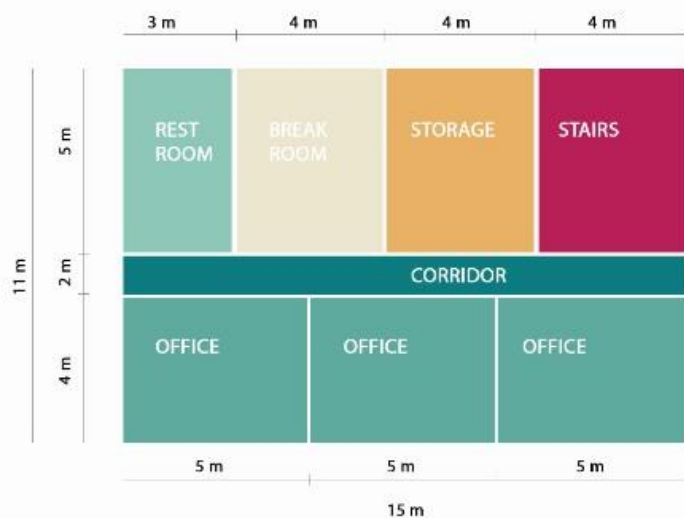
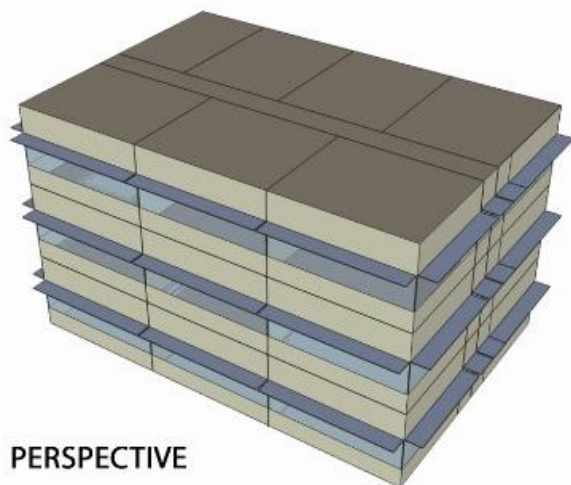


# Energetic Simulation

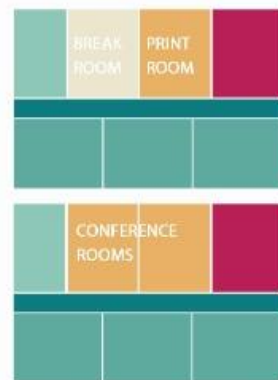
TECHNICAL ENVIRONMENTAL SYSTEMS



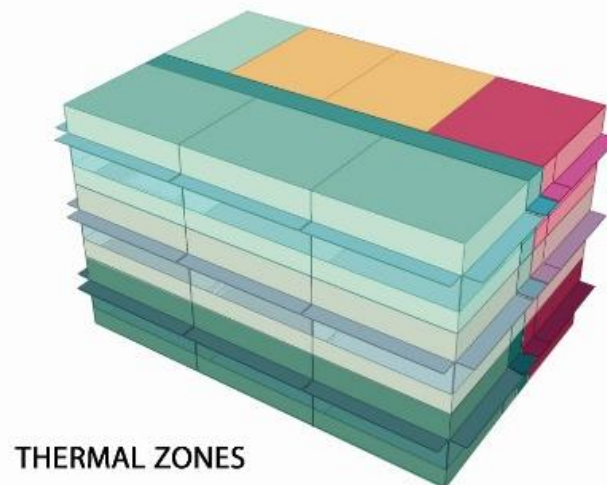
GROUND FLOOR PLAN



PERSPECTIVE



TOP FLOOR PLANS



THERMAL ZONES

## BUILDING AREA

	Area [m <sup>2</sup> ]
Total Building Area	495.00
Net Conditioned Building Area	495.00
Unconditioned Building Area	0.00

NUMBER OF FLOORS : 3  
FLOOR HEIGHT : 3 m  
WINDOW TO WALL RATIO : 0,4  
OFFSET ABOVE FLOOR : 0,76 m  
OVERHANGS PROJECTION FACTOR : 0,5  
TOTAL THERMAL ZONES : 17

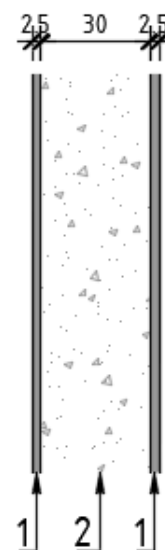
## CITIES

1. PIACENZA
2. NEW YORK
3. KUWAIT

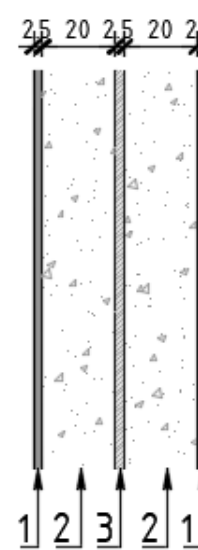
## TYPES OF WALLS

1. Stucco
2. Concrete wall
3. Insulated board: foam

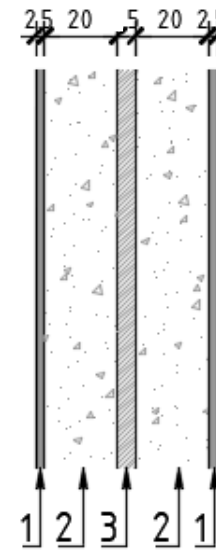
### WALL 1



### WALL 2



### WALL 3



Wall 1

End Uses

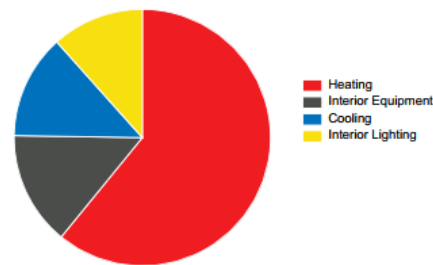
	Electricity [GJ]	Natural Gas [GJ]	Additional Fuel [GJ]	District Cooling [GJ]	District Heating [GJ]	Water [m3]
Heating	0.00	0.00	0.00	0.00	276.56	0.00
Cooling	0.00	0.00	0.00	59.65	0.00	0.00
Interior Lighting	52.74	0.00	0.00	0.00	0.00	0.00
Exterior Lighting	0.00	0.00	0.00	0.00	0.00	0.00
Interior Equipment	65.15	0.00	0.00	0.00	0.00	0.00
Exterior Equipment	0.00	0.00	0.00	0.00	0.00	0.00
Fans	0.00	0.00	0.00	0.00	0.00	0.00
Pumps	0.00	0.00	0.00	0.00	0.00	0.00
Heat Rejection	0.00	0.00	0.00	0.00	0.00	0.00
Humidification	0.00	0.00	0.00	0.00	0.00	0.00
Heat Recovery	0.00	0.00	0.00	0.00	0.00	0.00
Water Systems	0.00	0.00	0.00	0.00	0.00	0.00
Refrigeration	0.00	0.00	0.00	0.00	0.00	0.00
Generators	0.00	0.00	0.00	0.00	0.00	0.00
Total End Uses	117.89	0.00	0.00	59.65	276.56	0.00

Note: District heat appears to be the principal heating source based on energy usage.

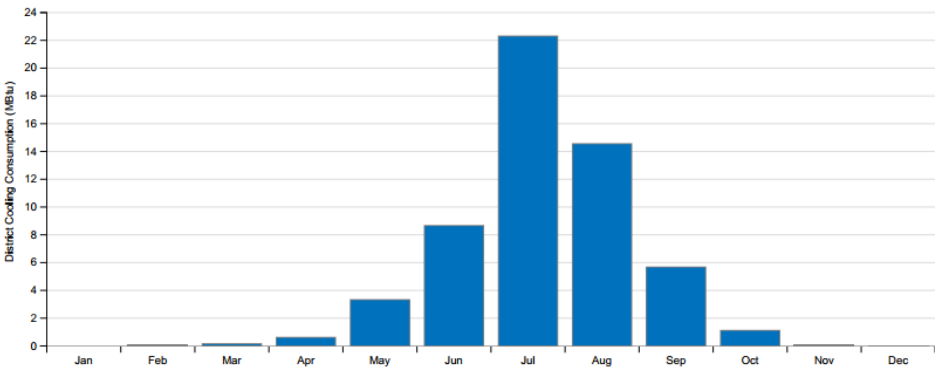
Total energy GJ  
1 435.64

U Factor no Film (W/M2-K)  
4.055

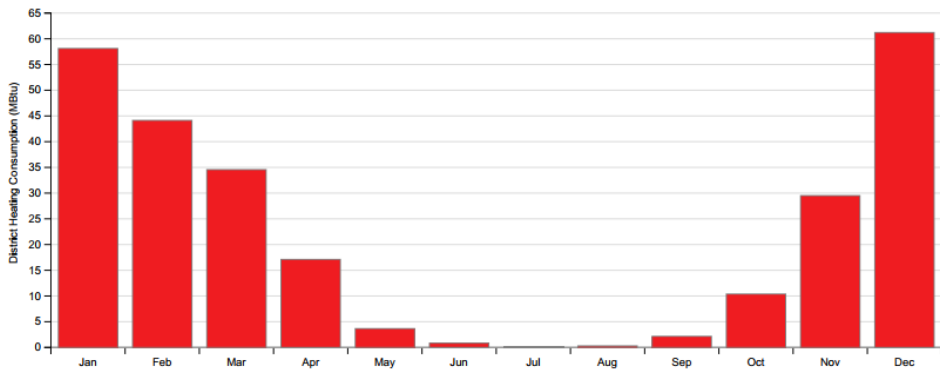
End uses (annual overview)



District cooling consumption (MBtu)



District heating consumption (MBtu)



Wall 2

End Uses

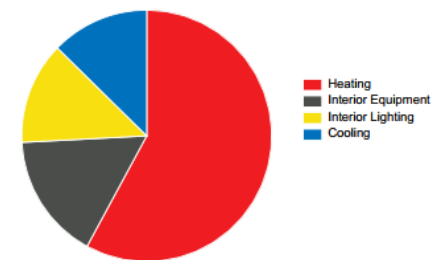
	Electricity [GJ]	Natural Gas [GJ]	Additional Fuel [GJ]	District Cooling [GJ]	District Heating [GJ]	Water [m3]
Heating	0.00	0.00	0.00	0.00	232.36	0.00
Cooling	0.00	0.00	0.00	50.85	0.00	0.00
Interior Lighting	52.74	0.00	0.00	0.00	0.00	0.00
Exterior Lighting	0.00	0.00	0.00	0.00	0.00	0.00
Interior Equipment	65.15	0.00	0.00	0.00	0.00	0.00
Exterior Equipment	0.00	0.00	0.00	0.00	0.00	0.00
Fans	0.00	0.00	0.00	0.00	0.00	0.00
Pumps	0.00	0.00	0.00	0.00	0.00	0.00
Heat Rejection	0.00	0.00	0.00	0.00	0.00	0.00
Humidification	0.00	0.00	0.00	0.00	0.00	0.00
Heat Recovery	0.00	0.00	0.00	0.00	0.00	0.00
Water Systems	0.00	0.00	0.00	0.00	0.00	0.00
Refrigeration	0.00	0.00	0.00	0.00	0.00	0.00
Generators	0.00	0.00	0.00	0.00	0.00	0.00
Total End Uses	117.89	0.00	0.00	50.85	232.36	0.00

Note: District heat appears to be the principal heating source based on energy usage.

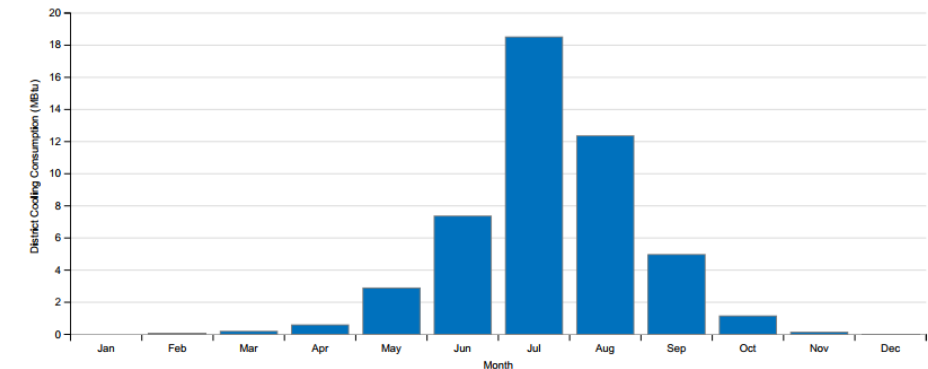
Total energy GJ  
1 266.64

U Factor no Film (W/M2-K)  
0.879

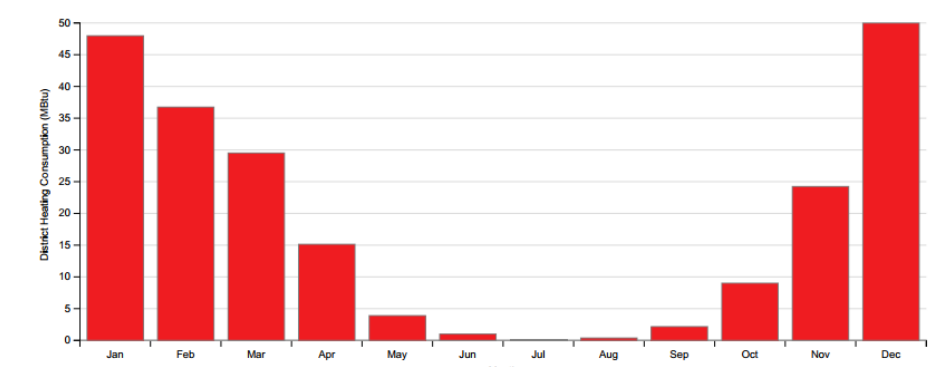
End uses (annual overview)



District cooling consumption (MBtu)



District heating consumption (MBtu)



Wall 3

End Uses

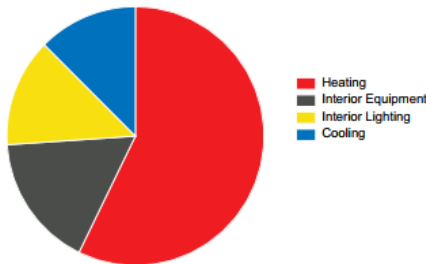
	Electricity [GJ]	Natural Gas [GJ]	Additional Fuel [GJ]	District Cooling [GJ]	District Heating [GJ]	Water [m3]
Heating	0.00	0.00	0.00	0.00	223.14	0.00
Cooling	0.00	0.00	0.00	48.87	0.00	0.00
Interior Lighting	52.74	0.00	0.00	0.00	0.00	0.00
Exterior Lighting	0.00	0.00	0.00	0.00	0.00	0.00
Interior Equipment	65.15	0.00	0.00	0.00	0.00	0.00
Exterior Equipment	0.00	0.00	0.00	0.00	0.00	0.00
Fans	0.00	0.00	0.00	0.00	0.00	0.00
Pumps	0.00	0.00	0.00	0.00	0.00	0.00
Heat Rejection	0.00	0.00	0.00	0.00	0.00	0.00
Humidification	0.00	0.00	0.00	0.00	0.00	0.00
Heat Recovery	0.00	0.00	0.00	0.00	0.00	0.00
Water Systems	0.00	0.00	0.00	0.00	0.00	0.00
Refrigeration	0.00	0.00	0.00	0.00	0.00	0.00
Generators	0.00	0.00	0.00	0.00	0.00	0.00
Total End Uses	117.89	0.00	0.00	48.87	223.14	0.00

Note: District heat appears to be the principal heating source based on energy usage.

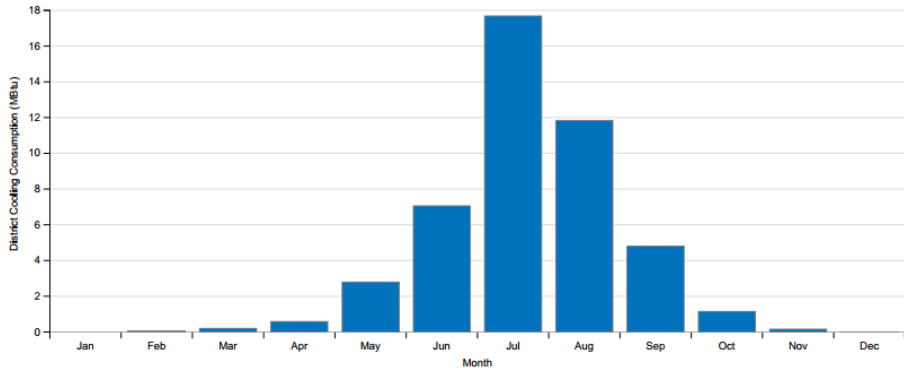
Total energy GJ  
1 231.24

U Factor no Film (W/M2-K)  
0.507

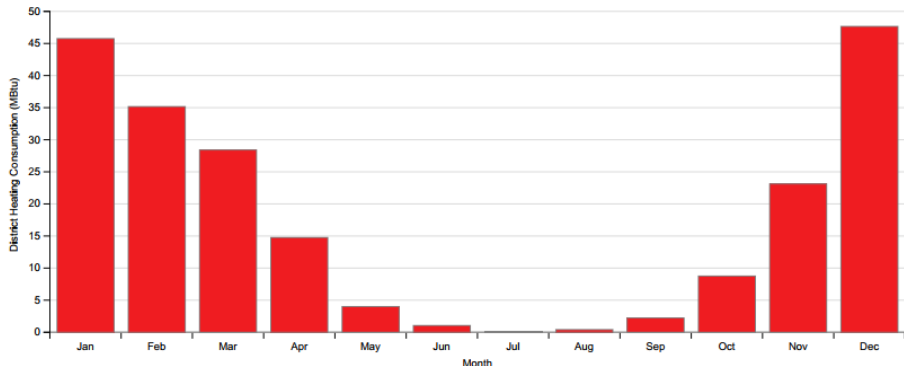
End uses (annual overview)



District cooling consumption (MBtu)



District heating consumption (MBtu)





## Wall 1

### End Uses

	Electricity [GJ]	Natural Gas [GJ]	Additional Fuel [GJ]	District Cooling [GJ]	District Heating [GJ]	Water [m3]
Heating	0.00	0.00	0.00	0.00	19.94	0.00
Cooling	0.00	0.00	0.00	393.28	0.00	0.00
Interior Lighting	52.74	0.00	0.00	0.00	0.00	0.00
Exterior Lighting	0.00	0.00	0.00	0.00	0.00	0.00
Interior Equipment	65.15	0.00	0.00	0.00	0.00	0.00
Exterior Equipment	0.00	0.00	0.00	0.00	0.00	0.00
Fans	0.00	0.00	0.00	0.00	0.00	0.00
Pumps	0.00	0.00	0.00	0.00	0.00	0.00
Heat Rejection	0.00	0.00	0.00	0.00	0.00	0.00
Humidification	0.00	0.00	0.00	0.00	0.00	0.00
Heat Recovery	0.00	0.00	0.00	0.00	0.00	0.00
Water Systems	0.00	0.00	0.00	0.00	0.00	0.00
Refrigeration	0.00	0.00	0.00	0.00	0.00	0.00
Generators	0.00	0.00	0.00	0.00	0.00	0.00
Total End Uses	117.89	0.00	0.00	393.28	19.94	0.00

Note: District heat appears to be the principal heating source based on energy usage.

Total energy GJ  
860.58

U Factor no Film (W/M2-K)  
4.055

## Wall 2

### End Uses

	Electricity [GJ]	Natural Gas [GJ]	Additional Fuel [GJ]	District Cooling [GJ]	District Heating [GJ]	Water [m3]
Heating	0.00	0.00	0.00	0.00	19.55	0.00
Cooling	0.00	0.00	0.00	325.50	0.00	0.00
Interior Lighting	52.74	0.00	0.00	0.00	0.00	0.00
Exterior Lighting	0.00	0.00	0.00	0.00	0.00	0.00
Interior Equipment	65.15	0.00	0.00	0.00	0.00	0.00
Exterior Equipment	0.00	0.00	0.00	0.00	0.00	0.00
Fans	0.00	0.00	0.00	0.00	0.00	0.00
Pumps	0.00	0.00	0.00	0.00	0.00	0.00
Heat Rejection	0.00	0.00	0.00	0.00	0.00	0.00
Humidification	0.00	0.00	0.00	0.00	0.00	0.00
Heat Recovery	0.00	0.00	0.00	0.00	0.00	0.00
Water Systems	0.00	0.00	0.00	0.00	0.00	0.00
Refrigeration	0.00	0.00	0.00	0.00	0.00	0.00
Generators	0.00	0.00	0.00	0.00	0.00	0.00
Total End Uses	117.89	0.00	0.00	325.50	19.55	0.00

Note: District heat appears to be the principal heating source based on energy usage.

Total energy GJ  
787.64

U Factor no Film (W/M2-K)  
0.879

## Wall 3

### End Uses

	Electricity [GJ]	Natural Gas [GJ]	Additional Fuel [GJ]	District Cooling [GJ]	District Heating [GJ]	Water [m3]
Heating	0.00	0.00	0.00	0.00	21.72	0.00
Cooling	0.00	0.00	0.00	313.78	0.00	0.00
Interior Lighting	52.74	0.00	0.00	0.00	0.00	0.00
Exterior Lighting	0.00	0.00	0.00	0.00	0.00	0.00
Interior Equipment	65.15	0.00	0.00	0.00	0.00	0.00
Exterior Equipment	0.00	0.00	0.00	0.00	0.00	0.00
Fans	0.00	0.00	0.00	0.00	0.00	0.00
Pumps	0.00	0.00	0.00	0.00	0.00	0.00
Heat Rejection	0.00	0.00	0.00	0.00	0.00	0.00
Humidification	0.00	0.00	0.00	0.00	0.00	0.00
Heat Recovery	0.00	0.00	0.00	0.00	0.00	0.00
Water Systems	0.00	0.00	0.00	0.00	0.00	0.00
Refrigeration	0.00	0.00	0.00	0.00	0.00	0.00
Generators	0.00	0.00	0.00	0.00	0.00	0.00
Total End Uses	117.89	0.00	0.00	313.78	21.72	0.00

Note: District heat appears to be the principal heating source based on energy usage.

Total energy GJ  
783.08

U Factor no Film (W/M2-K)  
0.507



## Wall 1

## End Uses

	Electricity [GJ]	Natural Gas [GJ]	Additional Fuel [GJ]	District Cooling [GJ]	District Heating [GJ]	Water [m3]
Heating	0.00	0.00	0.00	0.00	303.85	0.00
Cooling	0.00	0.00	0.00	87.88	0.00	0.00
Interior Lighting	52.74	0.00	0.00	0.00	0.00	0.00
Exterior Lighting	0.00	0.00	0.00	0.00	0.00	0.00
Interior Equipment	65.15	0.00	0.00	0.00	0.00	0.00
Exterior Equipment	0.00	0.00	0.00	0.00	0.00	0.00
Fans	0.00	0.00	0.00	0.00	0.00	0.00
Pumps	0.00	0.00	0.00	0.00	0.00	0.00
Heat Rejection	0.00	0.00	0.00	0.00	0.00	0.00
Humidification	0.00	0.00	0.00	0.00	0.00	0.00
Heat Recovery	0.00	0.00	0.00	0.00	0.00	0.00
Water Systems	0.00	0.00	0.00	0.00	0.00	0.00
Refrigeration	0.00	0.00	0.00	0.00	0.00	0.00
Generators	0.00	0.00	0.00	0.00	0.00	0.00
Total End Uses	117.89	0.00	0.00	87.88	303.85	0.00

Note: District heat appears to be the principal heating source based on energy usage.

Total energy GJ  
1564.04

U Factor no Film (W/M2-K)  
4.055

## Wall 2

## End Uses

	Electricity [GJ]	Natural Gas [GJ]	Additional Fuel [GJ]	District Cooling [GJ]	District Heating [GJ]	Water [m3]
Heating	0.00	0.00	0.00	0.00	256.09	0.00
Cooling	0.00	0.00	0.00	75.60	0.00	0.00
Interior Lighting	52.74	0.00	0.00	0.00	0.00	0.00
Exterior Lighting	0.00	0.00	0.00	0.00	0.00	0.00
Interior Equipment	65.15	0.00	0.00	0.00	0.00	0.00
Exterior Equipment	0.00	0.00	0.00	0.00	0.00	0.00
Fans	0.00	0.00	0.00	0.00	0.00	0.00
Pumps	0.00	0.00	0.00	0.00	0.00	0.00
Heat Rejection	0.00	0.00	0.00	0.00	0.00	0.00
Humidification	0.00	0.00	0.00	0.00	0.00	0.00
Heat Recovery	0.00	0.00	0.00	0.00	0.00	0.00
Water Systems	0.00	0.00	0.00	0.00	0.00	0.00
Refrigeration	0.00	0.00	0.00	0.00	0.00	0.00
Generators	0.00	0.00	0.00	0.00	0.00	0.00
Total End Uses	117.89	0.00	0.00	75.60	256.09	0.00

Note: District heat appears to be the principal heating source based on energy usage.

Total energy GJ

1378.52

U Factor no Film (W/M2-K)

0.879

## Wall 3

### End Uses

	Electricity [GJ]	Natural Gas [GJ]	Additional Fuel [GJ]	District Cooling [GJ]	District Heating [GJ]	Water [m3]
Heating	0.00	0.00	0.00	0.00	256.09	0.00
Cooling	0.00	0.00	0.00	75.60	0.00	0.00
Interior Lighting	52.74	0.00	0.00	0.00	0.00	0.00
Exterior Lighting	0.00	0.00	0.00	0.00	0.00	0.00
Interior Equipment	65.15	0.00	0.00	0.00	0.00	0.00
Exterior Equipment	0.00	0.00	0.00	0.00	0.00	0.00
Fans	0.00	0.00	0.00	0.00	0.00	0.00
Pumps	0.00	0.00	0.00	0.00	0.00	0.00
Heat Rejection	0.00	0.00	0.00	0.00	0.00	0.00
Humidification	0.00	0.00	0.00	0.00	0.00	0.00
Heat Recovery	0.00	0.00	0.00	0.00	0.00	0.00
Water Systems	0.00	0.00	0.00	0.00	0.00	0.00
Refrigeration	0.00	0.00	0.00	0.00	0.00	0.00
Generators	0.00	0.00	0.00	0.00	0.00	0.00
Total End Uses	117.89	0.00	0.00	75.60	256.09	0.00

Note: District heat appears to be the principal heating source based on energy usage.

Total energy GJ  
1343.50

U Factor no Film (W/M2-K)  
0.507

# Conclusion

Net Source Energy			
	Piacenza	New York	Kuwait
Wall 1	1435.64 GJ	1564.04 GJ	860.58 GJ
Wall 2	1266.64 GJ	1378.52 GJ	787.64 GJ
Wall 3	1231.24 GJ	1343.50 GJ	783.08 GJ

The lowest value: 783.08 GJ - Kuwait

The highest value: 1564.04 GJ - New York

- From the table we have the values of the total amount of fuel consumed to operate the building with regards of transmission, delivery, and production losses.
- Kuwait has the lowest value with wall 3, meaning that insulated walls in hot weathers is efficient and wastes low amount of energy.
- New York has the highest value with wall 1, which means that wall 1 is wasting much energy, as NY is a cold city.

## ANNUAL CONSUMPTION BY CATEGORY

