

ENERGETIC SIMULATION OF A BUILDING IN DIFFERENT LOCATIONS

TECHNICAL ENVIRONMENTAL SYSTEMS

ZHANG YILIN 914482

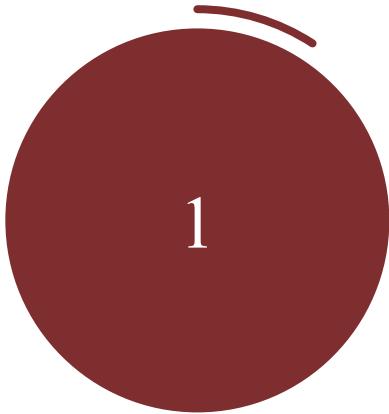
LIU FANGFANG 913734

TAN HSUAN LIN 906764

ZHANG XIANGHUI 913344



CONTENTS



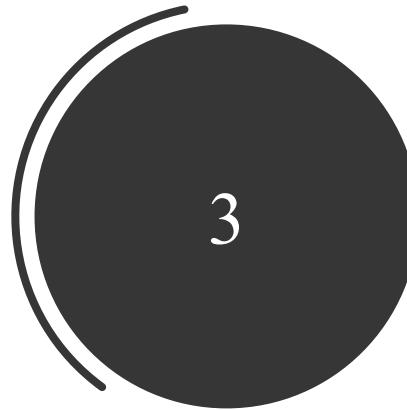
INTRODUCTIO N

Thermal zone and occupation



PART ONE

Analysis of using a single wall characteristics 'wall 1' in 3 different cities



PART TWO

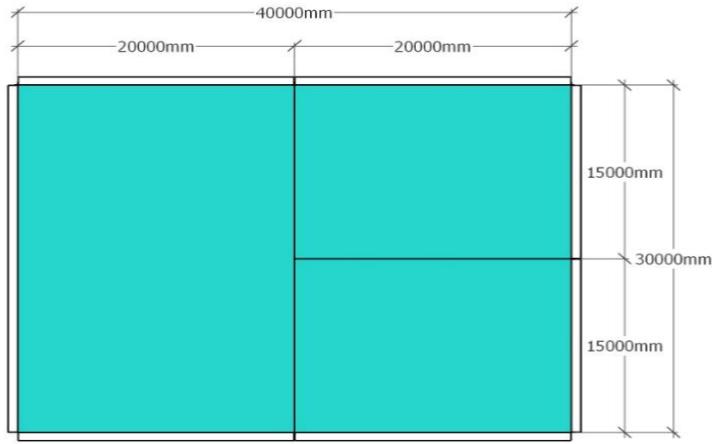
Analysis of using different wall characteristics in a city (Milan)



1

INTRODUCTION



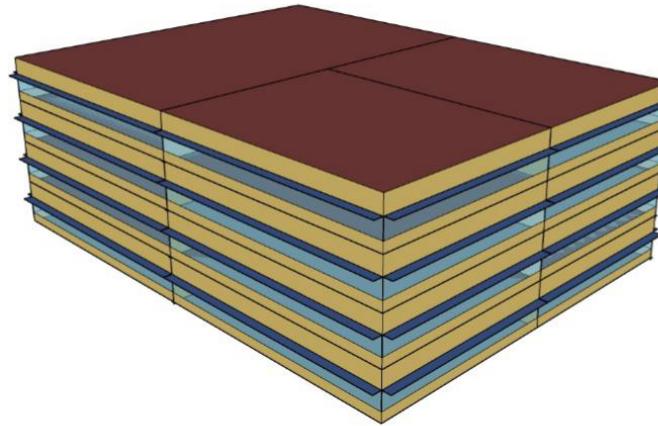


01

Computer Modelling and Simulation of how a building performs in terms of energy consumption is extremely important for designers, users and especially developers. The key reason is to understand the building condition and run an analysis against utility bills with the aim of reducing the energy consumption of the buildings and achieve a more sustainable and efficient design.

Building modelling and simulation was done in Sketchup, Open Studio and Energy Plus.

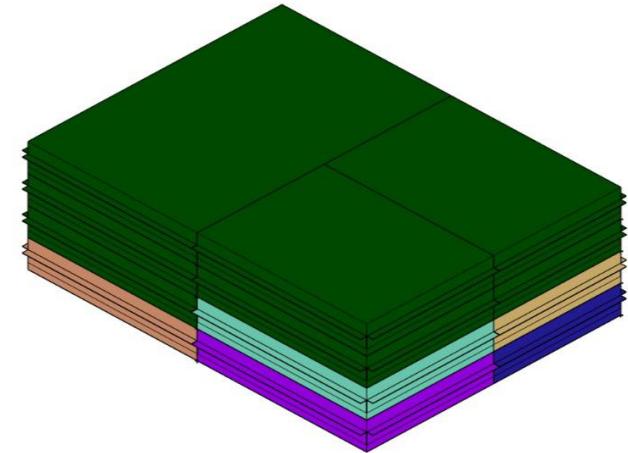
- Building type: Office
- Building height: 14m
- Number of floors: 4
- City for analysis :Milan,Tokyo,Harbin



02

Building Area(m²)

Total building area
4800.00

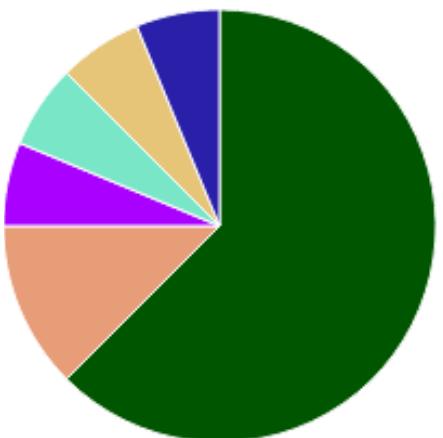


03

Open Office
Lobby
Elec / Mech Room
Conference
Break Room

Space Type Breakdown - view table

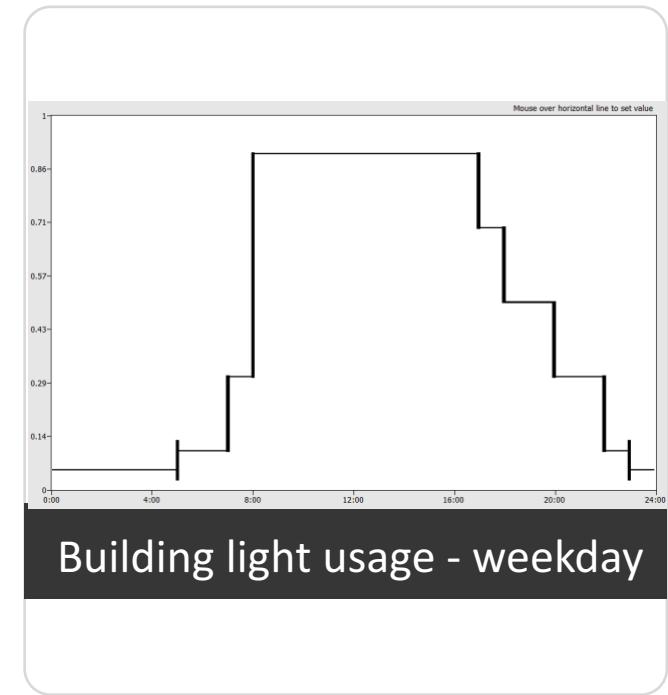
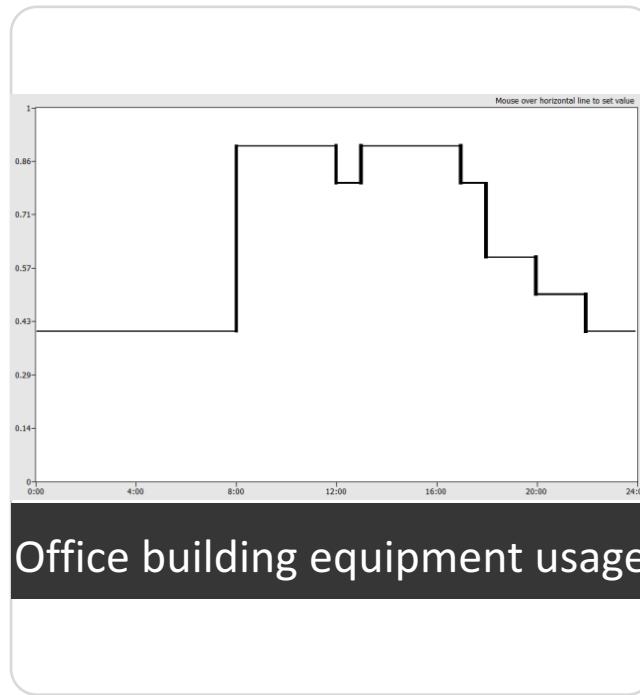
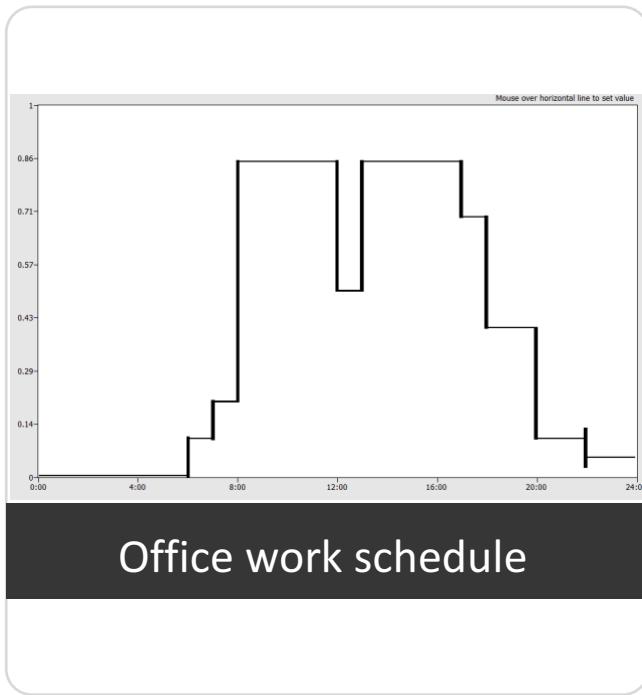
Space Type Name	Floor Area (ft^2)	Standards Building Type	Standards Space Type
189.1-2009 - Office - BreakRoom - CZ1-3	3,229	Office	BreakRoom
189.1-2009 - Office - ClosedOffice - CZ1-3	3,229	Office	ClosedOffice
189.1-2009 - Office - Conference - CZ1-3	3,229	Office	Conference
189.1-2009 - Office - Elec/MechRoom - CZ1-3	3,229	Office	Elec/MechRoom
189.1-2009 - Office - Lobby - CZ1-3	6,458	Office	Lobby
189.1-2009 - Office - OpenOffice - CZ1-3	32,292	Office	OpenOffice



- 189.1-2009 - Office - OpenOffice - CZ1-3
- 189.1-2009 - Office - Lobby - CZ1-3
- 189.1-2009 - Office - BreakRoom - CZ1-3
- 189.1-2009 - Office - ClosedOffice - CZ1-3
- 189.1-2009 - Office - Conference - CZ1-3
- 189.1-2009 - Office - Elec/MechRoom - CZ1-3



SCHEDULE



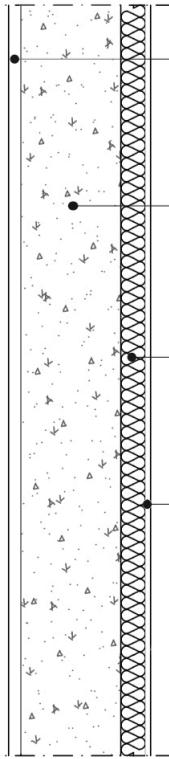
2

Analysis of using a single wall Characteristics 'wall 1' in 3 different cities

-MILANO

-TOKYO

-HARBIN



DATAIL FOR 'WALL 1'

MILANO

Building Summary

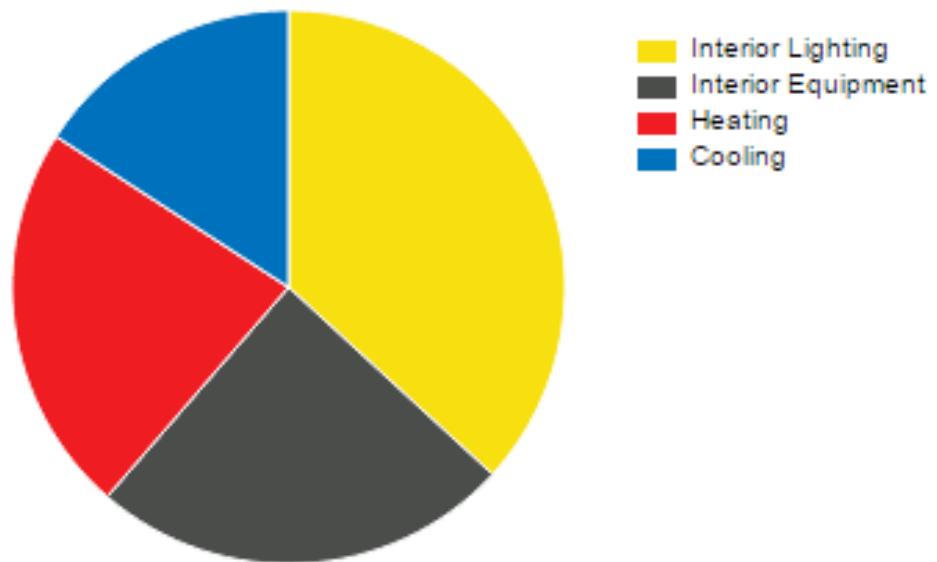
Data	Value
Building Name	Building 1
Total Site Energy	1,626,246 kBtu
Total Building Area	51,667 ft^2
Total Site EUI	31.48 kBtu/ft^2
OpenStudio Standards Building Type	n/a

Weather Summary

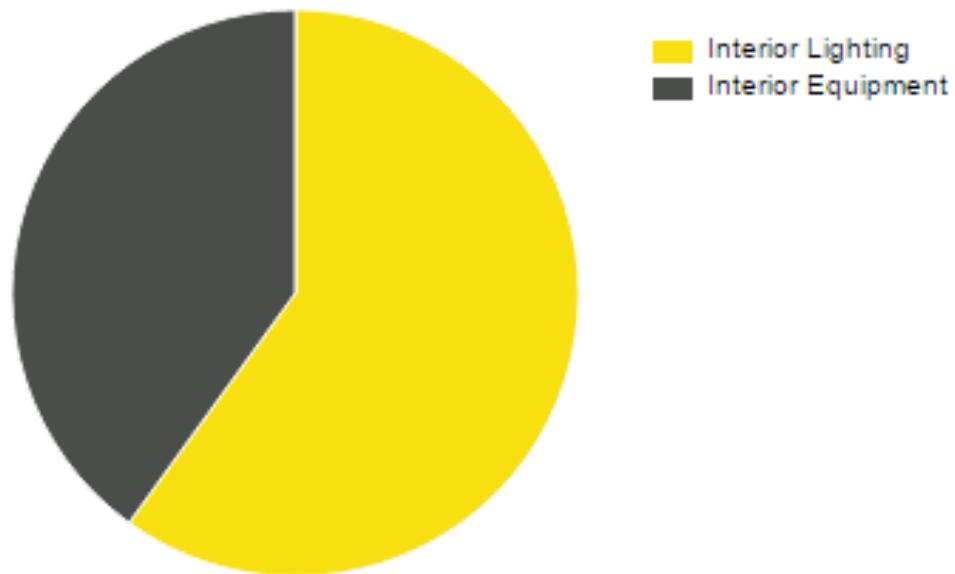
	Value
Weather File	MILAN - ITA IWECA Data WMO#=160660
Latitude	45.62
Longitude	8.73
Elevation	692 (ft)
Time Zone	1.00
North Axis Angle	0.00
ASHRAE Climate Zone	

End Use - view table

End Use	Consumption (kBtu)
Heating	370,322
Cooling	257,522
Interior Lighting	598,082
Exterior Lighting	0
Interior Equipment	399,126

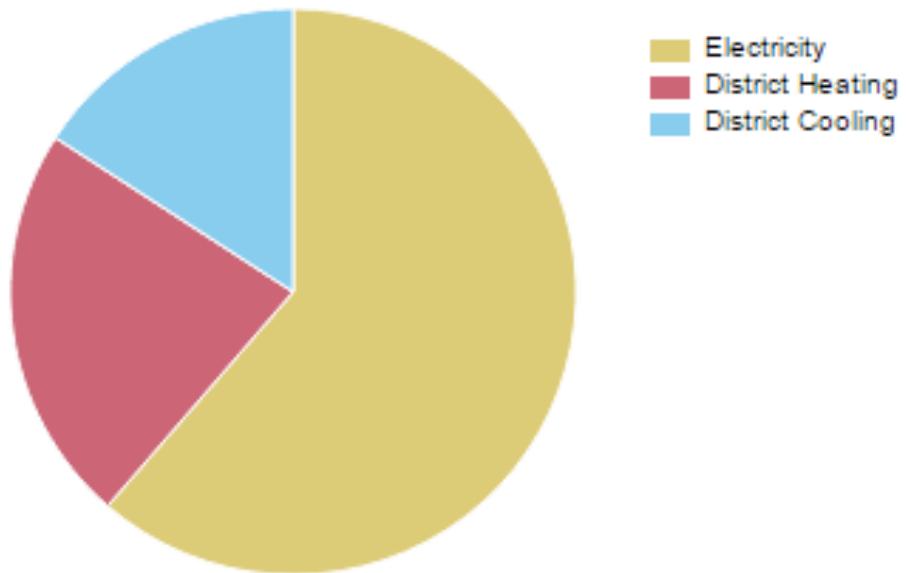


End Use	Consumption (kWh)
Heating	0
Cooling	0
Interior Lighting	175,281
Exterior Lighting	0
Interior Equipment	116,972



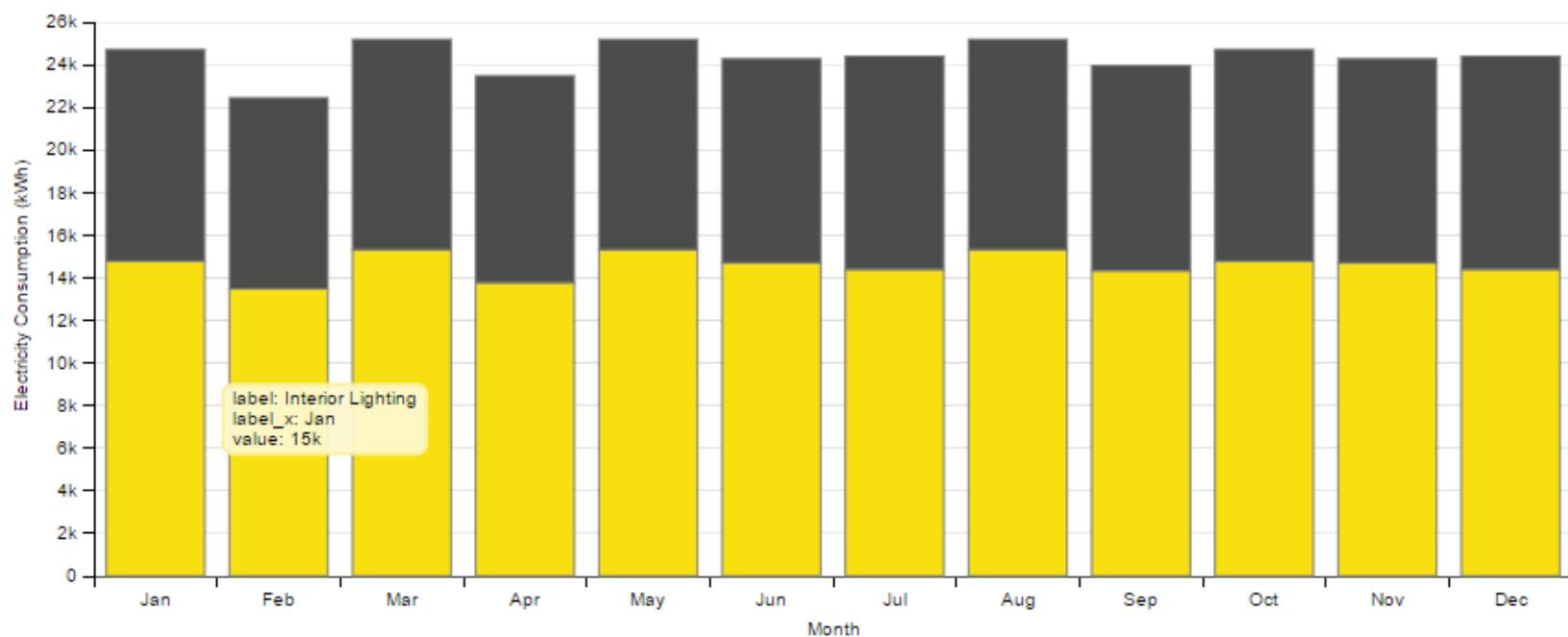
Energy Use - view table

Fuel	Consumption (kBtu)
Electricity	997,208
Natural Gas	0
Additional Fuel	0
District Cooling	257,522
District Heating	370,322



Electricity Consumption (kWh) - view table

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Heating													
Cooling													
Interior Lighting	14771.5	13478.06	15320.42	13776.97	15320.42	14706.31	14391.08	15320.42	14325.86	14771.5	14706.31	14391.08	175279.92
Exterior Lighting													
Interior Equipment	9940.06	8969.75	9875.08	9703.25	9875.08	9573.31	10005.03	9875.08	9638.28	9940.06	9573.31	10005.03	116973.31
Total	24711.56	22447.81	25195.5	23480.22	25195.5	24279.61	24396.11	25195.5	23964.14	24711.56	24279.61	24396.11	292253.22

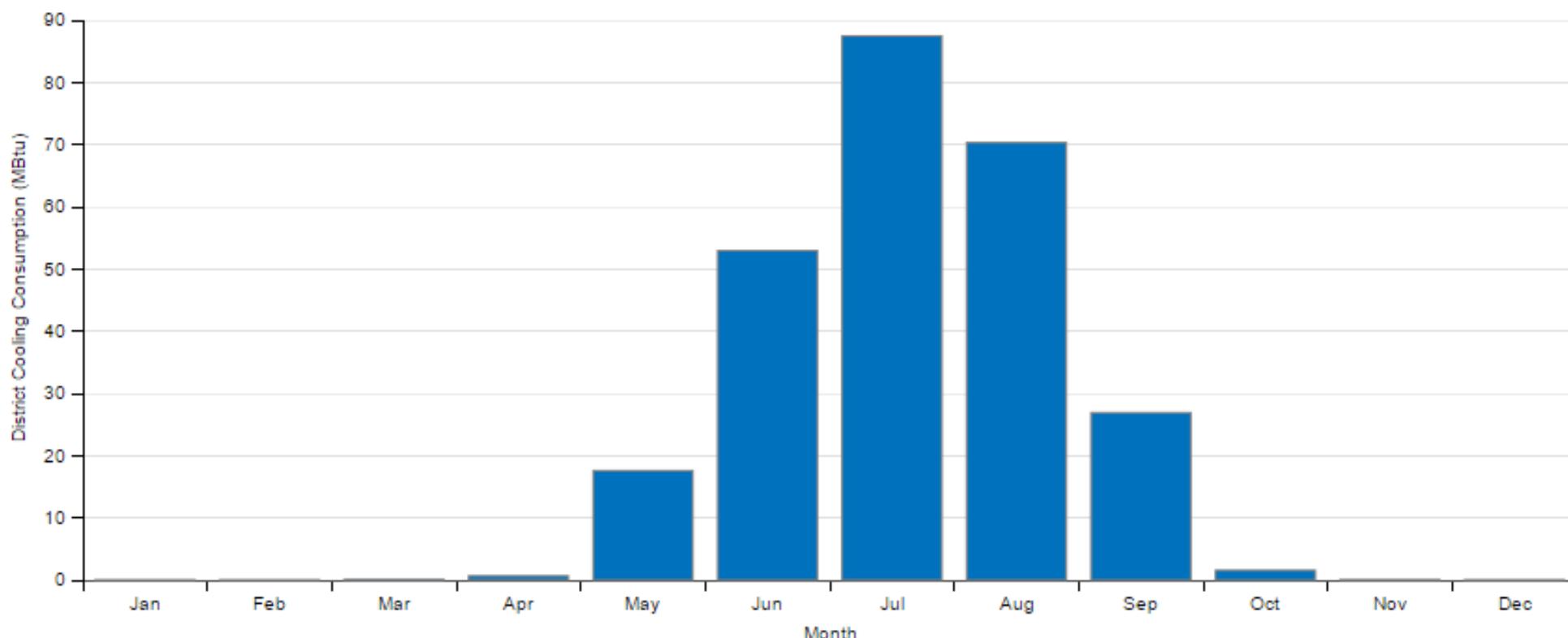


Electricity consumption in Milan is averagely higher from May to October as the city observe daylight saving time in between that period.

- Fans
- Interior Equipment
- Interior Lighting

District Cooling Consumption (MBtu) - view table

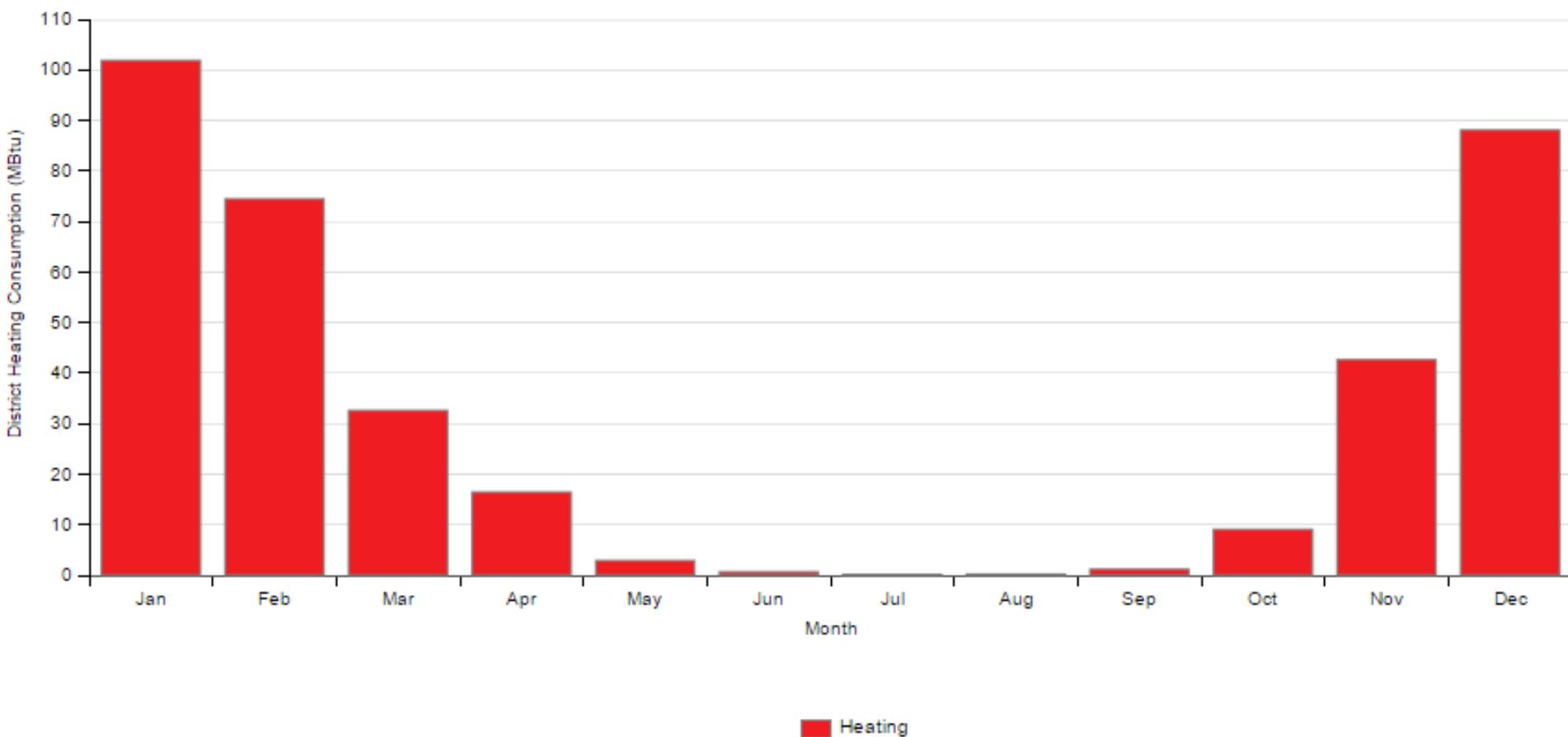
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Heating													
Cooling	0.01	0.01	0.07	0.65	17.58	52.95	87.45	70.31	26.9	1.55	0.04	0.01	257.52



Hot season for Milan lasts for 3.4 months from early June to the mid of September. The average highest temperature, 35° C, is recorded in July. Thus as observed from the graph, electricity consumption for cooling gradually increases from May onwards before reaching its peak in July and gradually decreasing afterwards.

District Heating Consumption (MBtu) - view table

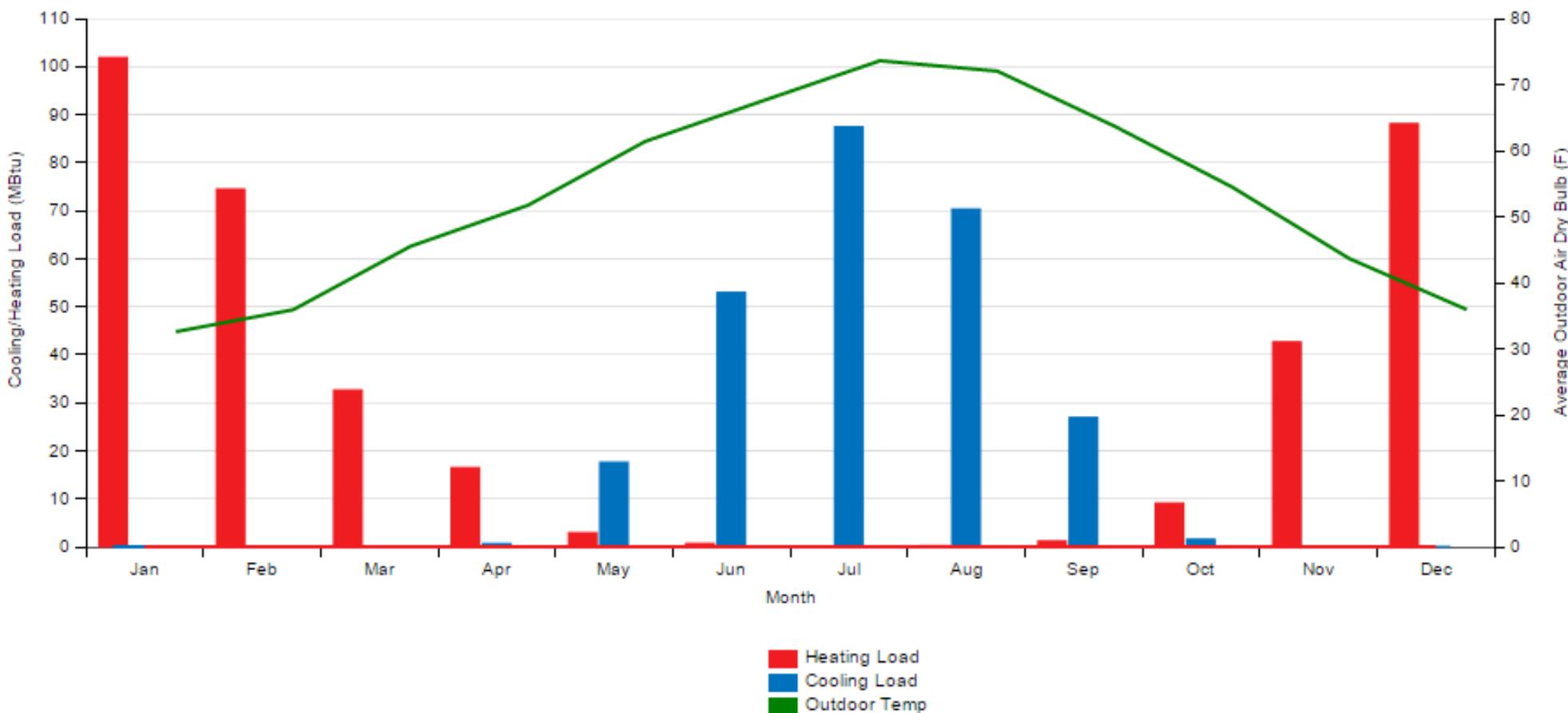
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Heating	101.87	74.45	32.61	16.46	2.91	0.68	0.16	0.23	1.17	9.09	42.64	88.07	370.32



Cold season for Milan lasts for 3.2 months from mid of November to the end of February. The lowest average temperature, -0.5° C , is recorded in January. Thus as observed from the graph, electricity consumption for heating gradually increases from October onwards before reaching its peak in January and gradually decreasing afterwards.

Monthly Load Profiles - [view table](#)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Average Outdoor Air Dry Bulb (F)	32.6	35.9	45.5	51.7	61.4	67.5	73.6	72.0	63.7	54.5	43.6	35.9
Cooling Load (MBtu)	0.01	0.01	0.07	0.65	17.58	52.95	87.45	70.31	26.9	1.55	0.04	0.01
Heating Load (MBtu)	101.87	74.45	32.61	16.46	2.91	0.68	0.16	0.23	1.17	9.09	42.64	88.07



Milan has warm, sultry summers and cold, foggy winters. During winter, daily average temperatures can fall below freezing. In summer, humidity levels are high and peak temperatures can reach temperatures above 35 ° C.

TOKYO

Building Summary

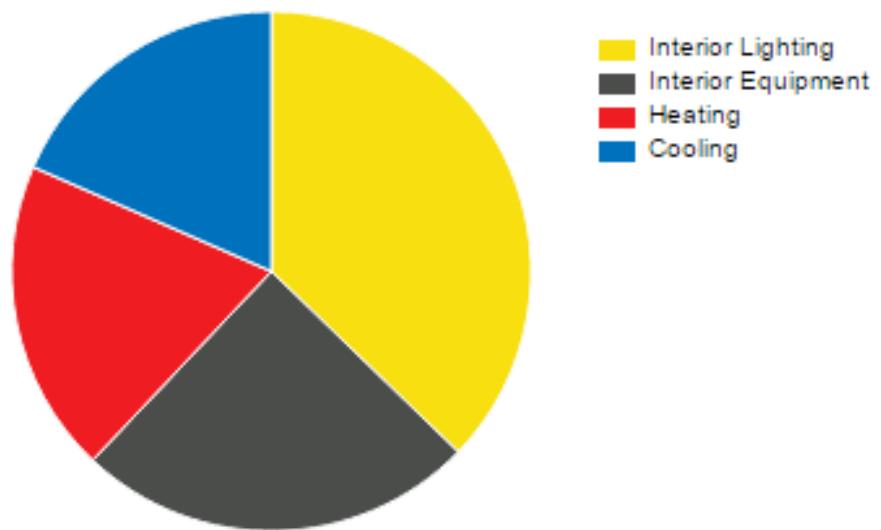
Data	Value
Building Name	Tokyo
Total Site Energy	1,606,806 kBtu
Total Building Area	51,667 ft ²
Total Site EUI	31.10 kBtu/ft ²
OpenStudio Standards Building Type	n/a

Weather Summary

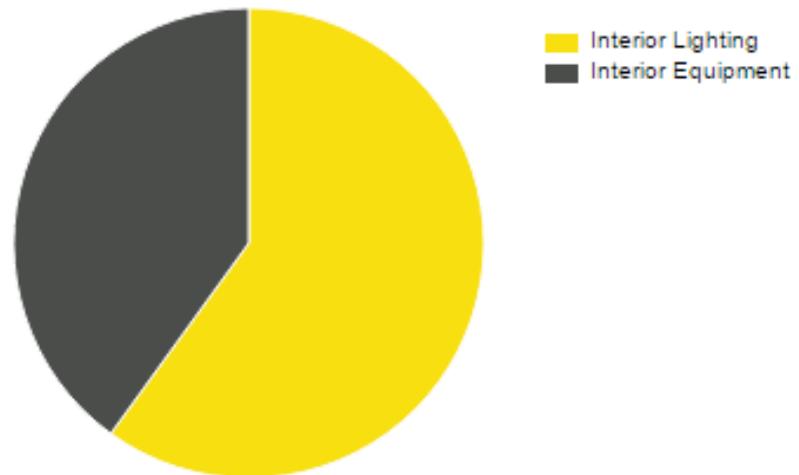
	Value
Weather File	TOKYO HYAKURI - JPN IWEC Data WMO#=477150
Latitude	36.18
Longitude	140.42
Elevation	115 (ft)
Time Zone	9.00
North Axis Angle	0.00
ASHRAE Climate Zone	

End Use - view table

End Use	Consumption (kBtu)
Heating	313,509
Cooling	296,089
Interior Lighting	598,082
Exterior Lighting	0
Interior Equipment	399,126

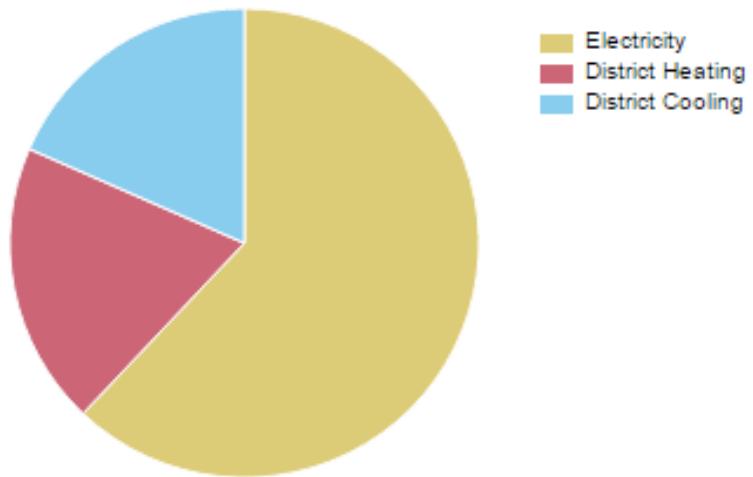


End Use	Consumption (kWh)
Heating	0
Cooling	0
Interior Lighting	175,281
Exterior Lighting	0
Interior Equipment	116,972



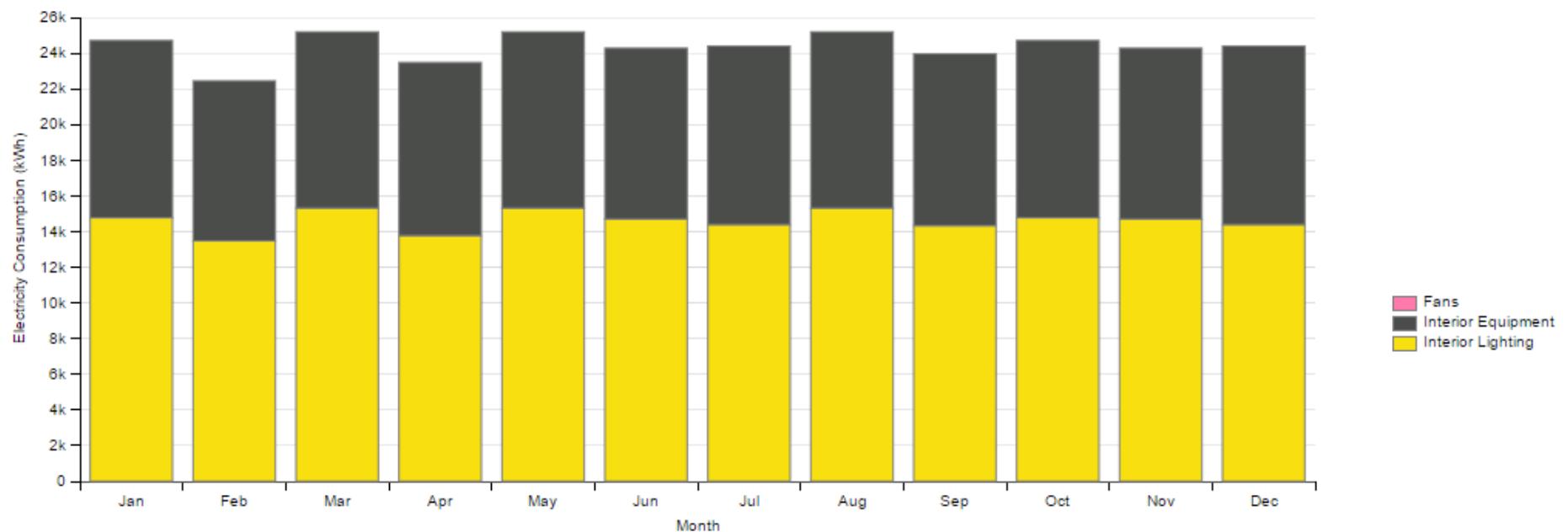
Energy Use - view table

Fuel	Consumption (kBtu)
Electricity	997,208
Natural Gas	0
Additional Fuel	0
District Cooling	296,089
District Heating	313,509



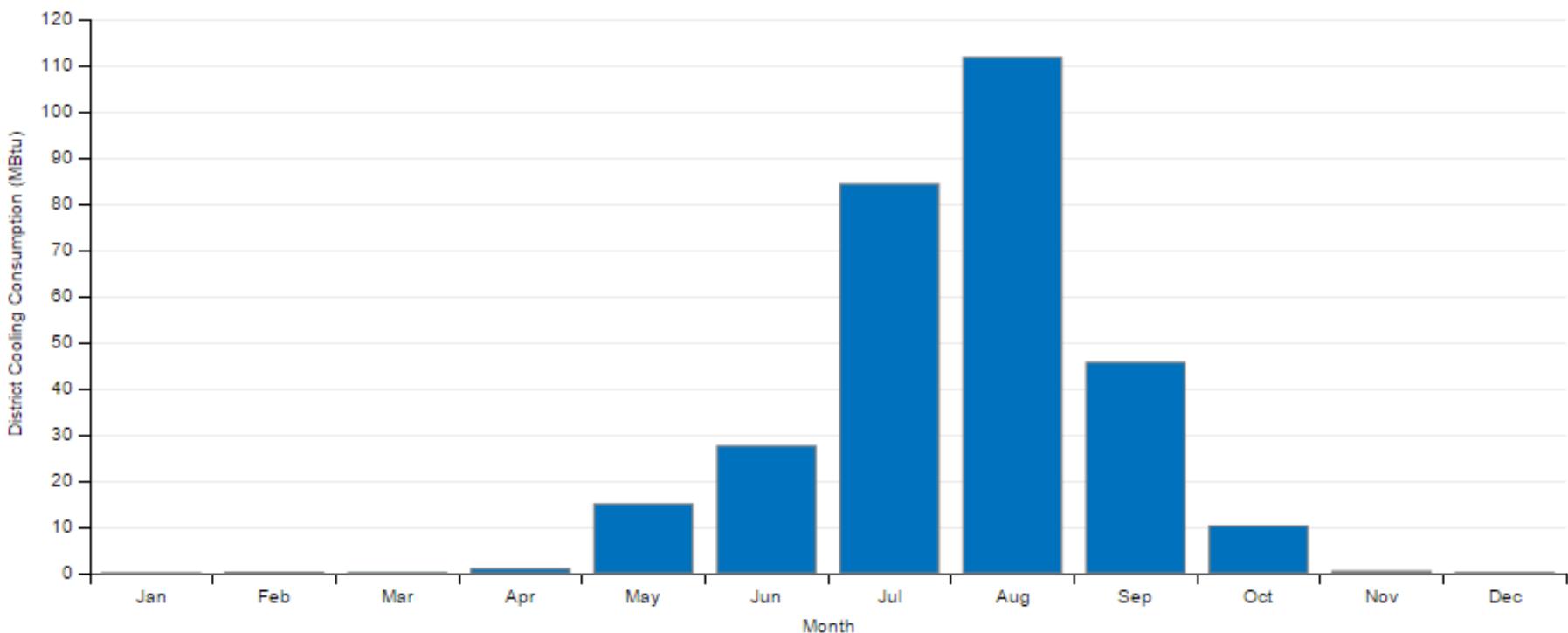
Electricity Consumption (kWh) - view table

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Heating													
Cooling													
Interior Lighting	14771.5	13478.06	15320.42	13776.97	15320.42	14706.31	14391.08	15320.42	14325.86	14771.5	14706.31	14391.08	175279.92
Exterior Lighting													
Interior Equipment	9940.06	8969.75	9875.08	9703.25	9875.08	9573.31	10005.03	9875.08	9638.28	9940.06	9573.31	10005.03	116973.31
Total	24711.56	22447.81	25195.5	23480.22	25195.5	24279.61	24396.11	25195.5	23964.14	24711.56	24279.61	24396.11	292253.22



District Cooling Consumption (MBtu) - [view table](#)

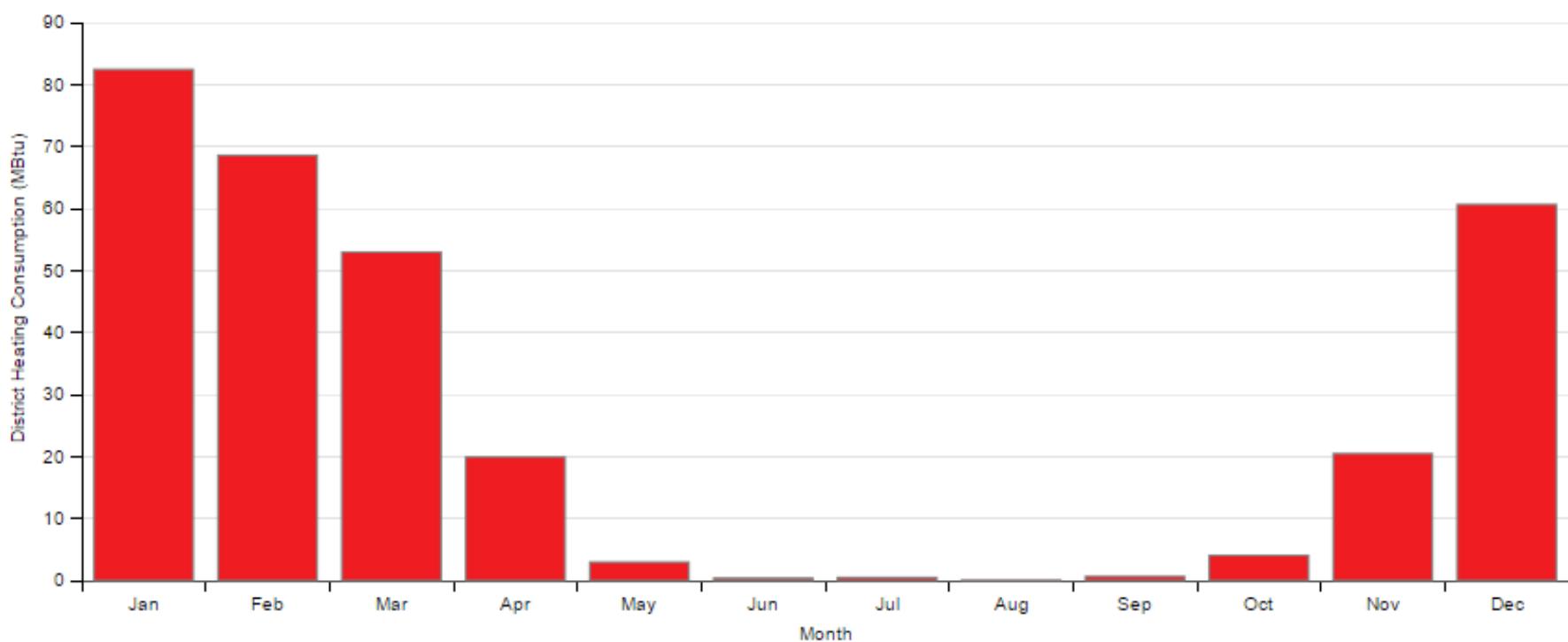
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Heating													
Cooling	0.03	0.14	0.08	0.94	14.95	27.58	84.32	111.7	45.64	10.23	0.4	0.09	296.09



Hot season for Tokyo starts from June to August. The average highest temperature, 31° C, is recorded in August. Thus as observed from the graph, electricity consumption for cooling gradually increases from May onwards before reaching its peak in August and gradually decreasing afterwards.

District Heating Consumption (MBtu) - view table

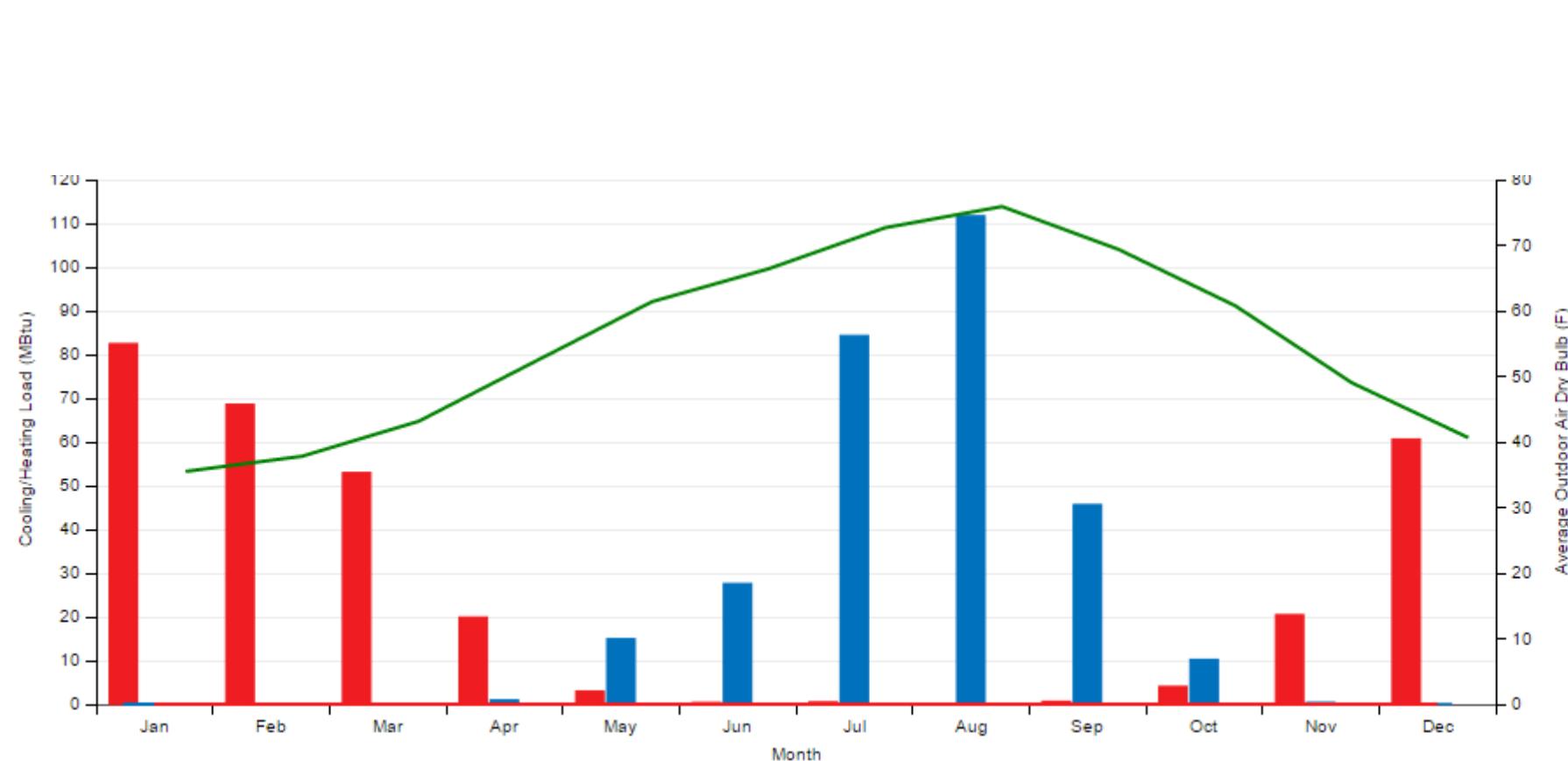
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Heating	82.44	68.58	52.96	19.9	2.96	0.37	0.49	0.04	0.64	4.04	20.45	60.63	313.51



Cold season for Tokyo starts from December to February. The lowest average temperature, $2^{\circ}\text{C} \sim 3^{\circ}\text{C}$, is recorded in February. Thus as observed from the graph, electricity consumption for heating gradually increases from October onwards before reaching its peak in February and gradually decreasing afterwards.

Monthly Load Profiles - view table

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Average Outdoor Air Dry Bulb (F)	35.5	37.8	43.1	52.3	61.4	66.4	72.7	75.9	69.4	60.8	49.0	40.6
Cooling Load (MBtu)	0.03	0.14	0.08	0.94	14.95	27.58	84.32	111.7	45.64	10.23	0.4	0.09
Heating Load (MBtu)	82.44	68.58	52.96	19.9	2.96	0.37	0.49	0.04	0.64	4.04	20.45	60.63



Tokyo lies in the humid subtropical climate zone with hot humid summers and generally mild winters with cool spells. On average, the warmest month is August and the coolest month is January.

- Heating Load
- Cooling Load
- Outdoor Temp

HARBIN

Building Summary

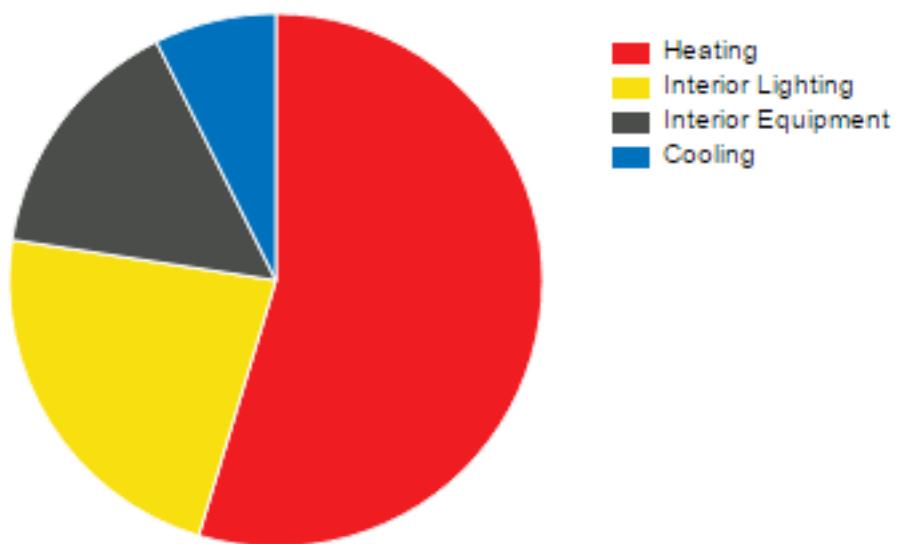
Data	Value
Building Name	Harbin
Total Site Energy	2,629,662 kBtu
Total Building Area	51,667 ft ²
Total Site EUI	50.90 kBtu/ft ²
OpenStudio Standards Building Type	n/a

Weather Summary

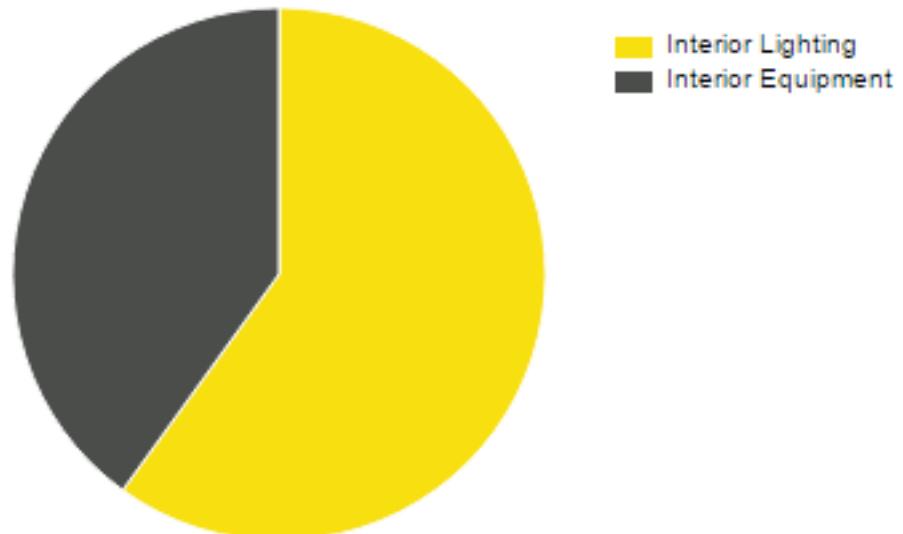
	Value
Weather File	Harbin Heilongjiang CHN CSWD WMO#=509530
Latitude	45.75
Longitude	126.77
Elevation	467 (ft)
Time Zone	8.00
North Axis Angle	0.00
ASHRAE Climate Zone	

[End Use - view table](#)

End Use	Consumption (kBtu)
Heating	1,437,933
Cooling	194,511
Interior Lighting	598,082
Exterior Lighting	0
Interior Equipment	399,126

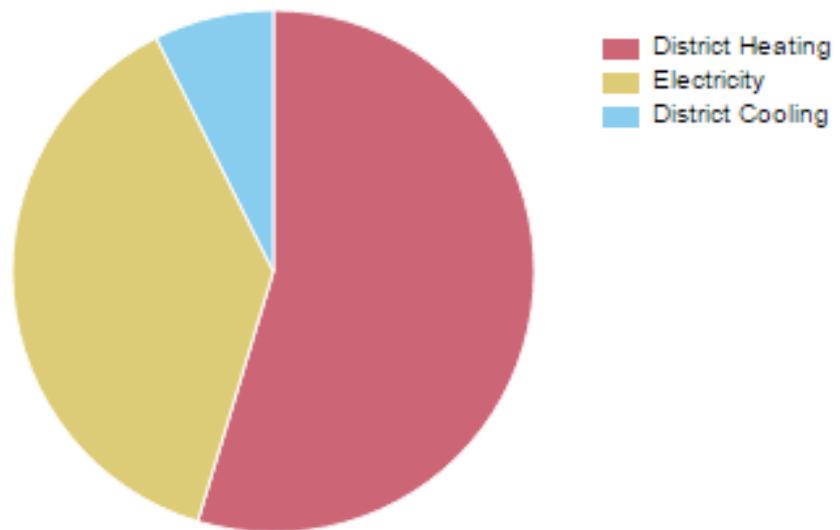


End Use	Consumption (kWh)
Heating	0
Cooling	0
Interior Lighting	175,281
Exterior Lighting	0
Interior Equipment	116,972



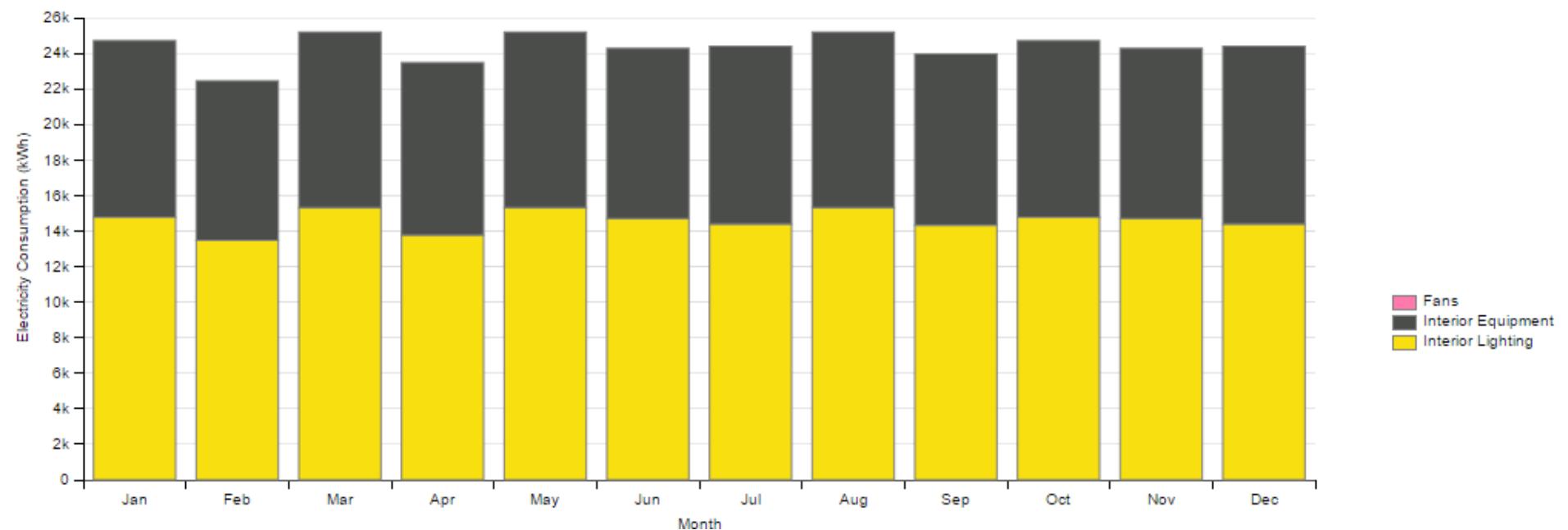
Energy Use - view table

Fuel	Consumption (kBtu)
Electricity	997,208
Natural Gas	0
Additional Fuel	0
District Cooling	194,511
District Heating	1,437,933



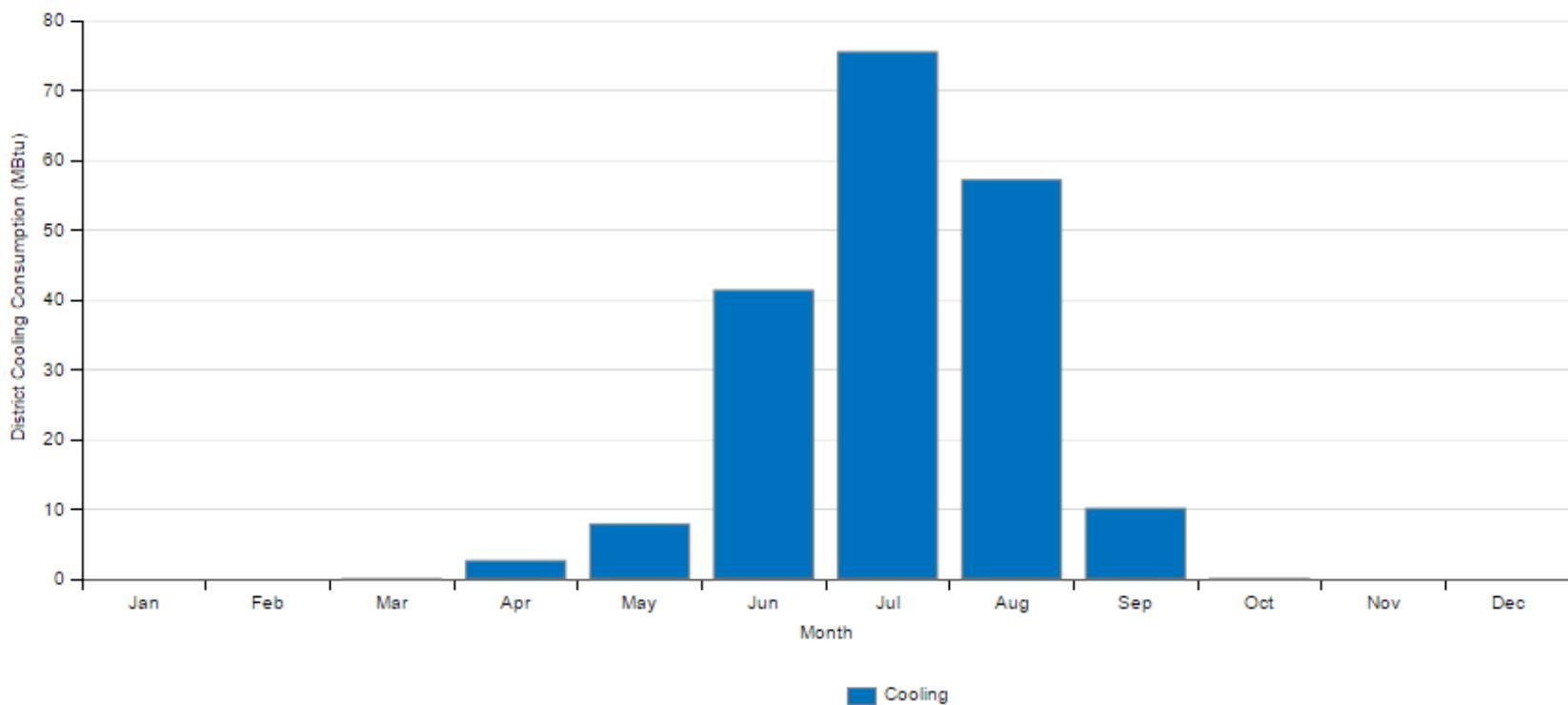
Electricity Consumption (kWh) - view table

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Heating													
Cooling													
Interior Lighting	14771.5	13478.06	15320.42	13776.97	15320.42	14706.31	14391.08	15320.42	14325.86	14771.5	14706.31	14391.08	175279.92
Exterior Lighting													
Interior Equipment	9940.06	8969.75	9875.08	9703.25	9875.08	9573.31	10005.03	9875.08	9638.28	9940.06	9573.31	10005.03	116973.31
Total	24711.56	22447.81	25195.5	23480.22	25195.5	24279.61	24396.11	25195.5	23964.14	24711.56	24279.61	24396.11	292253.22



District Cooling Consumption (MBtu) - [view table](#)

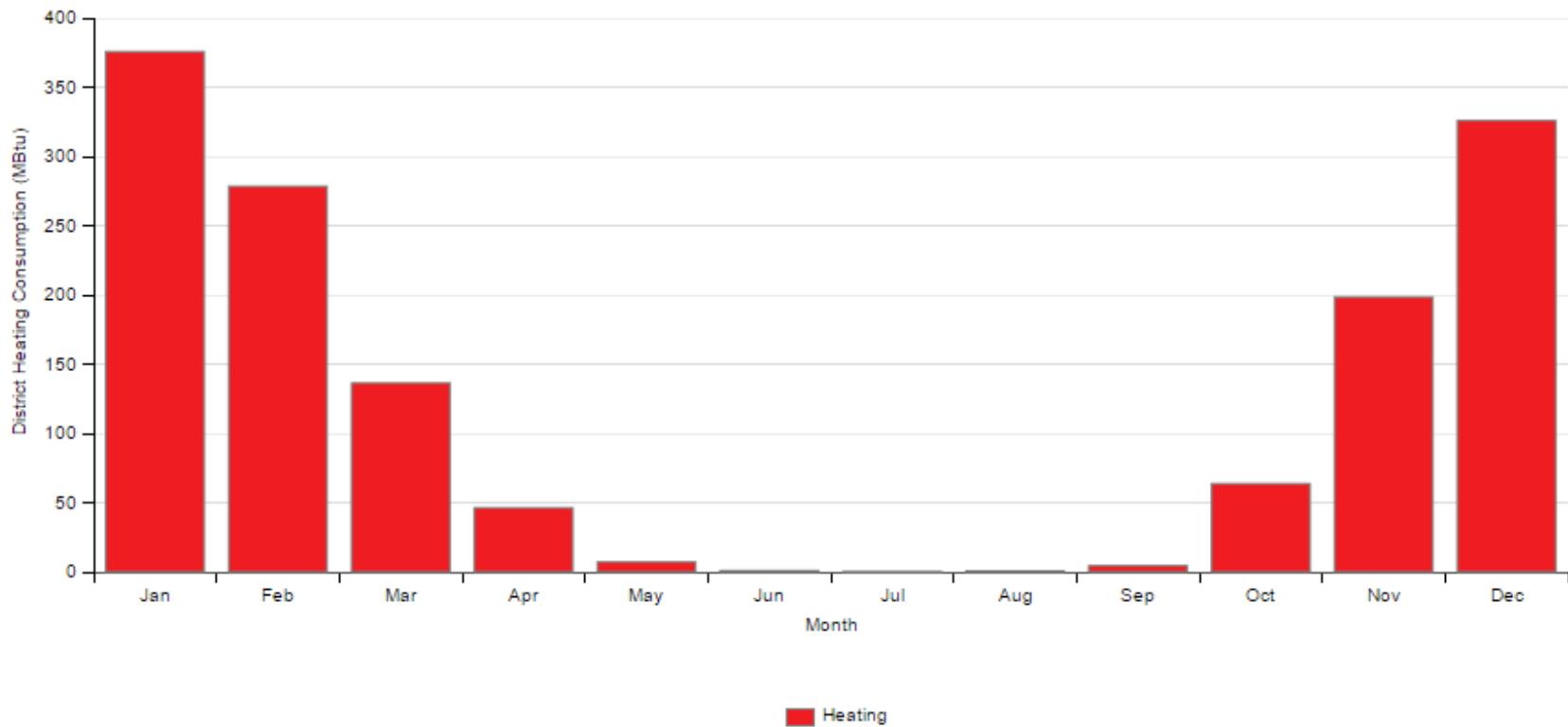
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Heating													
Cooling				0.0	2.61	7.82	41.34	75.47	57.14	10.1	0.02		194.51



Hot season for Harbin starts from June to August. The average highest temperature, 28°C , is recorded in July. Thus as observed from the graph, electricity consumption for cooling gradually increases from May onwards before reaching its peak in July and gradually decreasing afterwards.

District Heating Consumption (MBtu) - view table

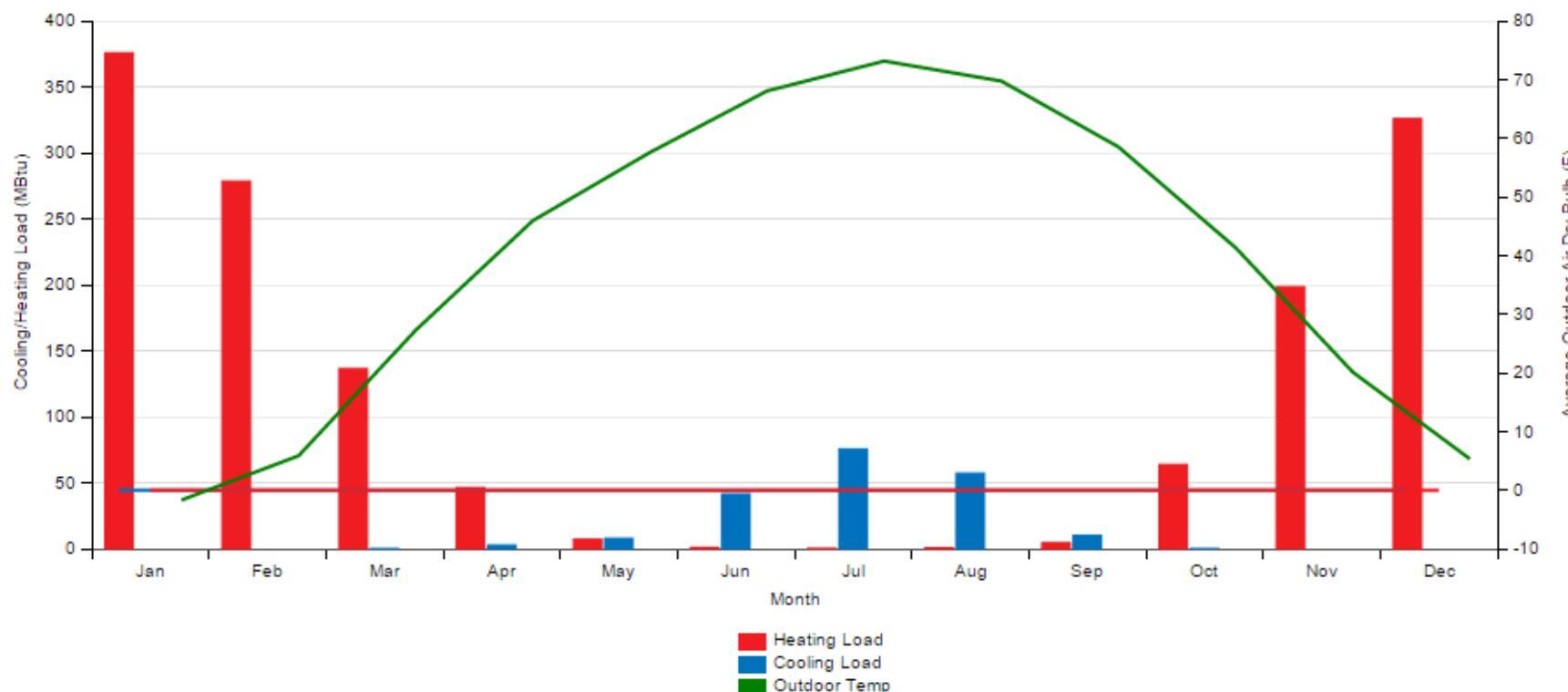
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Heating	375.67	278.43	136.3	46.3	7.09	0.87	0.17	0.66	4.43	63.71	198.47	325.83	1437.94



Cold season for Harbin starts from December to February. The lowest average temperature, -25 ° C, is recorded in January. Thus as observed from the graph, electricity consumption for heating gradually increases from October onwards before reaching its peak in January and gradually decreasing afterwards.

Monthly Load Profiles - view table

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Average Outdoor Air Dry Bulb (F)	-1.7	5.8	27.2	45.9	57.6	68.0	73.1	69.7	58.5	41.3	20.1	5.3
Cooling Load (MBtu)	0.0	0.0	0.0	2.61	7.82	41.34	75.47	57.14	10.1	0.02	0.0	0.0
Heating Load (MBtu)	375.67	278.43	136.3	46.3	7.09	0.87	0.17	0.66	4.43	63.71	198.47	325.83



Harbin has long, freezing winters thus the name 'ice city'. Summers are short and warm whereas Spring and autumn are transitional seasons which last for a very short time with rapid change of temperatures.

CONCLUSION

	MILAN	TOKYO	HARBIN
Total Site Energy (kBtu)			
Total Site EUI (kBtu/ft²)	31.48	31.10	50.90
End Use			
Heating (kBtu)	370,322	313,509	1,437,933
Cooling (kBtu)	257,522	296,089	194,511
Interior Lighting (kBtu)	598,082	598,082	598,082
Interior Equipment (kBtu)	399,126	399,126	399,126

In conclusion, It is shown that most of the energy in Harbin is used for heating of spaces due to the country's extreme cold weather, with a daily mean temperature recorded in winter of only -17.6 °C. Thus explaining the relatively high total site energy usage and total site EUI than the other 2 cities

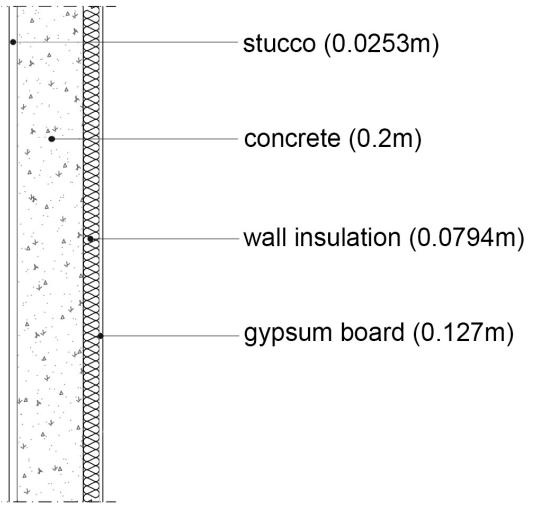


3

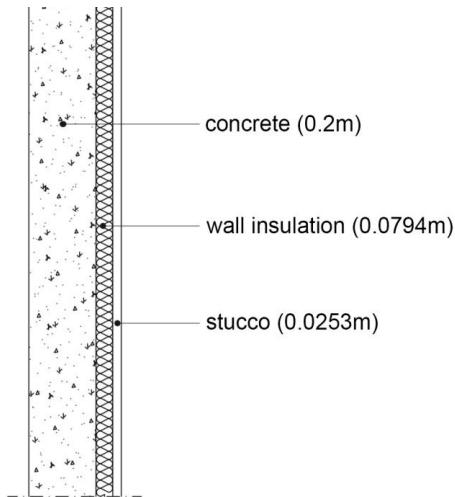
THE DIFFERENT EXTERNAL
WALLS IN THE SAME CITY

-MILANO

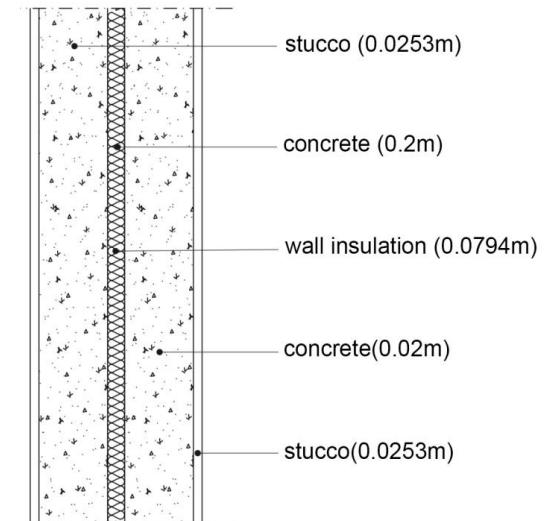




detail for 'WALL 1'



detail for 'WALL 2'



detail for 'WALL 3'

MILANO 'WALL 1'

Building Summary

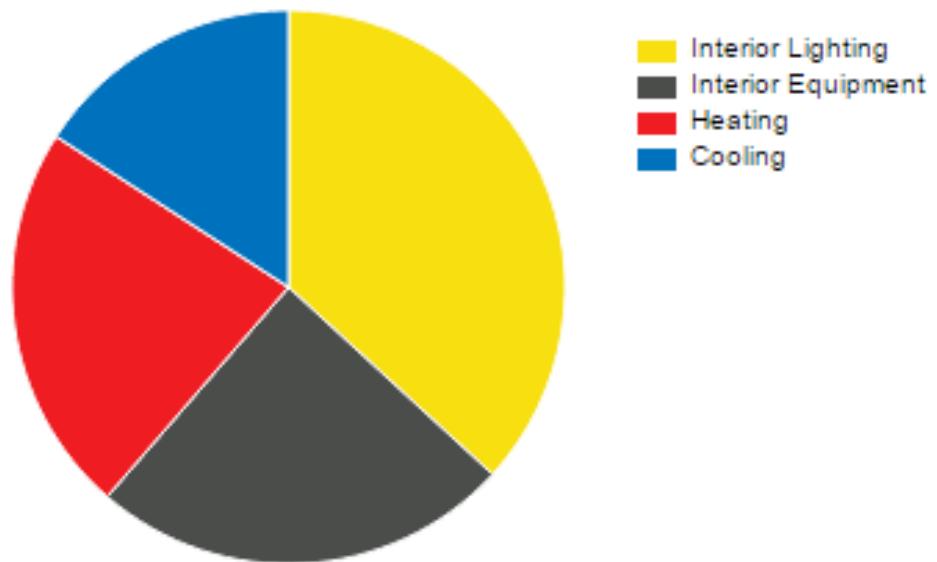
Data	Value
Building Name	Building 1
Total Site Energy	1,626,246 kBtu
Total Building Area	51,667 ft^2
Total Site EUI	31.48 kBtu/ft^2
OpenStudio Standards Building Type	n/a

Weather Summary

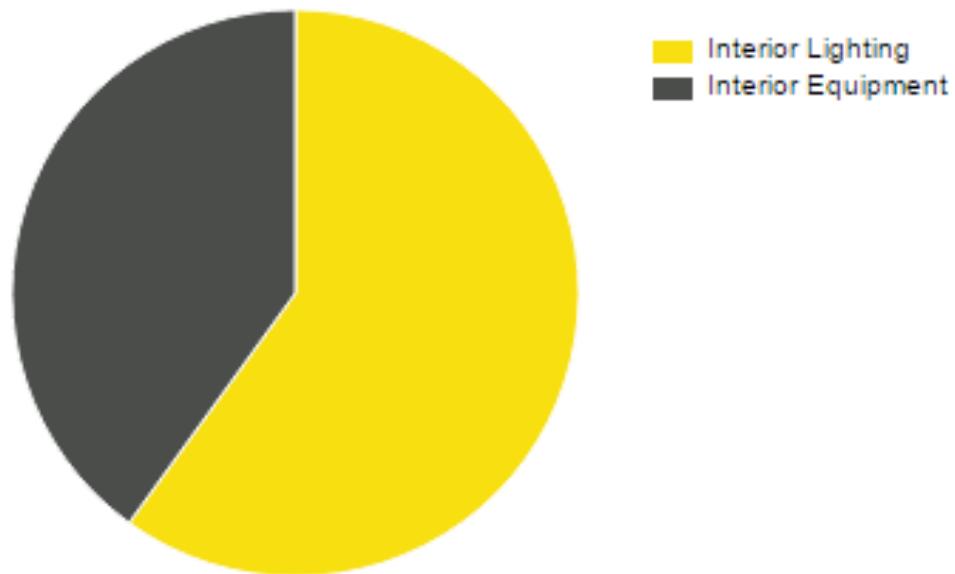
	Value
Weather File	MILAN - ITA IWECA Data WMO#=160660
Latitude	45.62
Longitude	8.73
Elevation	692 (ft)
Time Zone	1.00
North Axis Angle	0.00
ASHRAE Climate Zone	

End Use - view table

End Use	Consumption (kBtu)
Heating	370,322
Cooling	257,522
Interior Lighting	598,082
Exterior Lighting	0
Interior Equipment	399,126

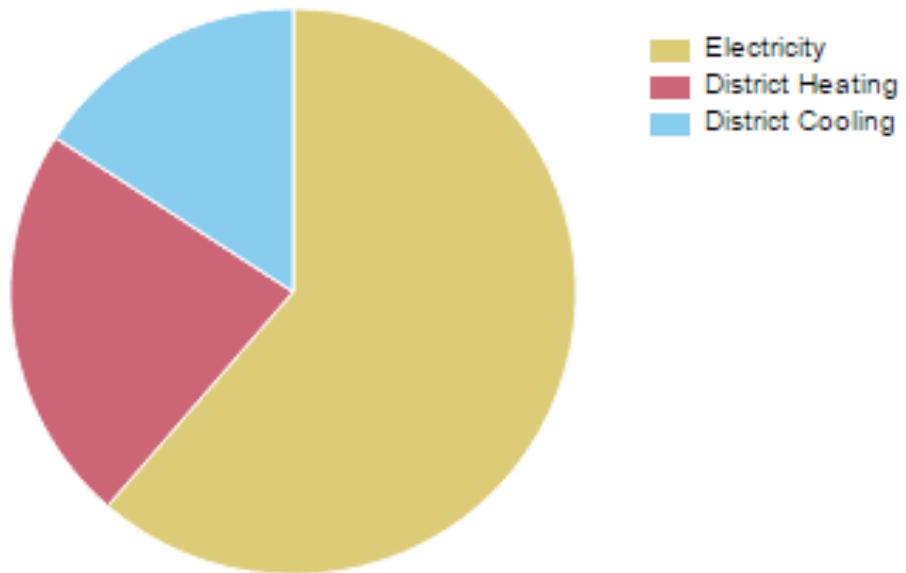


End Use	Consumption (kWh)
Heating	0
Cooling	0
Interior Lighting	175,281
Exterior Lighting	0
Interior Equipment	116,972



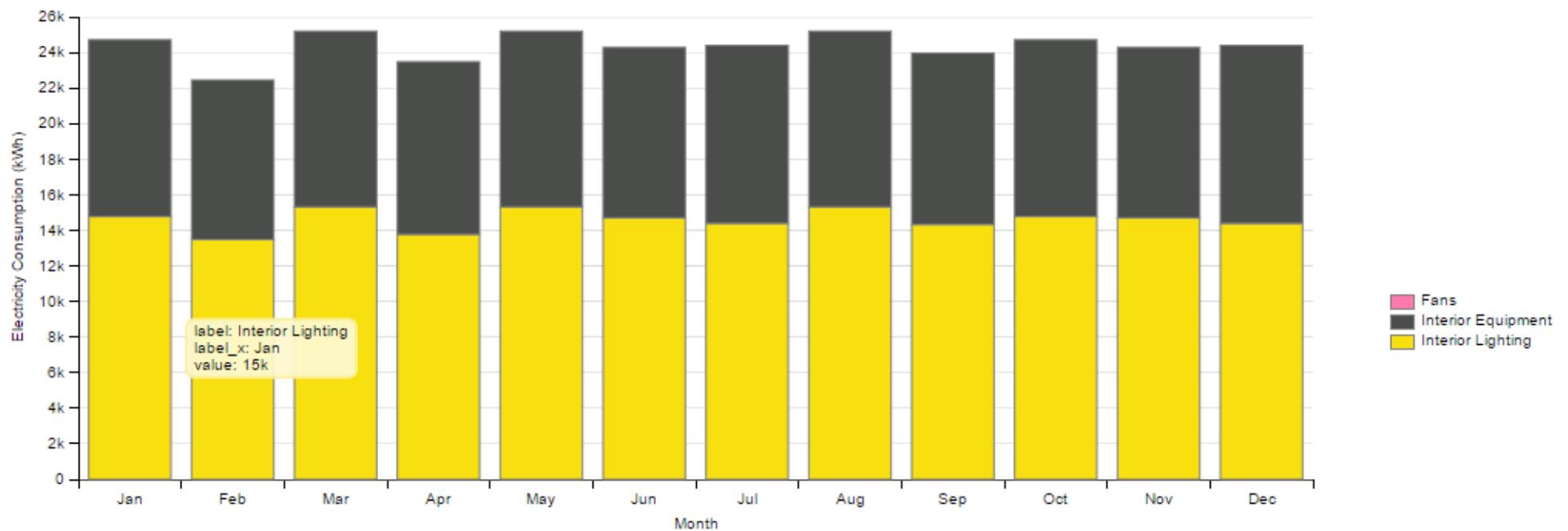
Energy Use - view table

Fuel	Consumption (kBtu)
Electricity	997,208
Natural Gas	0
Additional Fuel	0
District Cooling	257,522
District Heating	370,322



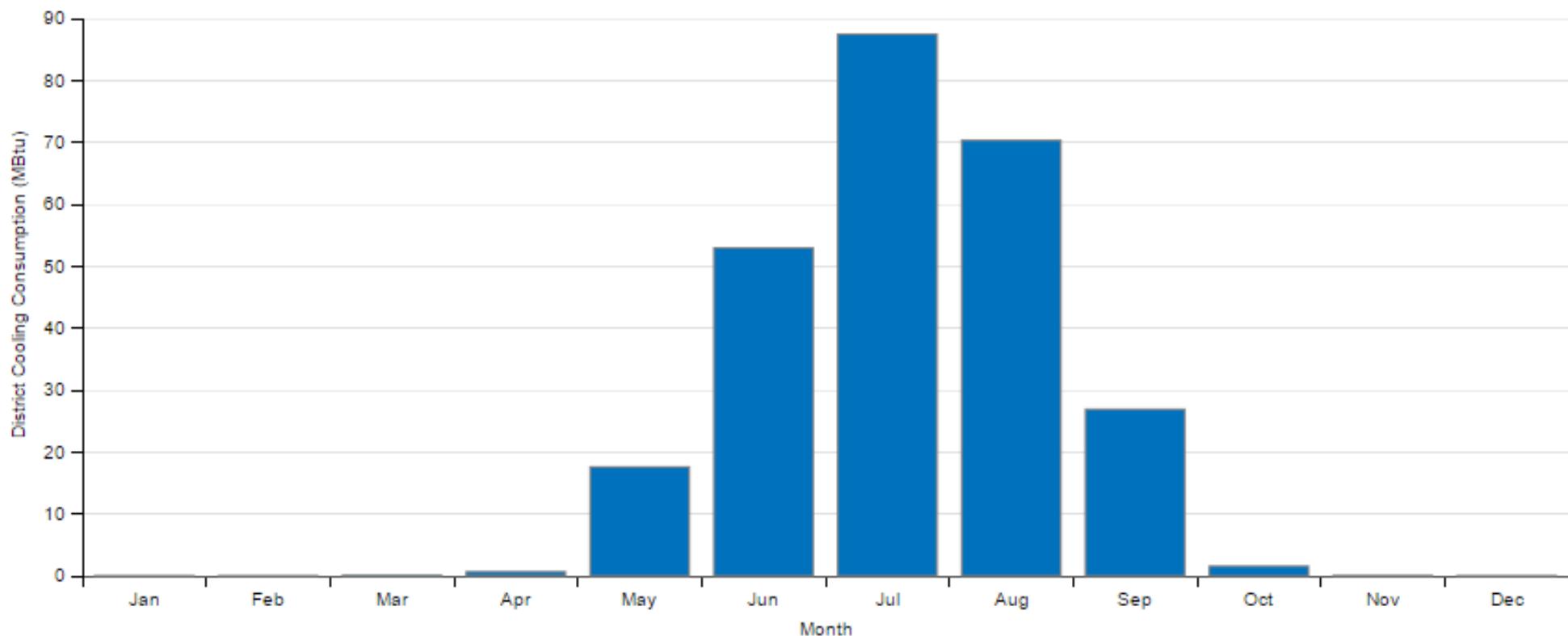
Electricity Consumption (kWh) - view table

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Heating													
Cooling													
Interior Lighting	14771.5	13478.06	15320.42	13776.97	15320.42	14706.31	14391.08	15320.42	14325.86	14771.5	14706.31	14391.08	175279.92
Exterior Lighting													
Interior Equipment	9940.06	8969.75	9875.08	9703.25	9875.08	9573.31	10005.03	9875.08	9638.28	9940.06	9573.31	10005.03	116973.31
Total	24711.56	22447.81	25195.5	23480.22	25195.5	24279.61	24396.11	25195.5	23964.14	24711.56	24279.61	24396.11	292253.22



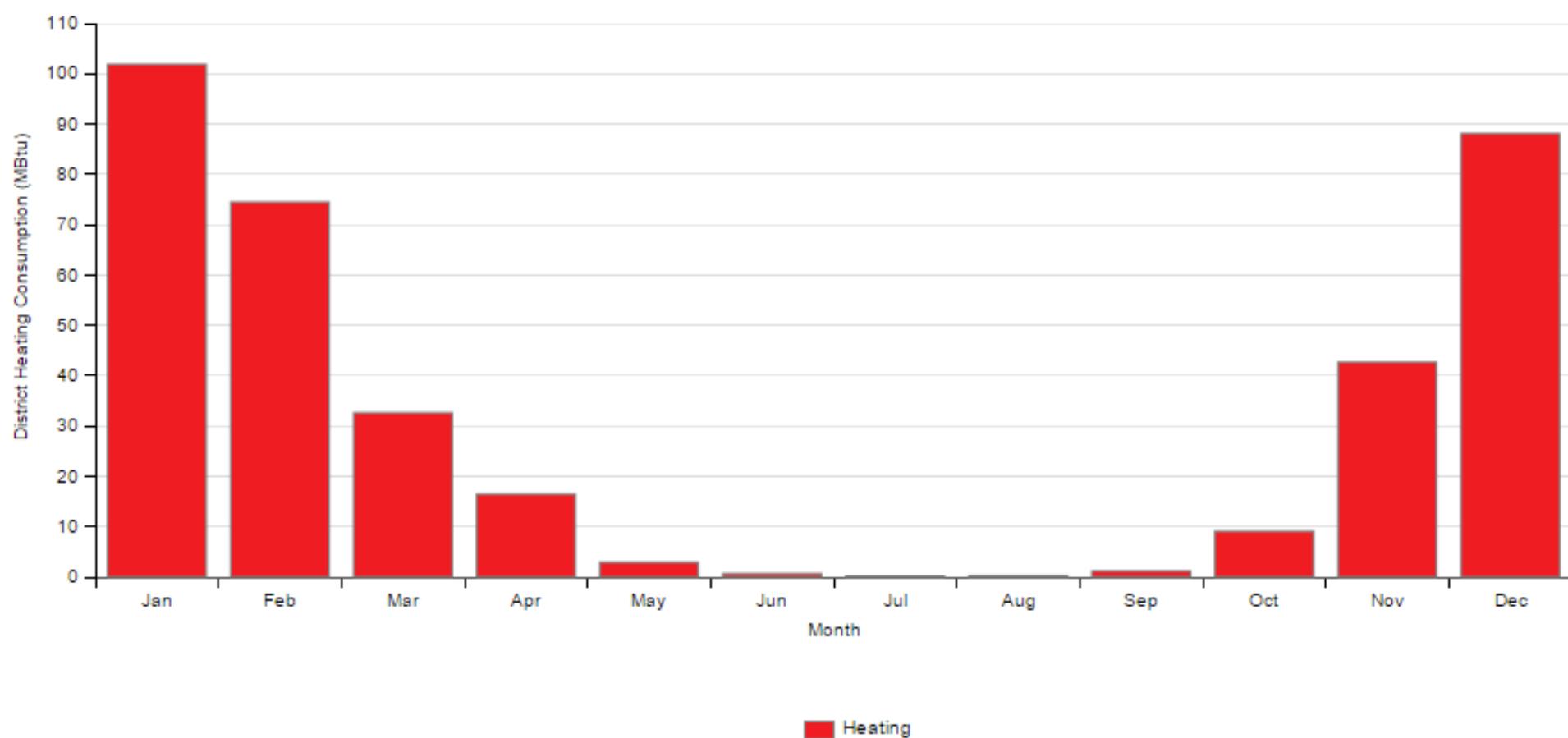
District Cooling Consumption (MBtu) - [view table](#)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Heating													
Cooling	0.01	0.01	0.07	0.65	17.58	52.95	87.45	70.31	26.9	1.55	0.04	0.01	257.52



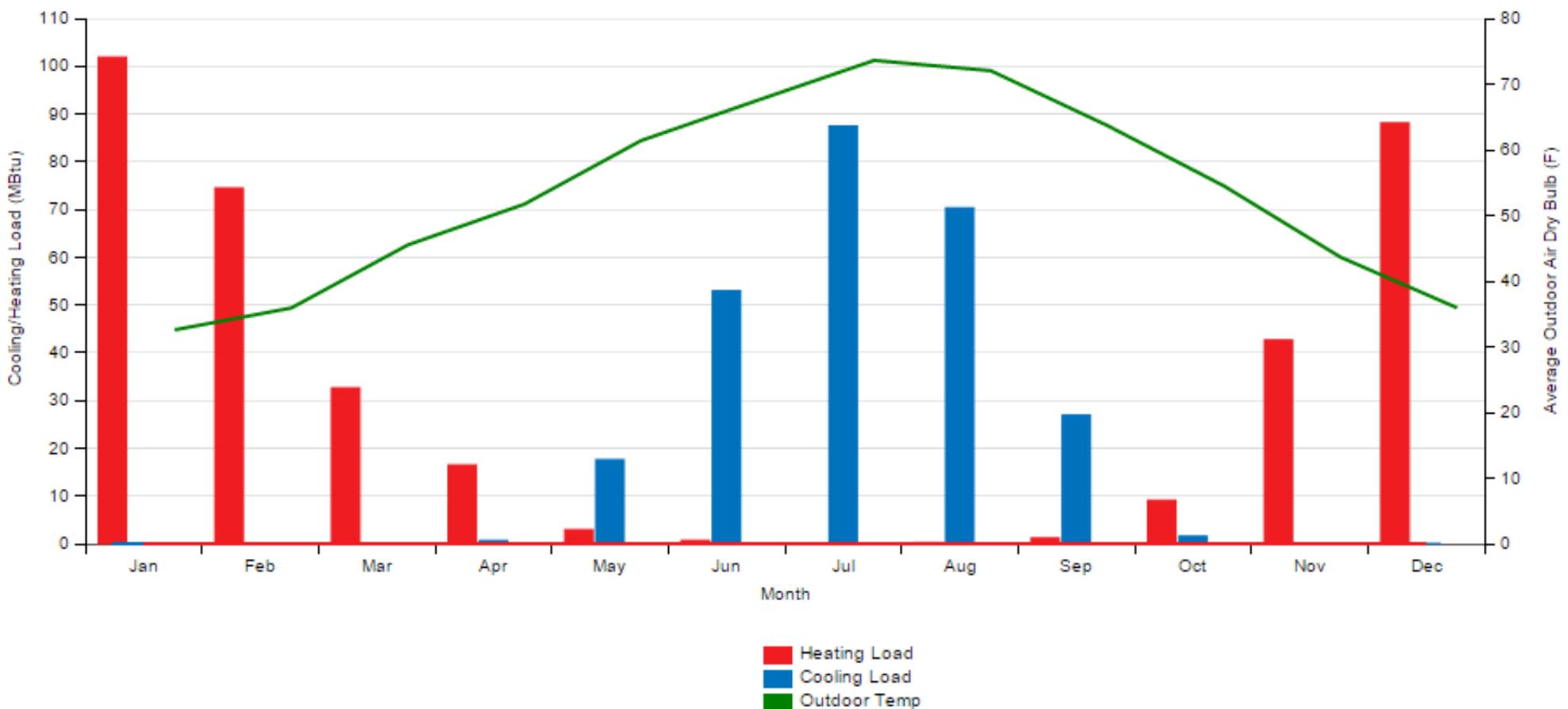
District Heating Consumption (MBtu) - view table

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Heating	101.87	74.45	32.61	16.46	2.91	0.68	0.16	0.23	1.17	9.09	42.64	88.07	370.32



Monthly Load Profiles - [view table](#)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Average Outdoor Air Dry Bulb (F)	32.6	35.9	45.5	51.7	61.4	67.5	73.6	72.0	63.7	54.5	43.6	35.9
Cooling Load (MBtu)	0.01	0.01	0.07	0.65	17.58	52.95	87.45	70.31	26.9	1.55	0.04	0.01
Heating Load (MBtu)	101.87	74.45	32.61	16.46	2.91	0.68	0.16	0.23	1.17	9.09	42.64	88.07



MILANO 'Wall 2'

Building Summary

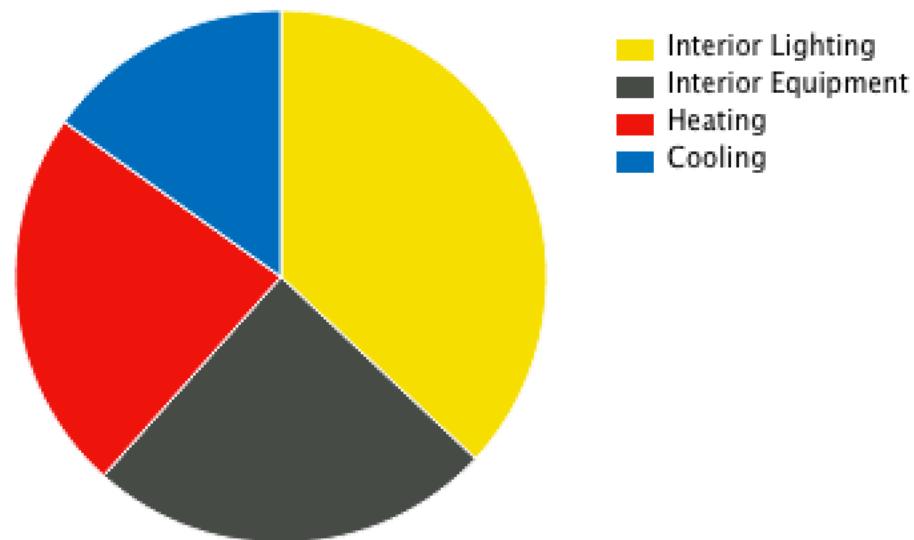
Data	Value
Building Name	Milan
Total Site Energy	1,618,767 kBtu
Total Building Area	51,667 ft ²
Total Site EUI	31.33 kBtu/ft ²
OpenStudio Standards Building Type	n/a

Weather Summary

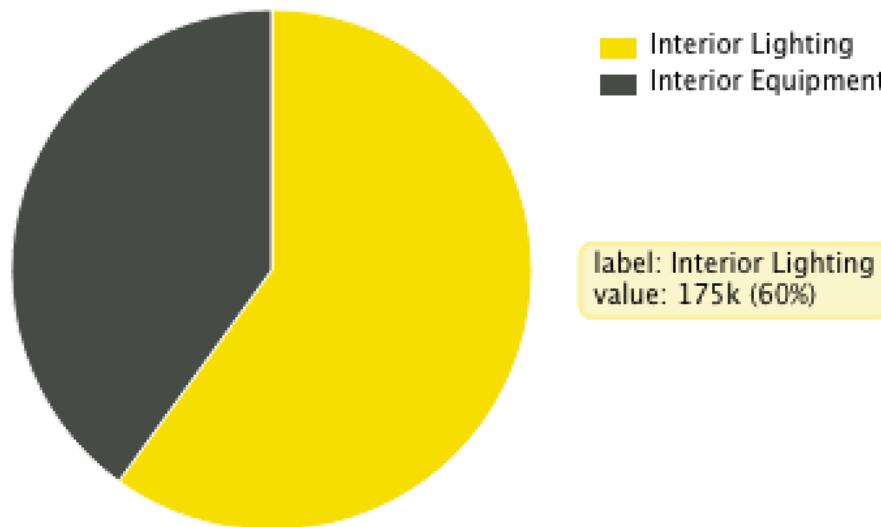
	Value
Weather File	MILAN - ITA IWEC Data WMO#=160660
Latitude	45.62
Longitude	8.73
Elevation	692 (ft)
Time Zone	1.00
North Axis Angle	0.00
ASHRAE Climate Zone	

End Use - view table

End Use	Consumption (kBtu)
Heating	376,634
Cooling	244,916
Interior Lighting	598,082
Exterior Lighting	0
Interior Equipment	399,126

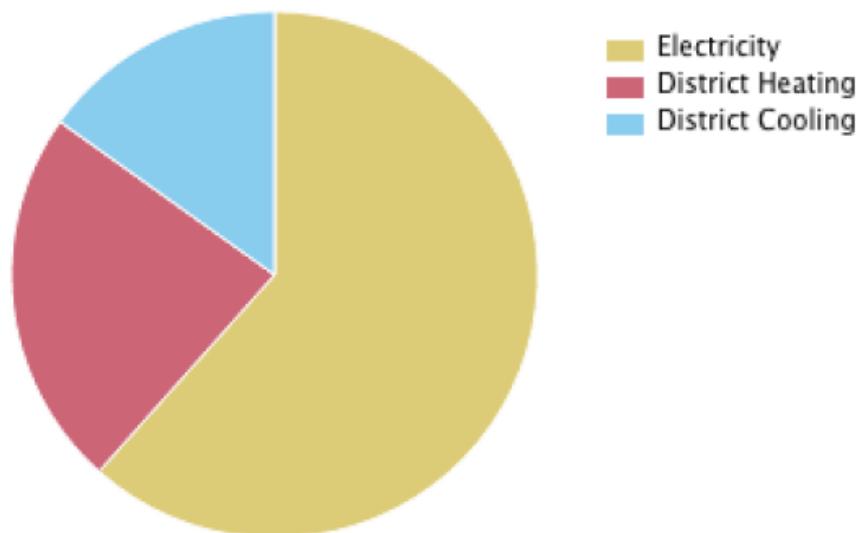


End Use	Consumption (kWh)
Heating	0
Cooling	0
Interior Lighting	175,281
Exterior Lighting	0
Interior Equipment	116,972



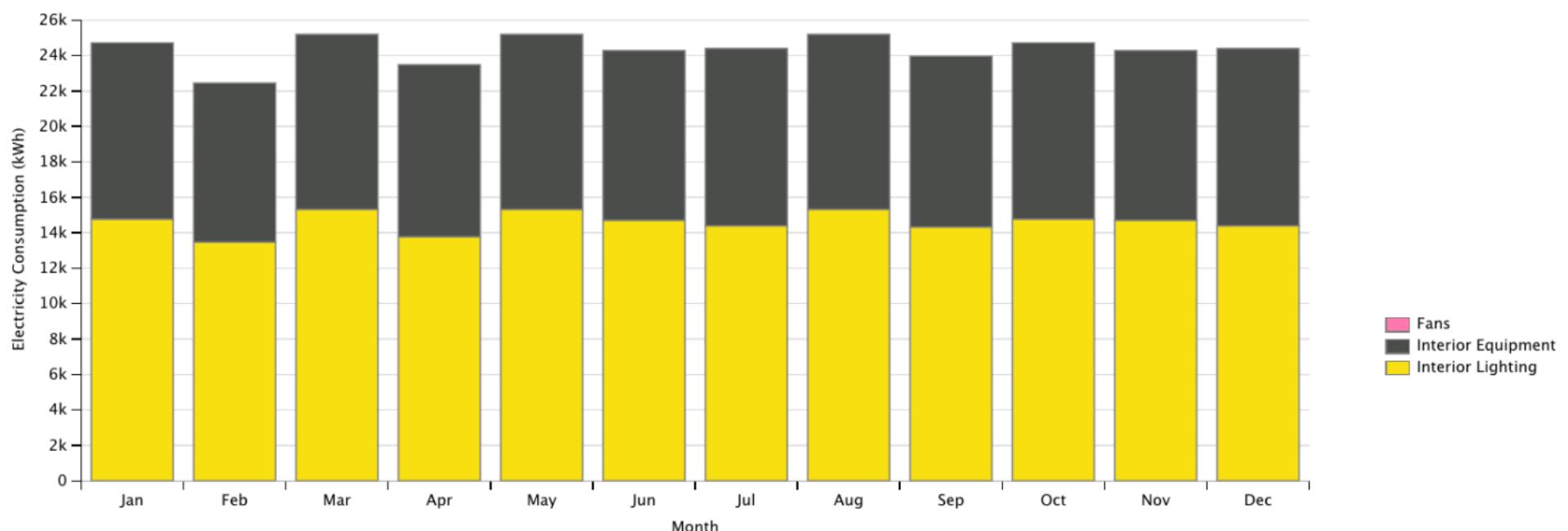
Energy Use - view table

Fuel	Consumption (kBtu)
Electricity	997,208
Natural Gas	0
Additional Fuel	0
District Cooling	244,916
District Heating	376,634



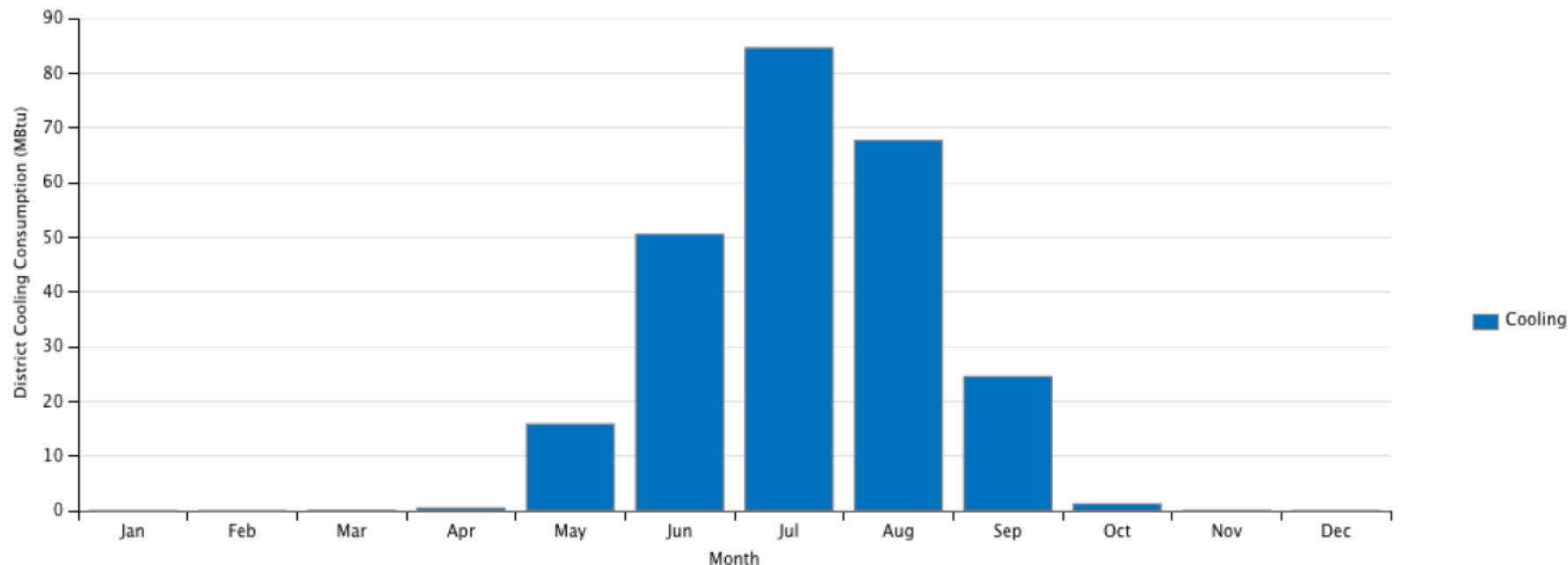
Electricity Consumption (kWh) - view table

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Heating													
Cooling													
Interior Lighting	14771.5	13478.06	15320.42	13776.97	15320.42	14706.31	14391.08	15320.42	14325.86	14771.5	14706.31	14391.08	175279.92
Exterior Lighting													
Interior Equipment	9940.06	8969.75	9875.08	9703.25	9875.08	9573.31	10005.03	9875.08	9638.28	9940.06	9573.31	10005.03	116973.31
Total	24711.56	22447.81	25195.5	23480.22	25195.5	24279.61	24396.11	25195.5	23964.14	24711.56	24279.61	24396.11	292253.22



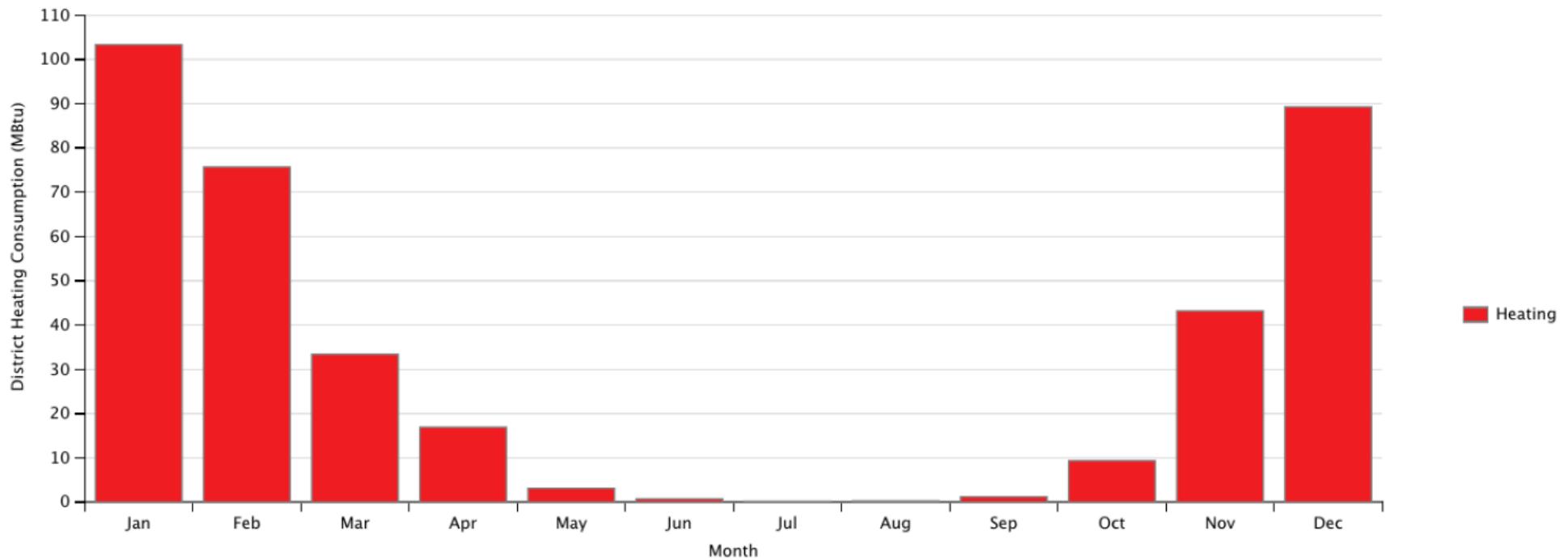
District Cooling Consumption (MBtu) - view table

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Heating													
Cooling	0.0	0.0	0.04	0.49	15.84	50.49	84.59	67.67	24.53	1.21	0.03	0.01	244.92



District Heating Consumption (MBtu) - view table

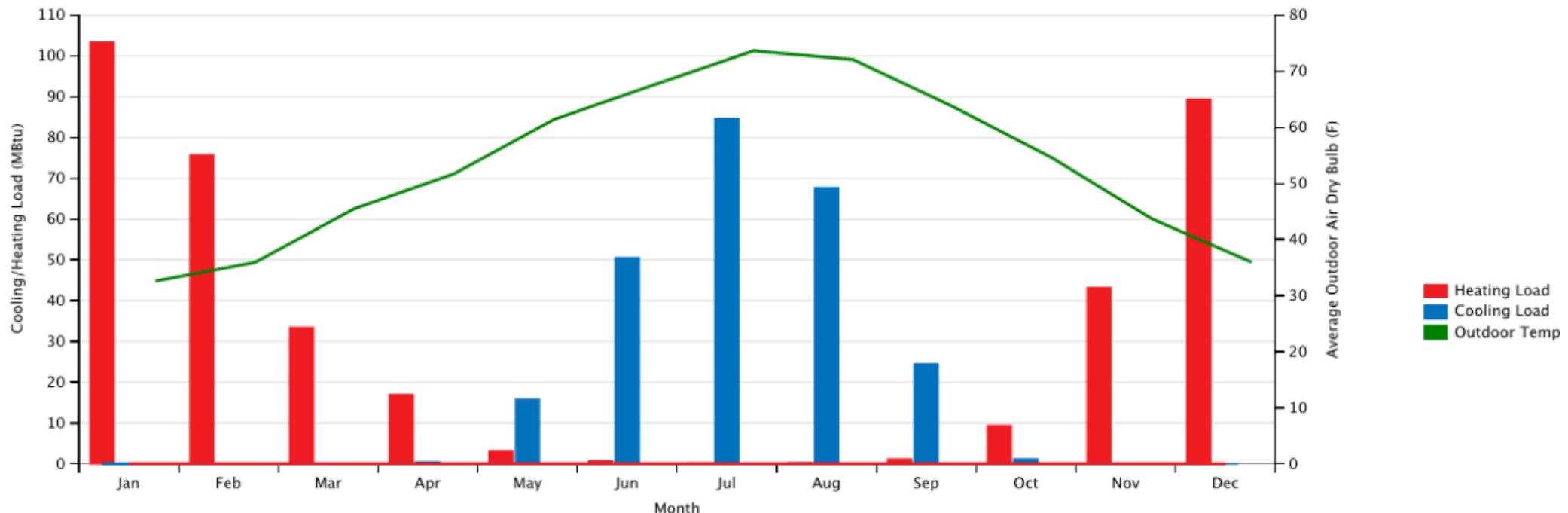
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Heating	103.32	75.7	33.39	16.93	3.11	0.73	0.17	0.26	1.2	9.36	43.18	89.29	376.64



HVAC Load Profiles

Monthly Load Profiles - view table

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Average Outdoor Air Dry Bulb (F)	32.6	35.9	45.5	51.7	61.4	67.5	73.6	72.0	63.7	54.5	43.6	35.9
Cooling Load (MBtu)	0.0	0.0	0.04	0.49	15.84	50.49	84.59	67.67	24.53	1.21	0.03	0.01
Heating Load (MBtu)	103.32	75.7	33.39	16.93	3.11	0.73	0.17	0.26	1.2	9.36	43.18	89.29



MILANO 'Wall 3'

Building Summary

Data	Value
Building Name	Milan
Total Site Energy	1,608,474 kBtu
Total Building Area	51,667 ft ²
Total Site EUI	31.13 kBtu/ft ²
OpenStudio Standards Building Type	n/a

Weather Summary

	Value
Weather File	MILAN - ITA IWEC Data WMO#=160660
Latitude	45.62
Longitude	8.73
Elevation	692 (ft)
Time Zone	1.00
North Axis Angle	0.00
ASHRAE Climate Zone	

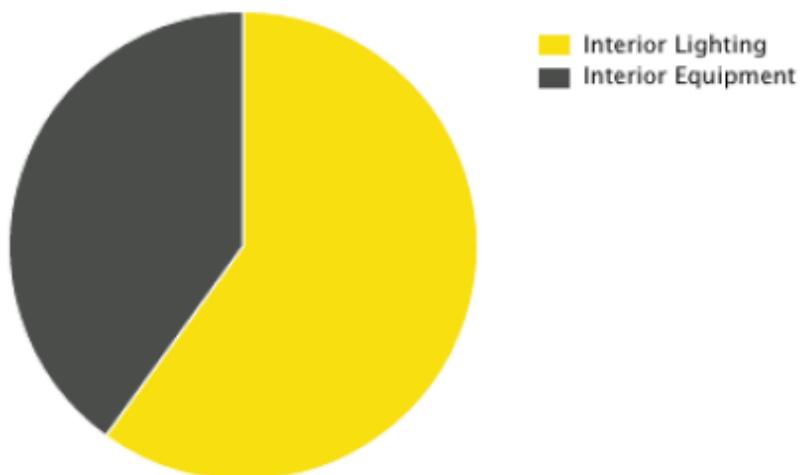
End Use - view table

End Use	Consumption (kBtu)
Heating	363,346
Cooling	247,921
Interior Lighting	598,082
Exterior Lighting	0
Interior Equipment	399,126



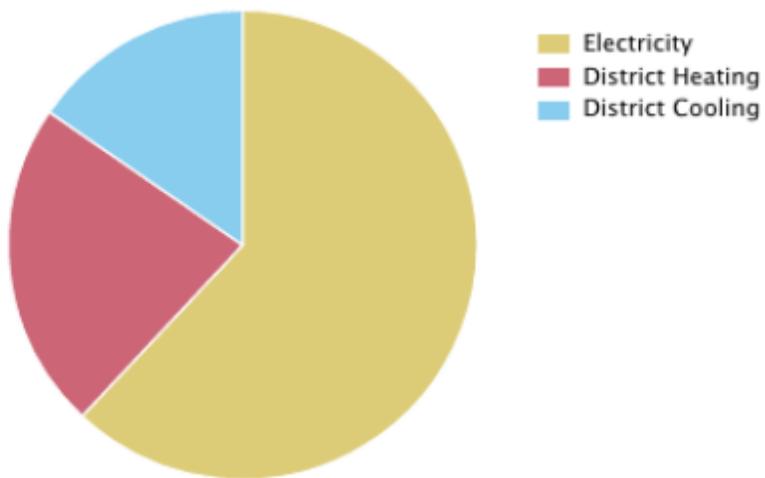
- Interior Lighting
- Interior Equipment
- Heating
- Cooling

End Use	Consumption (kWh)
Heating	0
Cooling	0
Interior Lighting	175,281
Exterior Lighting	0
Interior Equipment	116,972



Energy Use - view table

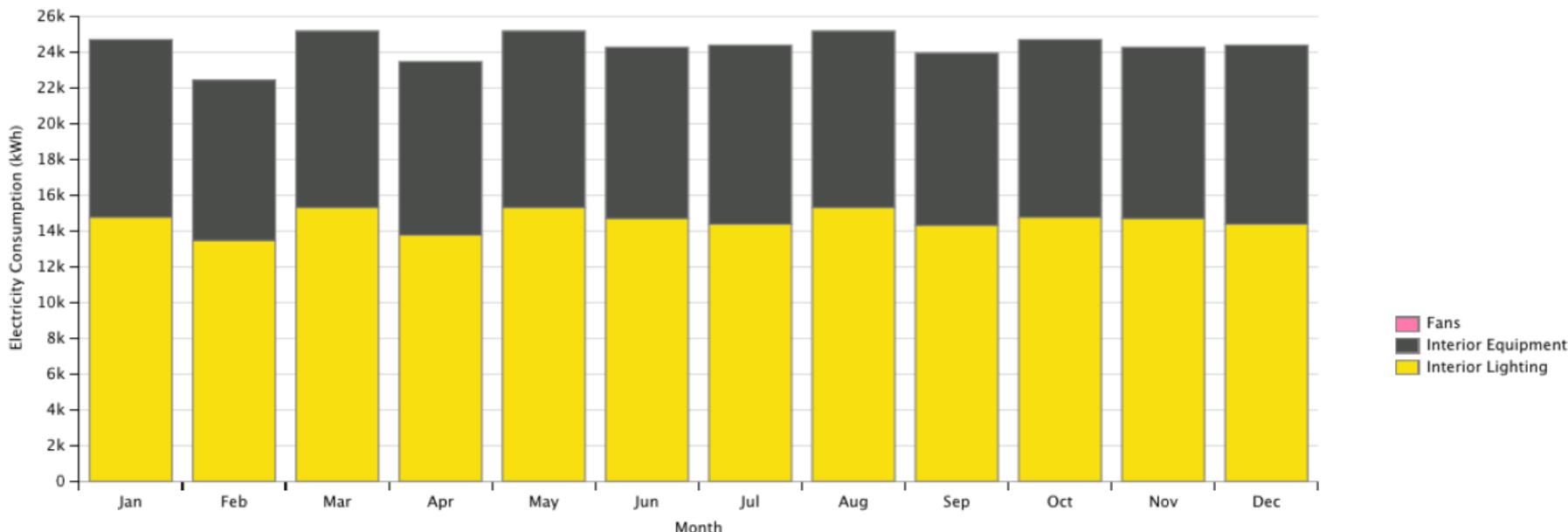
Fuel	Consumption (kBtu)
Electricity	997,208
Natural Gas	0
Additional Fuel	0
District Cooling	247,921
District Heating	363,346



Monthly Overview

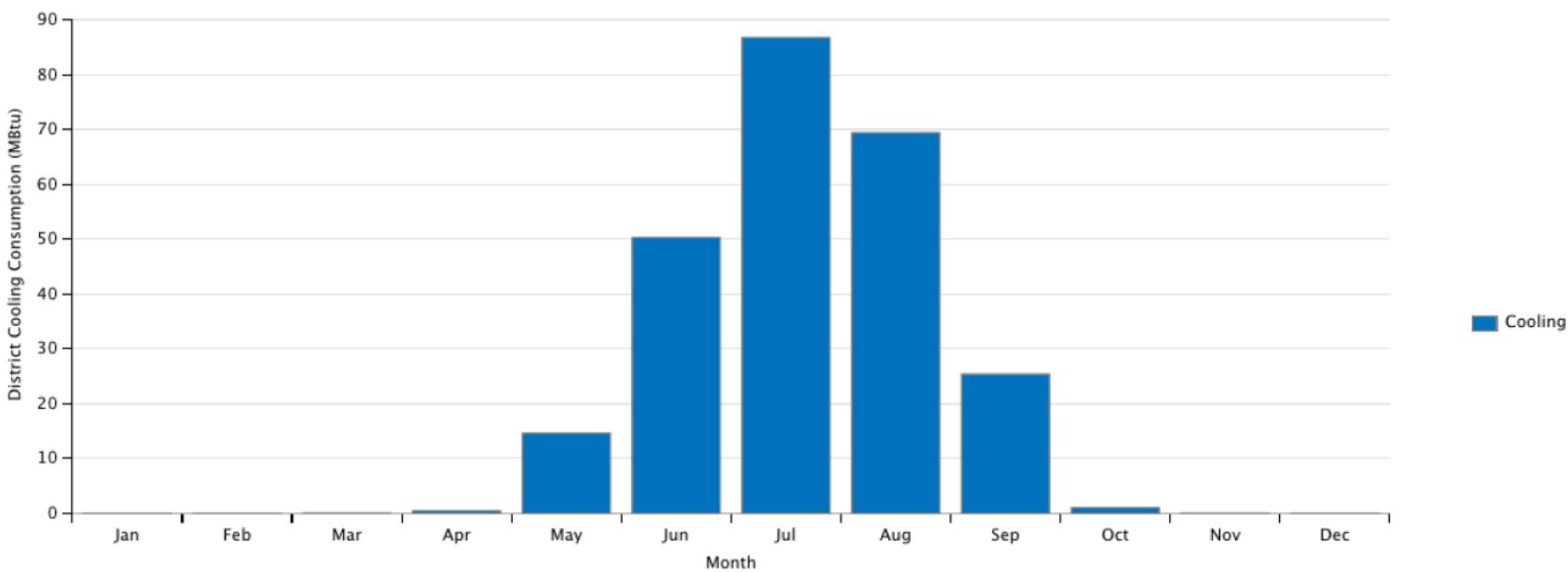
Electricity Consumption (kWh) - [view table](#)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Heating													
Cooling													
Interior Lighting	14771.5	13478.06	15320.42	13776.97	15320.42	14706.31	14391.08	15320.42	14325.86	14771.5	14706.31	14391.08	175279.92
Exterior Lighting													
Interior Equipment	9940.06	8969.75	9875.08	9703.25	9875.08	9573.31	10005.03	9875.08	9638.28	9940.06	9573.31	10005.03	116973.31
Total	24711.56	22447.81	25195.5	23480.22	25195.5	24279.61	24396.11	25195.5	23964.14	24711.56	24279.61	24396.11	292253.22



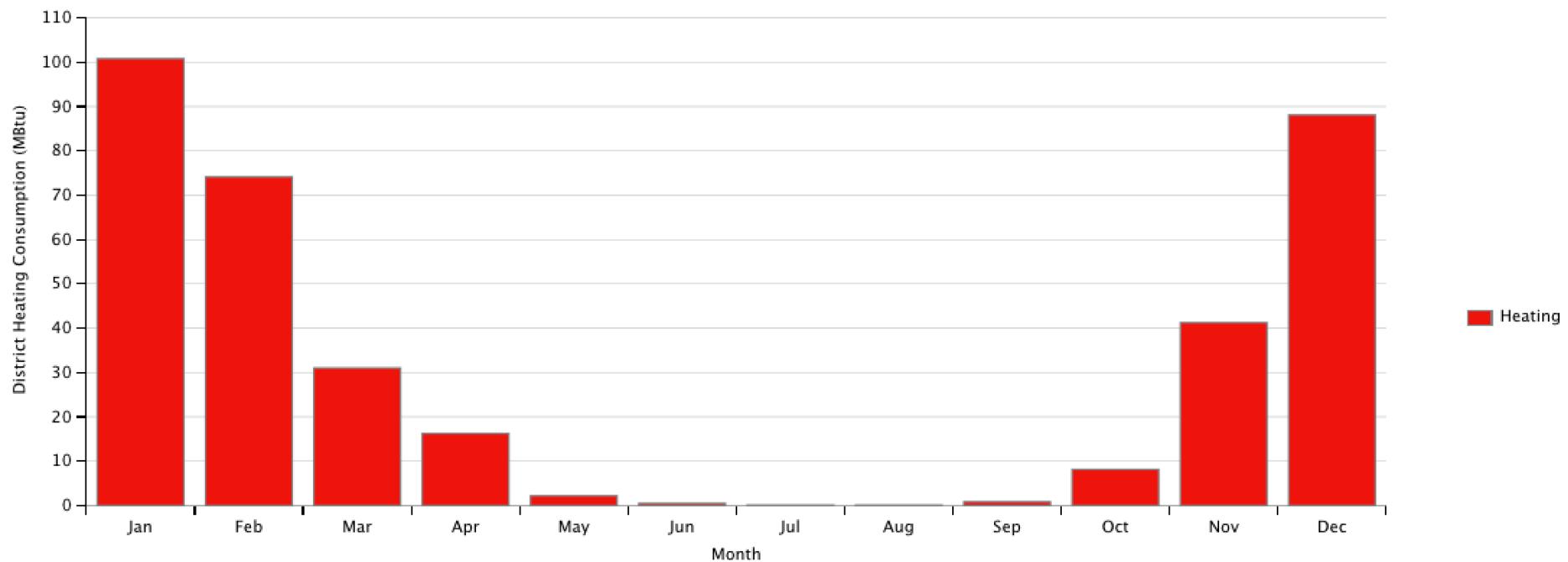
District Cooling Consumption (MBtu) - view table

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Heating													
Cooling	0.0	0.0	0.04	0.45	14.6	50.28	86.73	69.39	25.39	1.01	0.03	0.0	247.92



District Heating Consumption (MBtu) - view table

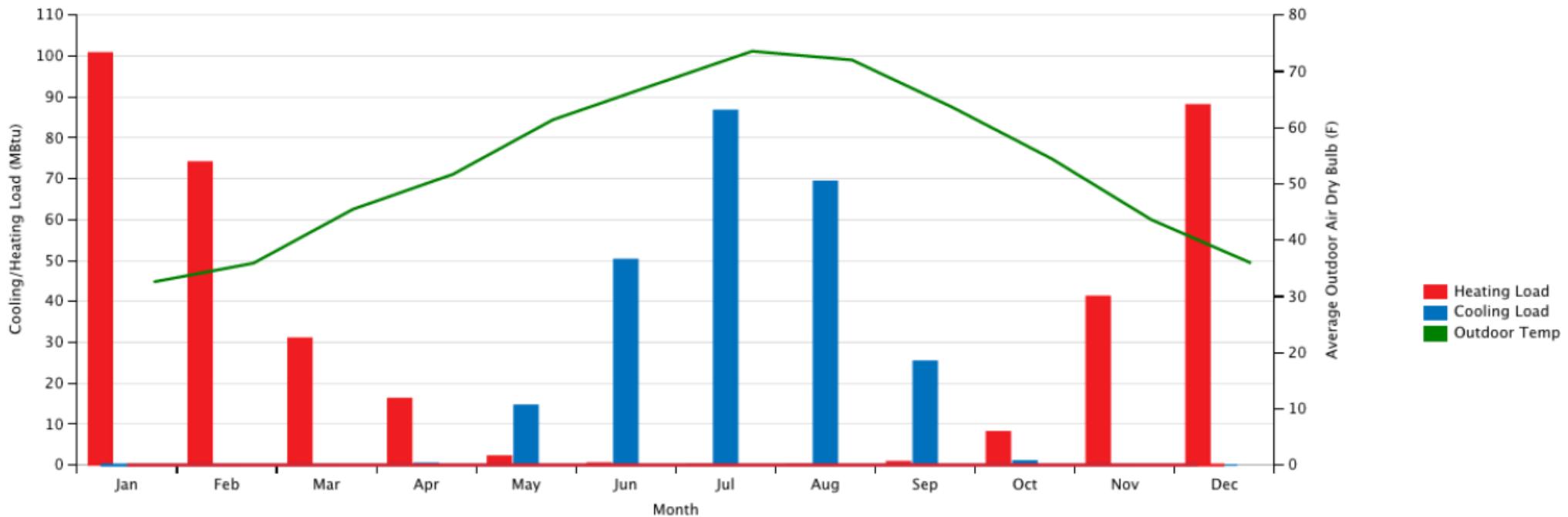
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Heating	100.79	74.11	31.02	16.25	2.19	0.49	0.1	0.1	0.84	8.13	41.24	88.09	363.34



HVAC Load Profiles

Monthly Load Profiles - view table

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Average Outdoor Air Dry Bulb (F)	32.6	35.9	45.5	51.7	61.4	67.5	73.6	72.0	63.7	54.5	43.6	35.9
Cooling Load (MBtu)	0.0	0.0	0.04	0.45	14.6	50.28	86.73	69.39	25.39	1.01	0.03	0.0
Heating Load (MBtu)	100.79	74.11	31.02	16.25	2.19	0.49	0.1	0.1	0.84	8.13	41.24	88.09



CONCLUSION

	MILAN WALL 1	WALL 2	WALL 3
Total Site Energy (kBtu)	1,626,246	1,618,767	1,608,474
Total Site EUI (kBtu/ft²)	31.48	31.33	31.13
End Use			
Heating (kBtu)	370,322	376,634	363,346
Cooling (kBtu)	257,522	244,916	247,921
Interior Lighting (kBtu)	598,082	598,082	598,082
Interior Equipment (kBtu)	399,126	399,126	399,126

The three different construction for external walls can be used to underline how the building construction affect the value of energy consumption.

In this report, 'wall 3' has the least energy consumption during winter thanks to its construction method which made out of 2 layers of concrete with a layer of insulation in between them.

However in summer 'wall 2' consumed the least energy followed on by 'wall 3' and 'wall 1'



THANK YOU