



 POLITECNICO DI MILANO



Technical Environmental System: OpenStudio Presentation

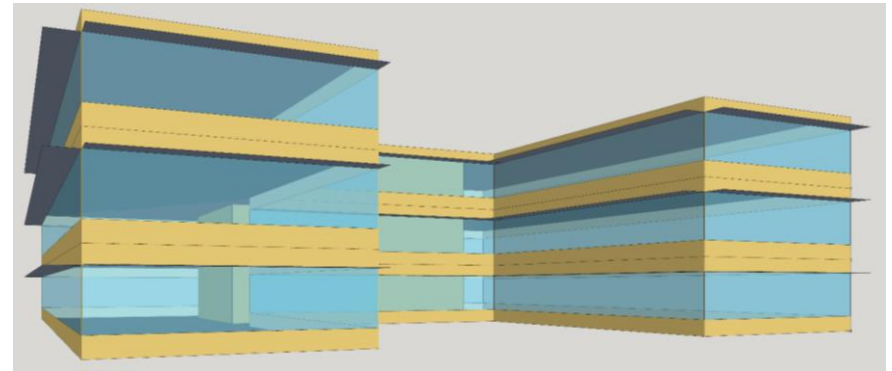
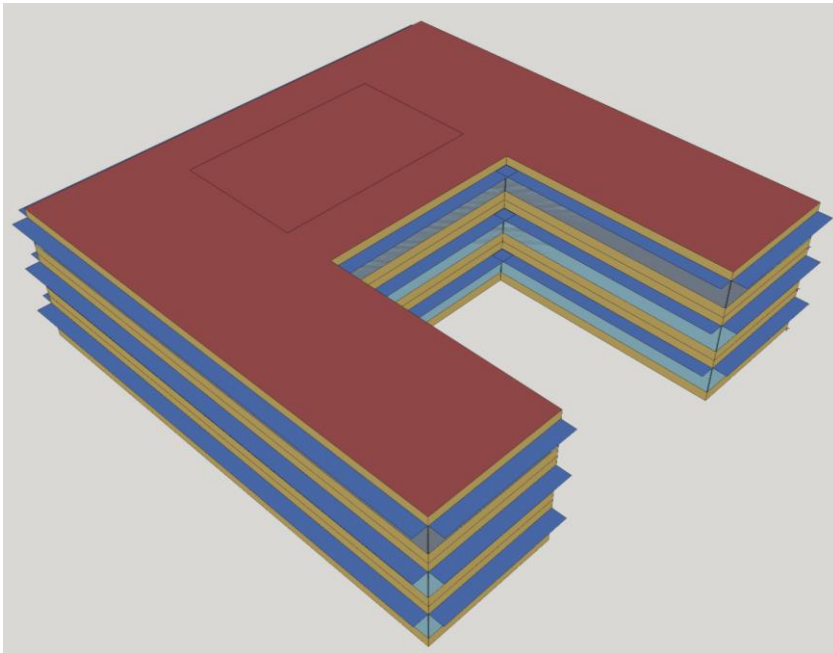
POLITECNICO DI MILANO - SUSTAINABLE ARCHITECTURE AND LANDSCAPE DESIGN - AA 2019-20

Professor: Najafi Behzad

Group T15: Nohra Theresa | Daccache Ilaya | Liu Jiaji | Li Xian



Form



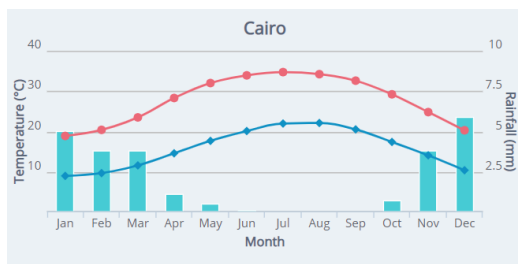
Area :	3504m ²
Layers :	3F
Height :	10.8m



Weather Information

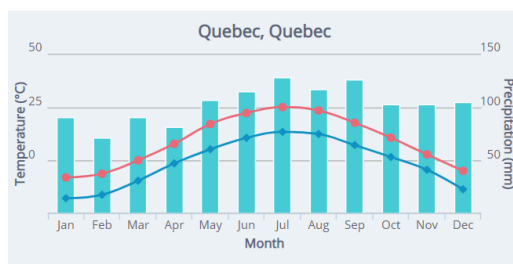
Quebec, Cairo, Piacenza

Temperature and Rainfall



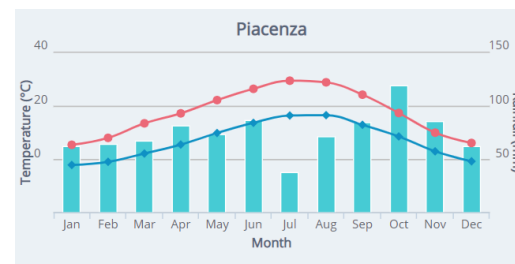
Month	Mean Daily Minimum Temperature (°C)	Mean Daily Maximum Temperature (°C)	Mean Total Rainfall (mm)	Mean Number of Rain Days
Jan	9.0	18.9	5.0	3.5
Feb	9.7	20.4	3.8	2.7
Mar	11.6	23.5	3.8	1.9
Apr	14.6	28.3	1.1	0.9
May	17.7	32.0	0.5	0.5
Jun	20.1	33.9	0.1	0.1
Jul	22.0	34.7	0.0	0.0
Aug	22.1	34.2	NaN	0.0
Sep	20.5	32.6	NaN	0.0
Oct	17.4	29.2	0.7	0.5
Nov	14.1	24.8	3.8	1.3
Dec	10.4	20.3	5.9	2.8

Cairo



Month	Mean Daily Minimum Temperature (°C)	Mean Daily Maximum Temperature (°C)	Mean Total Precipitation (mm)	Mean Number of Precipitation Days
Jan	-17.6	-7.9	89.8	18.5
Feb	-16.0	-6.1	70.6	14.9
Mar	-9.4	0.1	90.3	14.3
Apr	-1.3	7.8	81.2	13.3
May	5.3	17.1	106.1	14.3
Jun	10.6	22.2	114.2	13.7
Jul	13.4	25.0	127.8	13.8
Aug	12.4	23.4	116.7	13.9
Sep	7.2	17.7	125.5	14.2
Oct	1.7	10.7	101.7	15.1
Nov	-4.3	2.9	102.0	16.4
Dec	-13.4	-4.8	104.4	19.5

Quebec



Month	Mean Daily Minimum Temperature (°C)	Mean Daily Maximum Temperature (°C)	Mean Total Rainfall (mm)	Mean Number of Rain Days
Jan	-2.1	5.4	62.2	7.0
Feb	-0.9	8.0	63.4	5.5
Mar	2.2	13.4	66.8	6.5
Apr	5.5	17.1	81.3	8.2
May	9.8	22.0	72.9	8.1
Jun	13.6	26.2	86.5	6.7
Jul	16.3	29.2	38.0	4.6
Aug	16.4	28.6	70.5	5.0
Sep	12.8	24.0	83.9	5.3
Oct	8.5	17.2	118.1	8.2
Nov	3.0	9.9	84.8	7.2
Dec	-0.7	6.1	61.6	6.2

Piacenza



External Wall

layers & U values

Stucco | 20cm concrete | Wall Insulation | Gypsum 1

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	12,572	2	19.96
ExtWall1216	14,415	36	5.76

$U=0.17 \text{ W/}^{\circ}\text{C}$

20cm concrete

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	12,572	2	19.96
ExtWall1216-concrete	14,415	36	0.67

$U=1.49 \text{ W/}^{\circ}\text{C}$

Wood

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	12,572	2	19.96
ExtWall1216-wood	14,415	36	3.79

$U=0.26 \text{ W/}^{\circ}\text{C}$

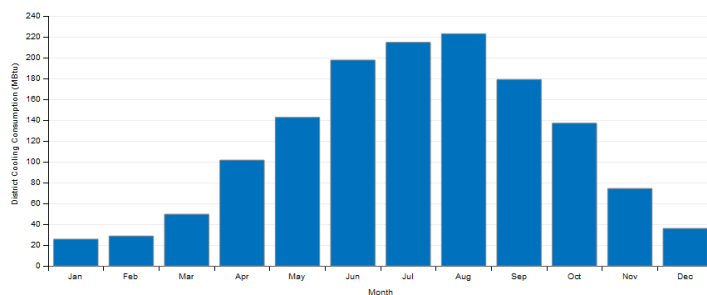


Monthly Consumption Comparison

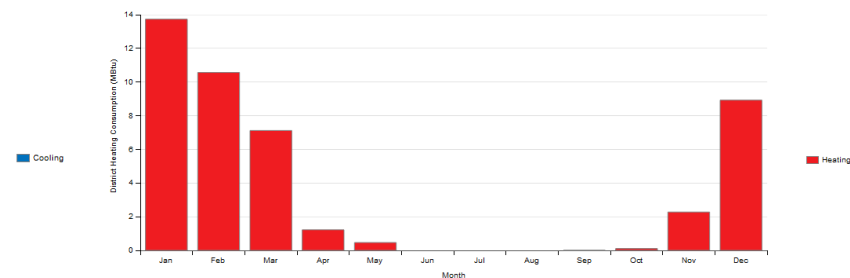
Different place, Same material

CAIRO

District Cooling Consumption (MBtu) - view table

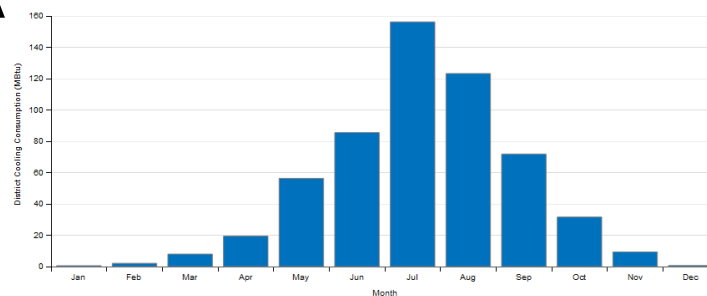


District Heating Consumption (MBtu) - view table

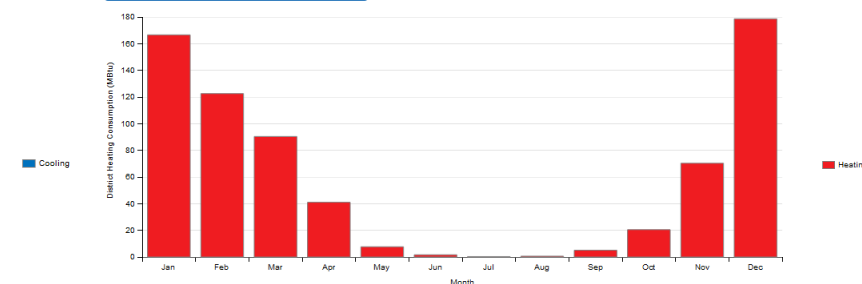


PIACENZA

District Cooling Consumption (MBtu) - view table

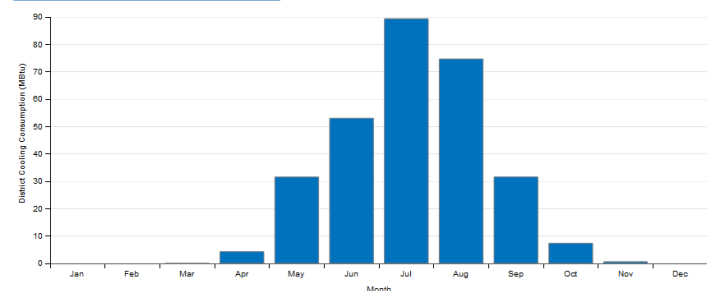


District Heating Consumption (MBtu) - view table

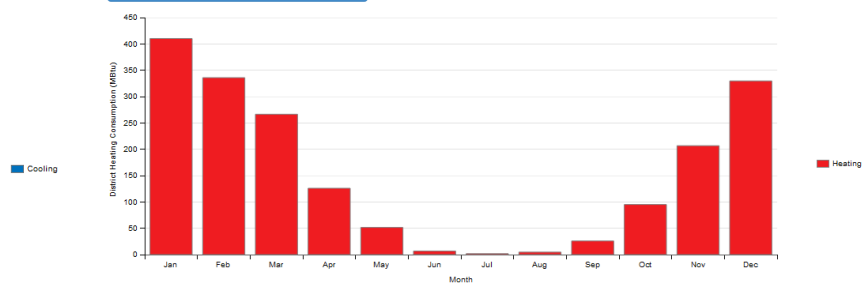


QUEBEC

District Cooling Consumption (MBtu) - view table



District Heating Consumption (MBtu) - view table





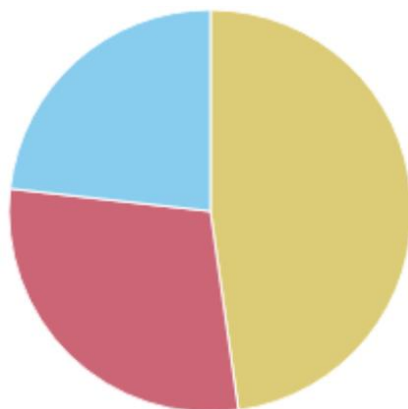
Monthly Consumption

Hottest and Coldest Months in the Three Cities

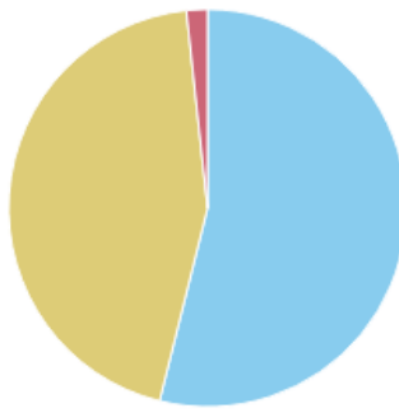
Cities	Coldest month (°C)	Heating consumption (MBtu)	Hottest month (°C)	Cooling consumption (MBtu)
Piacenza	Jan: -2.1	165	Jul: 29.2	155
Cairo	Jan: 9	14	Jul: 34.7	220
Quebec	Jan: -17.6	420	Jul: 25	90

Energy Use Diagrams

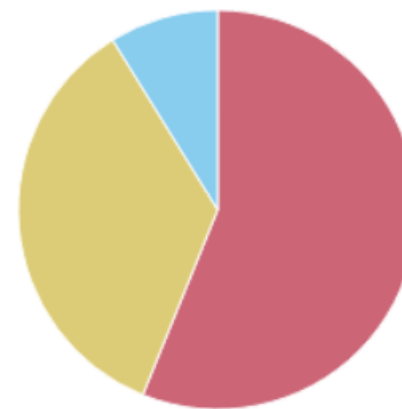
Piacenza



Cairo



Quebec



District Heating
Electricity
District Cooling



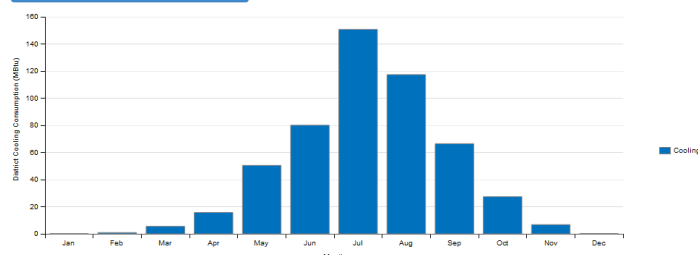
Monthly Consumption Comparison

Same place, Different material

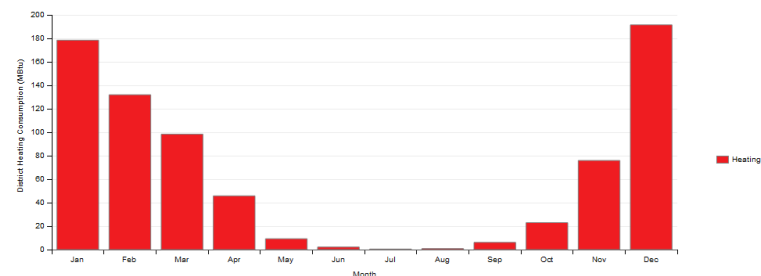
PIACENZA

Wood

District Cooling Consumption (MBtu) - view table

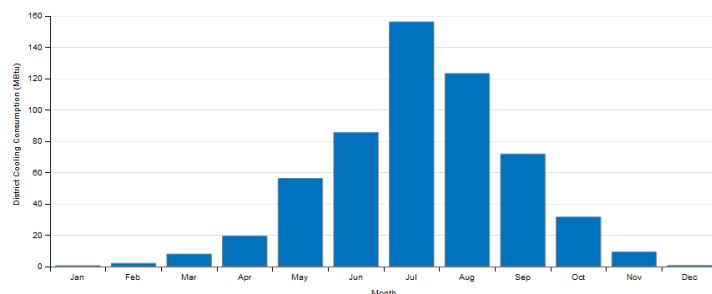


District Heating Consumption (MBtu) - view table

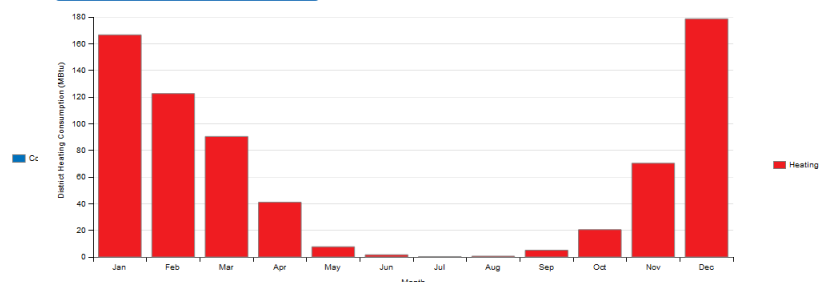


Layers

District Cooling Consumption (MBtu) - view table

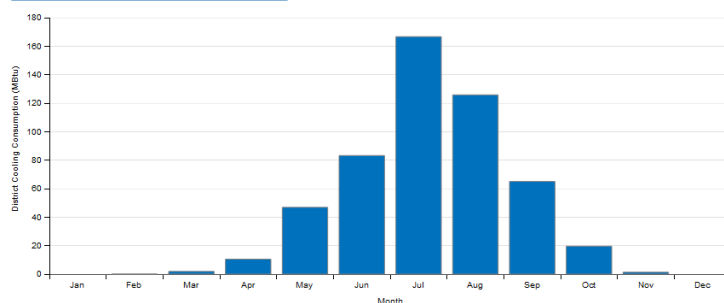


District Heating Consumption (MBtu) - view table

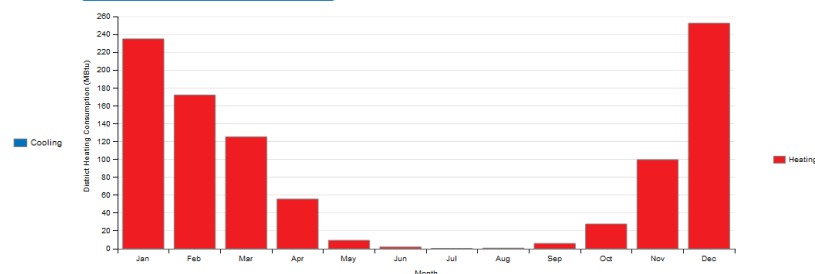


20cm
Concrete

District Cooling Consumption (MBtu) - view table



District Heating Consumption (MBtu) - view table



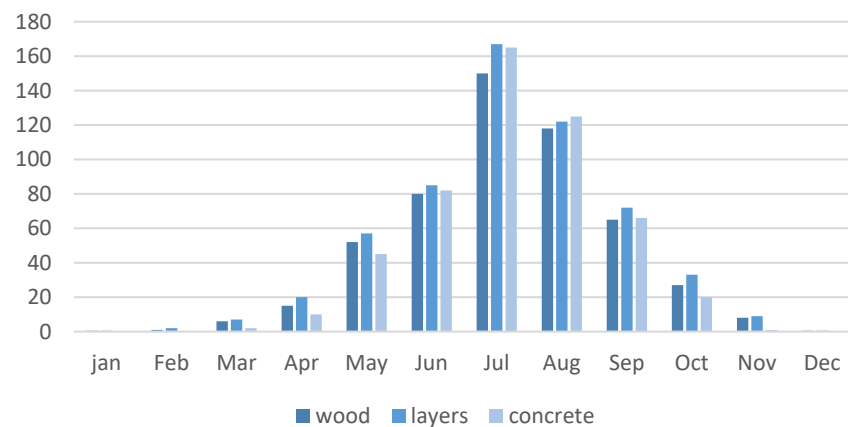


Monthly Consumption Comparison

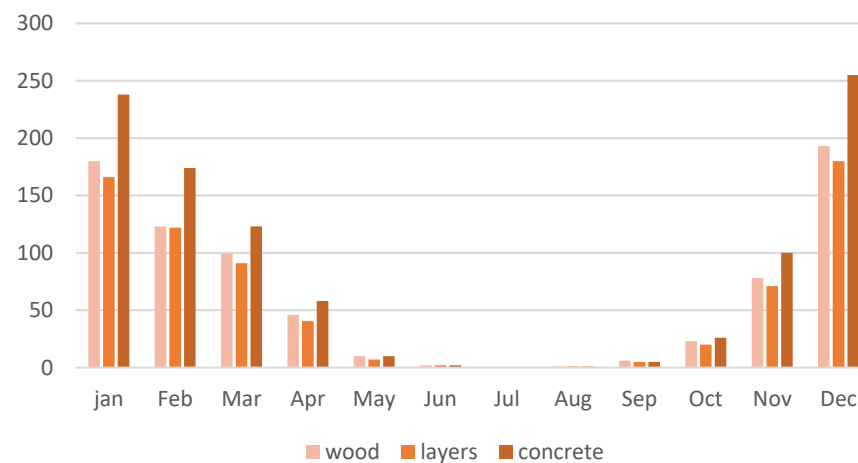
Same place, Different material

PIACENZA

Cooling Comparison



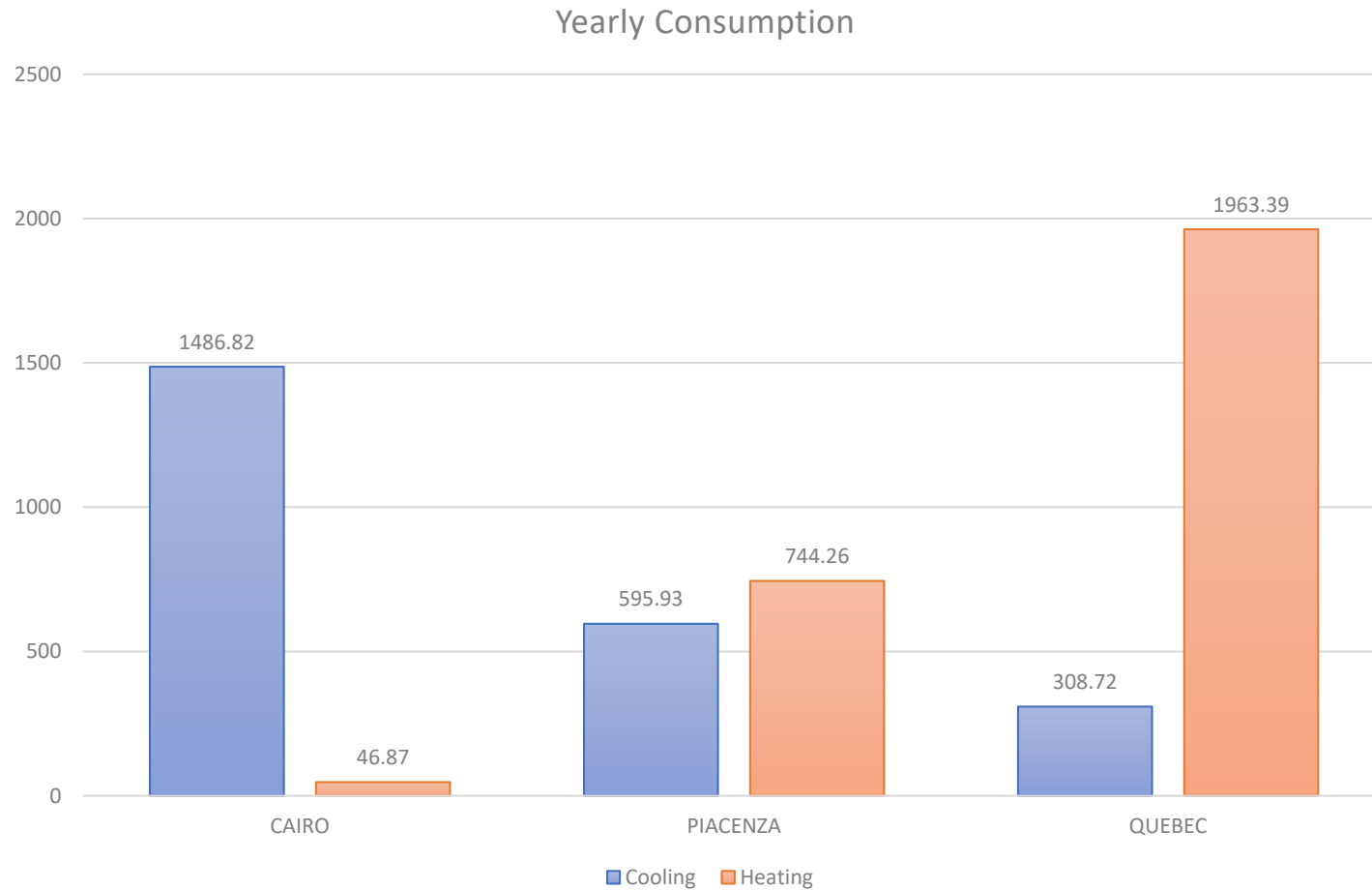
Heating Comparison





Yearly Cooling and Heating Consumption Comparison

Different place, Same material

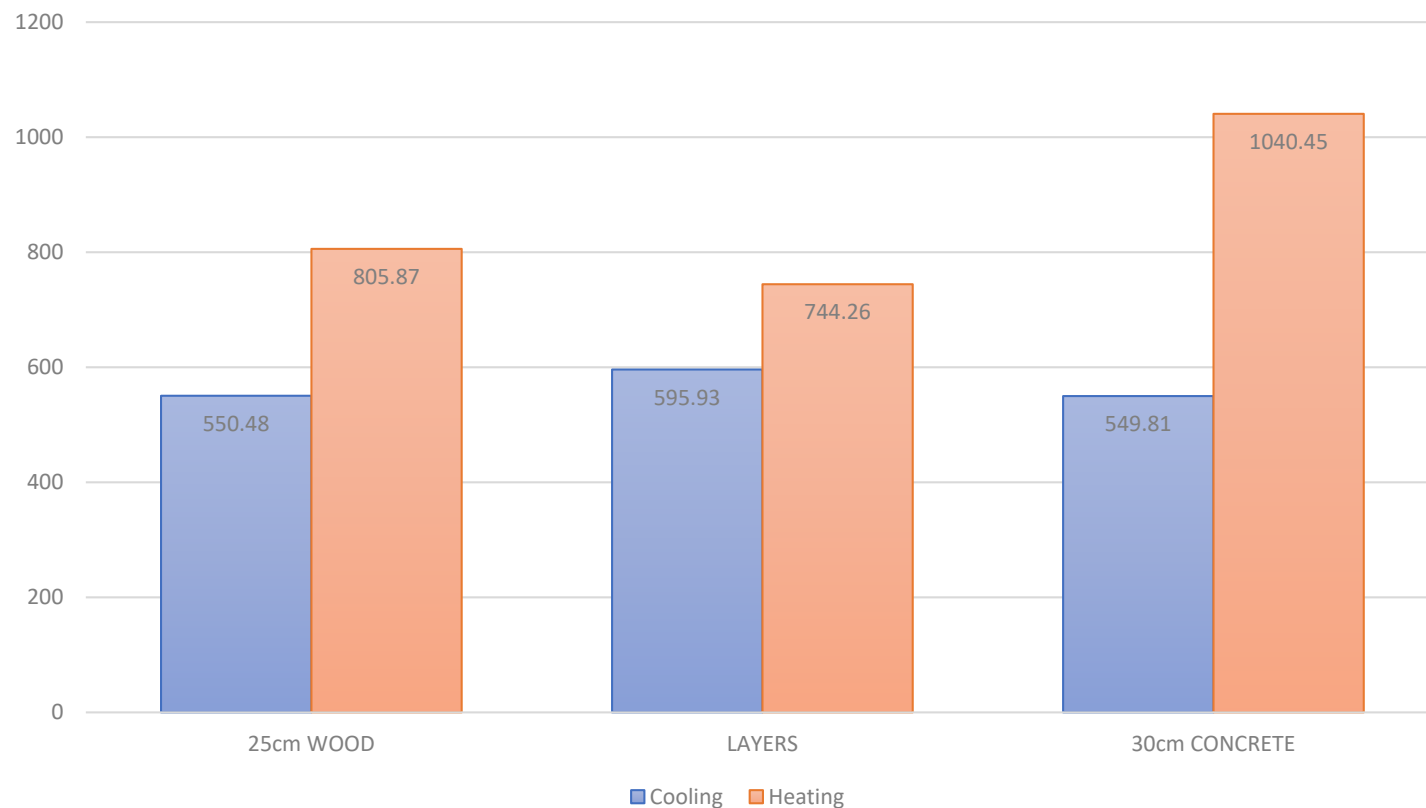




Yearly Cooling and Heating Consumption Comparison

Same place, Different material

Yearly consumption of Piacenza





Thank you