summary
Schedule Overview

	Area (ft ²)	Conditioned (Y/N)	Part of Total Floor Area (Y/N)	Volume (ft ³)	Multiplier	Gross Wall Area (ft ²)	Window Glass Area (ft ²)	Lighting (W/ft ²)	People (ft ² /person)	Plug and Process (W/ft ²)
THERMAL ZONE 1	10763.91	Yes	Yes	107639.1	1.00	4593.18	1837.29	0.99	190.52	0.71
THERMAL ZONE 2	10763.91	Yes	Yes	107639.1	1.00	4593.18	1837.29	0.99	190.52	0.71
THERMAL ZONE 3	10763.91	Yes	Yes	107639.1	1.00	4593.18	1837.29	0.99	190.52	0.71
Total	32291.73			322917.31		13779.53	5511.77	0.99	190.52	0.71
Conditioned Total	32291.73			322917.31		13779.53	5511.77	0.99	190.52	0.71
Unconditioned Total	0.0			0.0		0.0	0.0	0.0	0.0	0.0
Not Part of Total	0.0			0.0		0.0	0.0	0.0	0.0	0.0

Zone Sensible Cooling and Heating Sensible Sizing

	Heating/Cooling	Calculated Design Load	Design Load With Sizing Factor	Calculated Design Air Flow (ft ³ /min)	Design Air Flow With Sizing Factor (ft ³ /min)	Date/Time Of Peak	Outdoor Temperature at Peak Load (F)	Outdoor Humidity Ratio at Peak Load (lbWater/lbAir)
THERMAL ZONE 1	Cooling	7.44 (ton)	8.56 (ton)	4587.38	5276.01	8/21 15:30:00	90.93	0.01
THERMAL ZONE 1	Heating	94.87 (kBtu/h)	118.58 (kBtu/h)	2565.96	3205.87	1/21 06:00:00	21.02	0.0
THERMAL ZONE 2	Cooling	10.55 (ton)	12.14 (ton)	6504.96	7479.65	8/21 15:45:00	90.61	0.01

Untitled11.osm

File Preferences Components & Measures Help

Results Summary

Reports: OpenStudio Results

Zone Sensible Cooling and Heating Sensible Sizing

Model Summary
Annual Overview
Monthly Overview
Utility Bills/Rates
Envelope
Space Type Breakdown
Space Type Summary
Interior Lighting Summary
Plug Loads Summary
Exterior Lighting
Water Use Equipment
HVAC Load Profiles
Zone Conditions
Zone Overview
Zone Equipment Detail
Air Loops Detail
Plant Loops Detail
Outdoor Air
Cash Flow
Site and Source Summary
Schedule Overview

	Heating/Cooling	Calculated Design Load	Design Load With Sizing Factor	Calculated Design Air Flow (ft ³ /min)	Design Air Flow With Sizing Factor (ft ³ /min)	Date/Time Of Peak	Outdoor Temperature at Peak Load (F)	Outdoor Humidity Ratio at Peak Load (lbWater/lbAir)
THERMAL ZONE 1	Cooling	7.44 (ton)	8.56 (ton)	4587.38	5276.01	8/21 15:30:00	90.93	0.01
THERMAL ZONE 1	Heating	94.87 (kBtu/h)	118.58 (kBtu/h)	2565.96	3205.87	1/21 06:00:00	21.02	0.0
THERMAL ZONE 2	Cooling	10.55 (ton)	12.14 (ton)	6504.96	7479.65	8/21 15:45:00	90.61	0.01
THERMAL ZONE 2	Heating	99.82 (kBtu/h)	124.78 (kBtu/h)	2699.45	3373.26	1/21 06:00:00	21.02	0.0
THERMAL ZONE 3	Cooling	12.13 (ton)	13.95 (ton)	7475.41	8596.3	8/21 17:00:00	88.57	0.01
THERMAL ZONE 3	Heating	156.39 (kBtu/h)	195.49 (kBtu/h)	4227.17	5284.49	1/21 06:00:00	21.02	0.0

Zone Equipment Detail

No Data to Show for Zone Equipment Detail

Air Loops Detail

No Data to Show for Air Loops Detail

Plant Loops Detail

No Data to Show for Plant Loops Detail

Outdoor Air

Average and Minimum Outdoor Air During Occupied Hours

Average Number of Components	Nominal Number of Components	Zone Unders	Avg. Mechanical Ventilation (cfm)	Min. Mechanical Ventilation (cfm)	Avg. Infiltration	Min. Infiltration	Avg. Simple Ventilation (cfm)	Min. Simple Ventilation (cfm)
------------------------------	------------------------------	-------------	-----------------------------------	-----------------------------------	-------------------	-------------------	-------------------------------	-------------------------------

Untitled11.osm

File Preferences Components & Measures Help

Results Summary

Reports: OpenStudio Results

No Data to Show for Plant Loops Detail

Outdoor Air

Average and Minimum Outdoor Air During Occupied Hours

	Average Number of Occupants	Nominal Number of Occupants	Zone Volume (ft ³)	Avg. Mechanical Ventilation (ach)	Min. Mechanical Ventilation (ach)	Avg. Infiltration (ach)	Min. Infiltration (ach)	Avg. Simple Ventilation (ach)	Min. Simple Ventilation (ach)
THERMAL ZONE 1	31.55	56.51	107639	0.0	0.0	0.051	0.001	0.324	0.001
THERMAL ZONE 2	31.55	56.51	107639	0.0	0.0	0.051	0.001	0.324	0.001
THERMAL ZONE 3	31.55	56.51	107639	0.0	0.0	0.171	0.002	0.324	0.001

Cash Flow

No Data to Show for Cash Flow

Site and Source Summary

Site and Source Energy

	Total Energy (kBtu)	Energy Per Total Building Area (kBtu/ft ²)	Energy Per Conditioned Building Area (kBtu/ft ²)
Total Site Energy	1340952.7	41.5	41.5
Net Site Energy	1340952.7	41.5	41.5
Total Source Energy	3799088.0	117.6	117.6
Net Source Energy	3799088.0	117.6	117.6

5:13 PM 11/12/2019 ENG

Untitled11.osm

File Preferences Components & Measures Help

Results Summary

Reports: OpenStudio Results

Open ResultsViewer for Detailed Reports

Site to Source Energy Conversion Factors

	Site->Source Conversion Factor
Electricity	3.167
Natural Gas	1.084
District Cooling	1.056
District Heating	3.613

Schedule Overview

Schedule Overview - view table

Large Office HtgSetp

Medium Office HtgSetp

Office Activity

Office Bldg Equip

5:13 PM 11/12/2019 ENG

