

Assignment 10: Energy Balance

Parameters of Affecting Energy Load

1. Window to Wall Ratio

Basic Data: Window to Wall Ratio **South 0.3**

Blinds

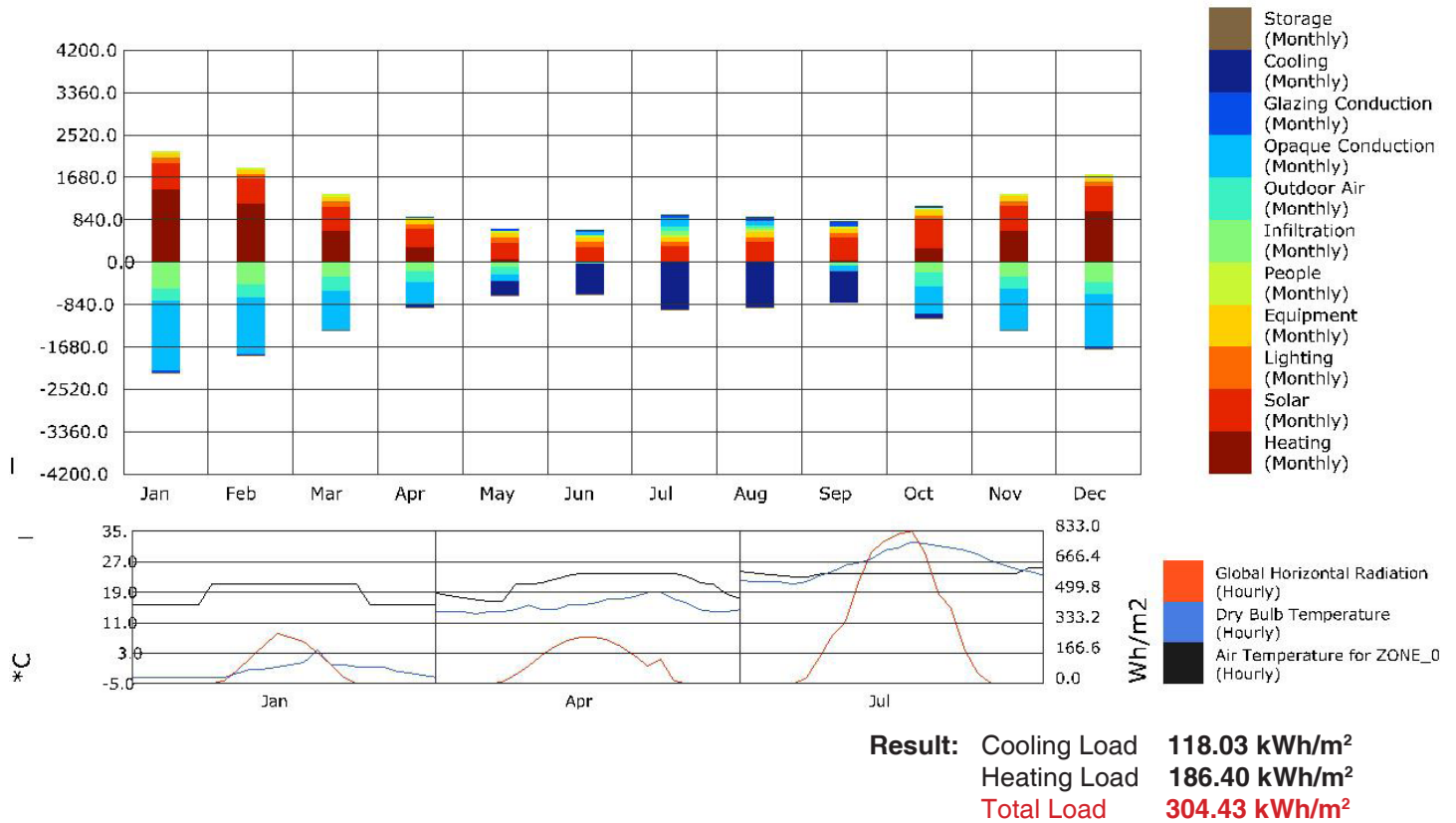
0

Construction

Exterior Wall R5.5 | Exterior Window R0.7, SHGC 0.65 | Exterior Roof R9.2

Thermal Mass

Existing Slab Construction



Basic Data: Window to Wall Ratio **South 0.6**

Blinds

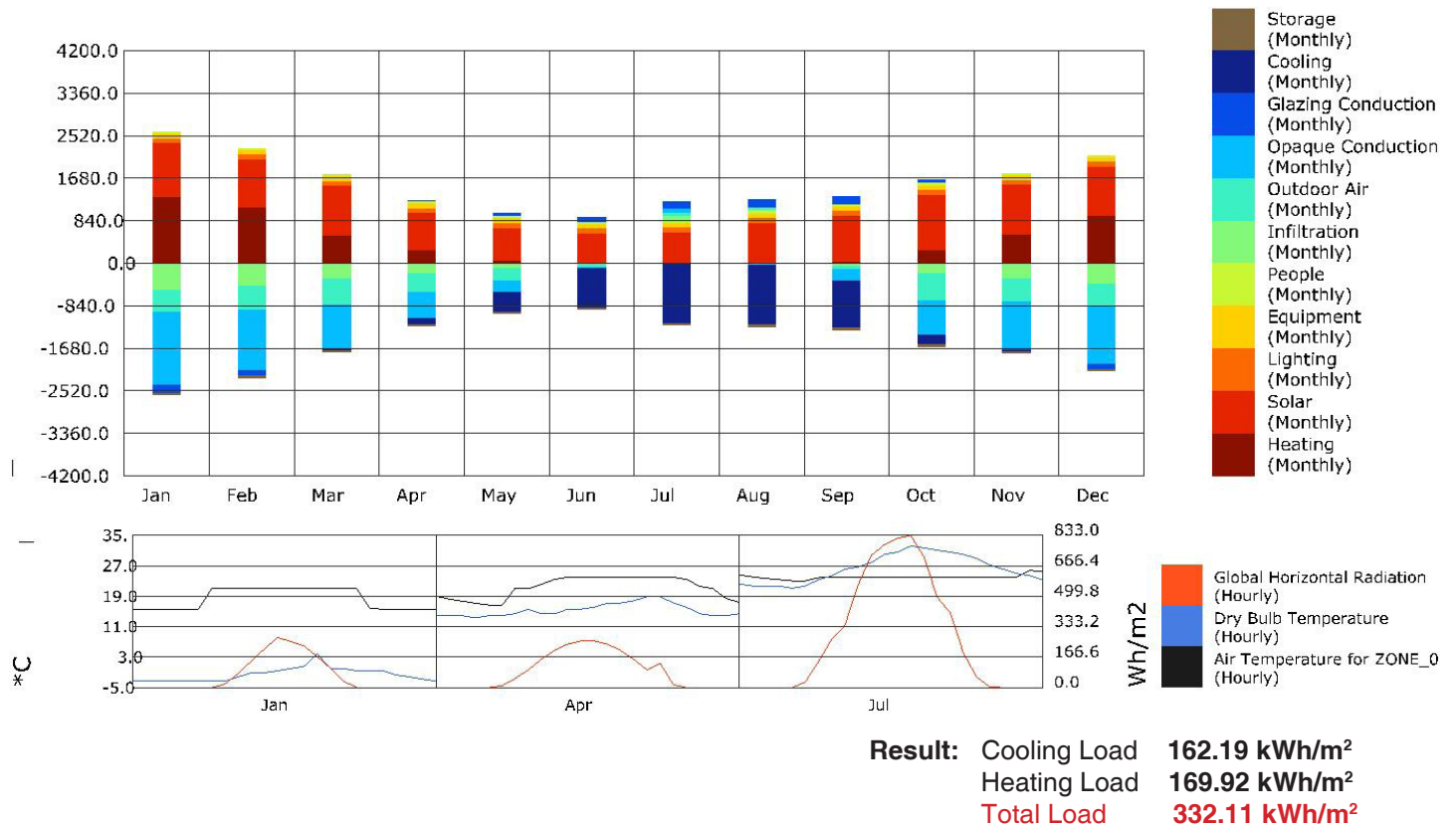
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Construction

Exterior Wall R5.5 | Exterior Window R0.7, SHGC 0.65 | Exterior Roof R9.2

Thermal Mass

Existing Slab Construction



Parameters of Affecting Energy Load

2. Blinds

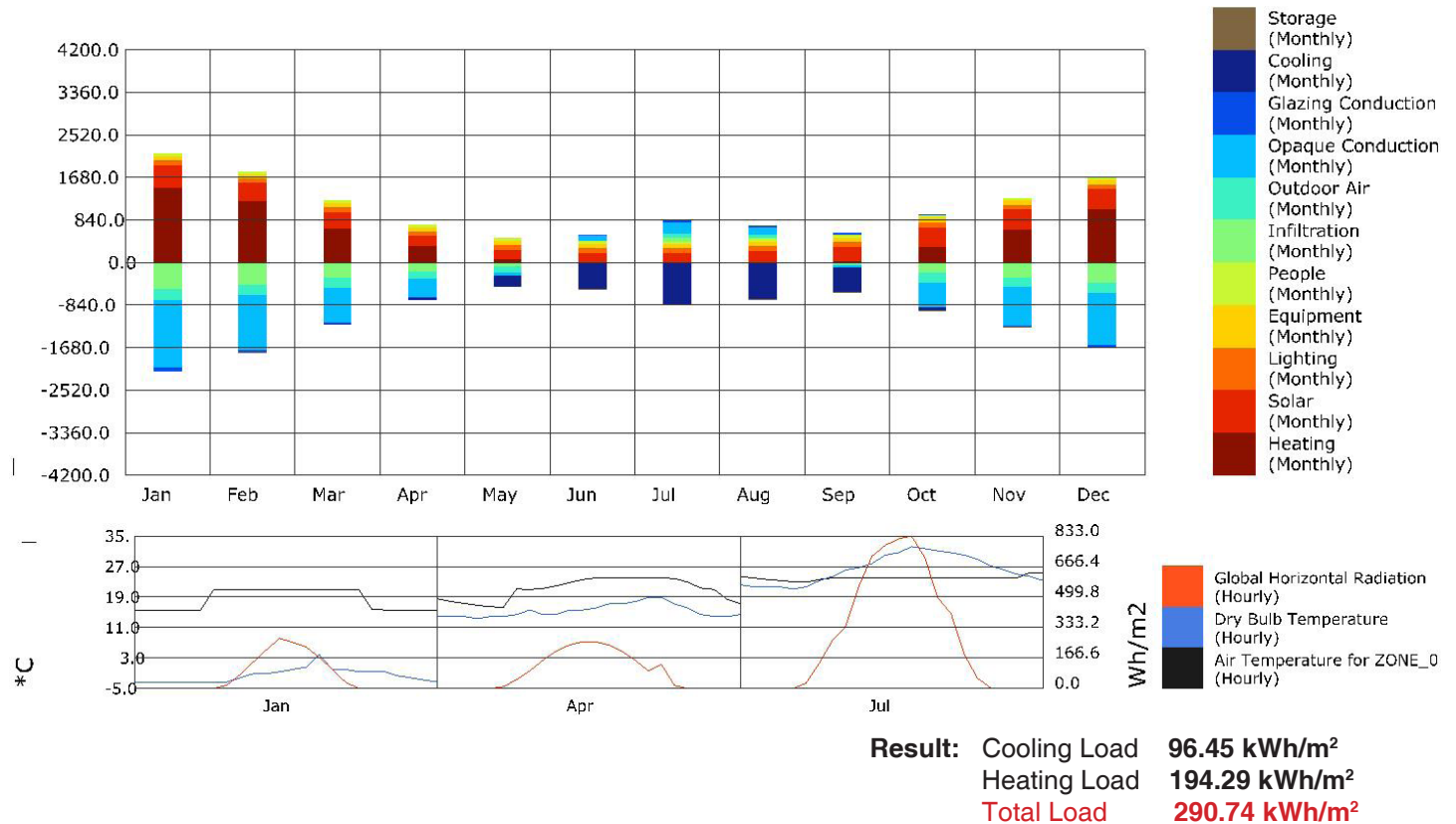
Basic Data: Window to Wall Ratio **South 0.3**

Blinds

Shading Depth 0.3 | Number of Blinds 2

Construction
Thermal Mass

Exterior Wall R5.5 | Exterior Window R0.7, SHGC 0.65 | Exterior Roof R9.2
Existing Slab Construction



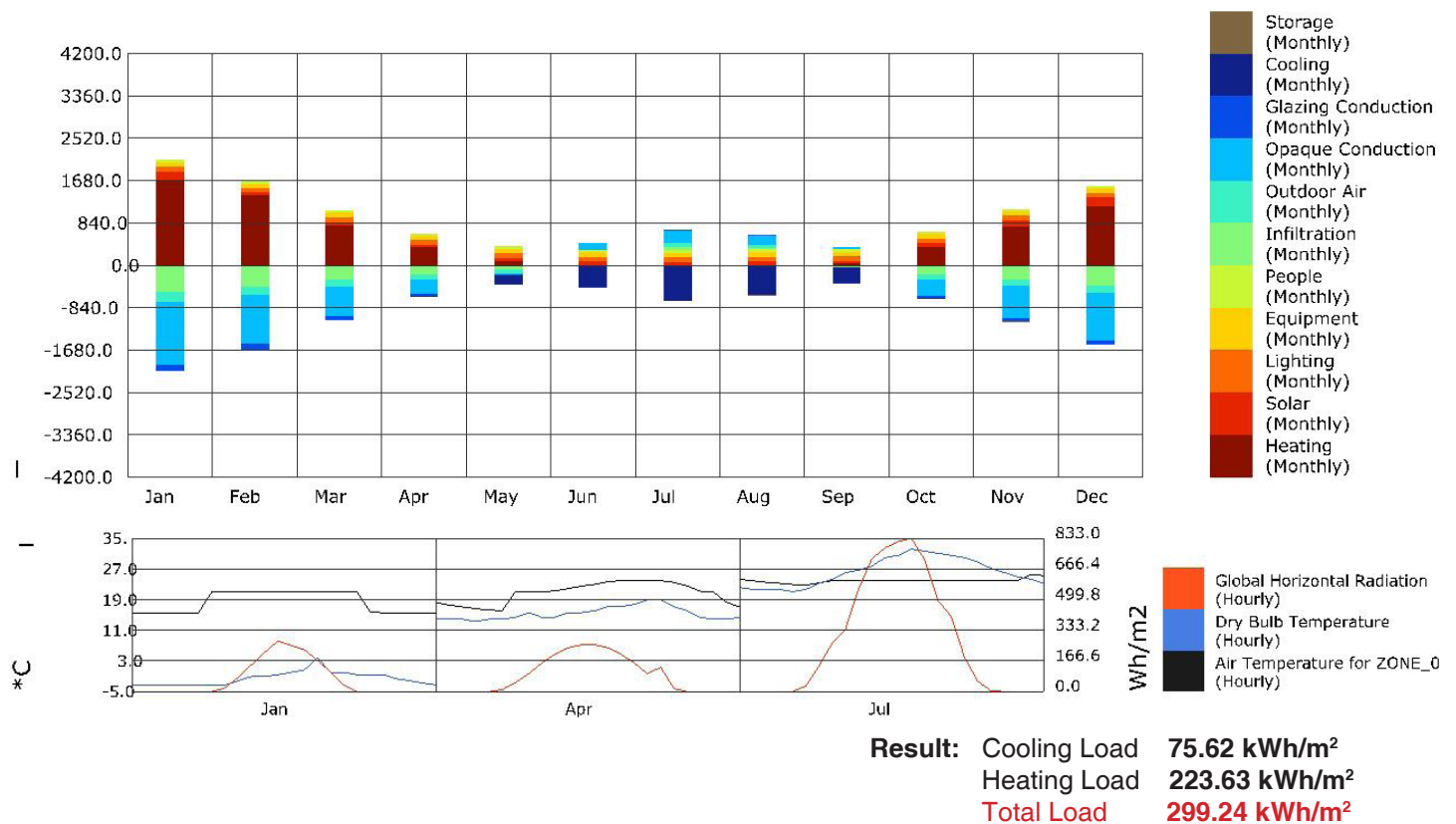
Basic Data: Window to Wall Ratio **South 0.3**

Blinds

Shading Depth 0.6 | Number of Blinds 4

Construction
Thermal Mass

Exterior Wall R5.5 | Exterior Window R0.7, SHGC 0.65 | Exterior Roof R9.2
Existing Slab Construction



Parameters of Affecting Energy Load

3. Construction

Basic Data: Window to Wall Ratio **South 0.3**

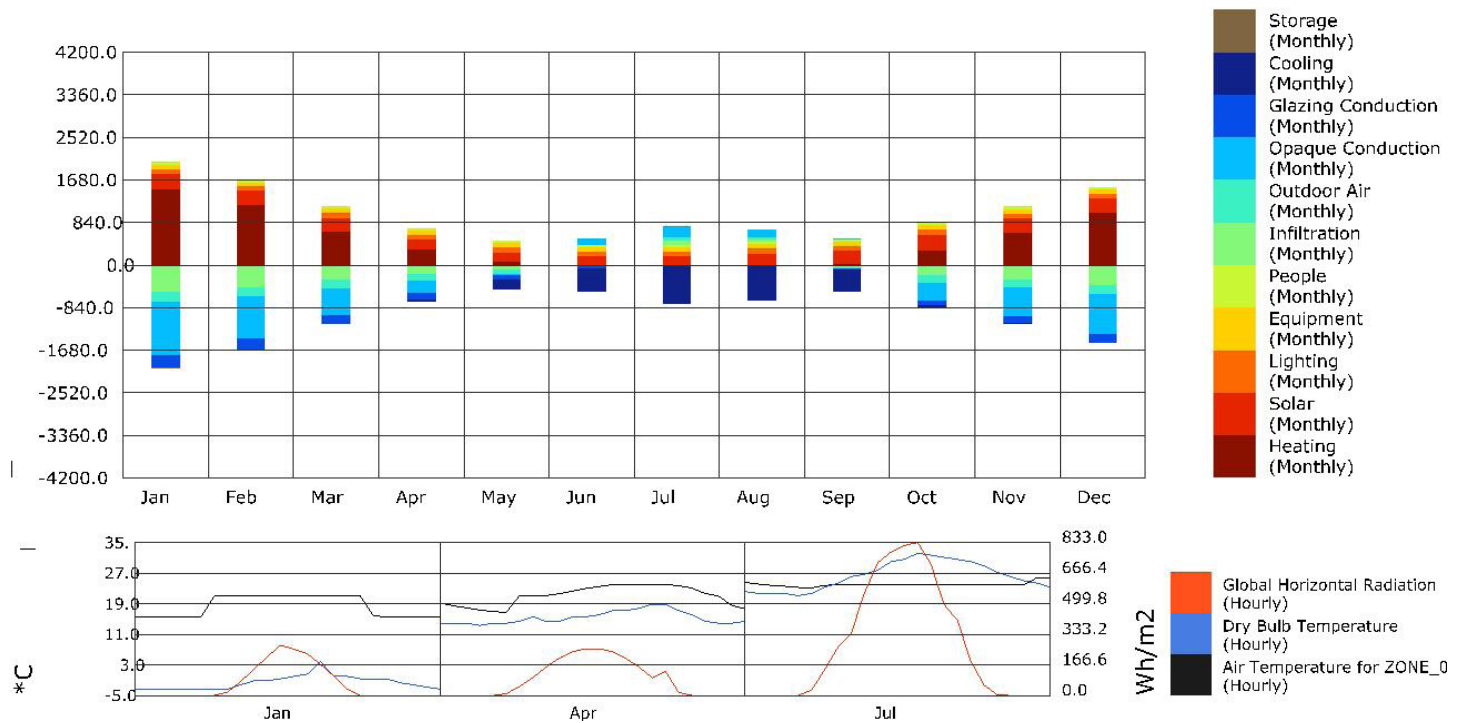
Blinds **0**

Construction

Thermal Mass

Exterior Wall R7.2 | Exterior Window R1.9, SHGC 0.39 | Exterior Roof R14.8

Existing Slab Construction



Basic Data: Window to Wall Ratio **South 0.3**

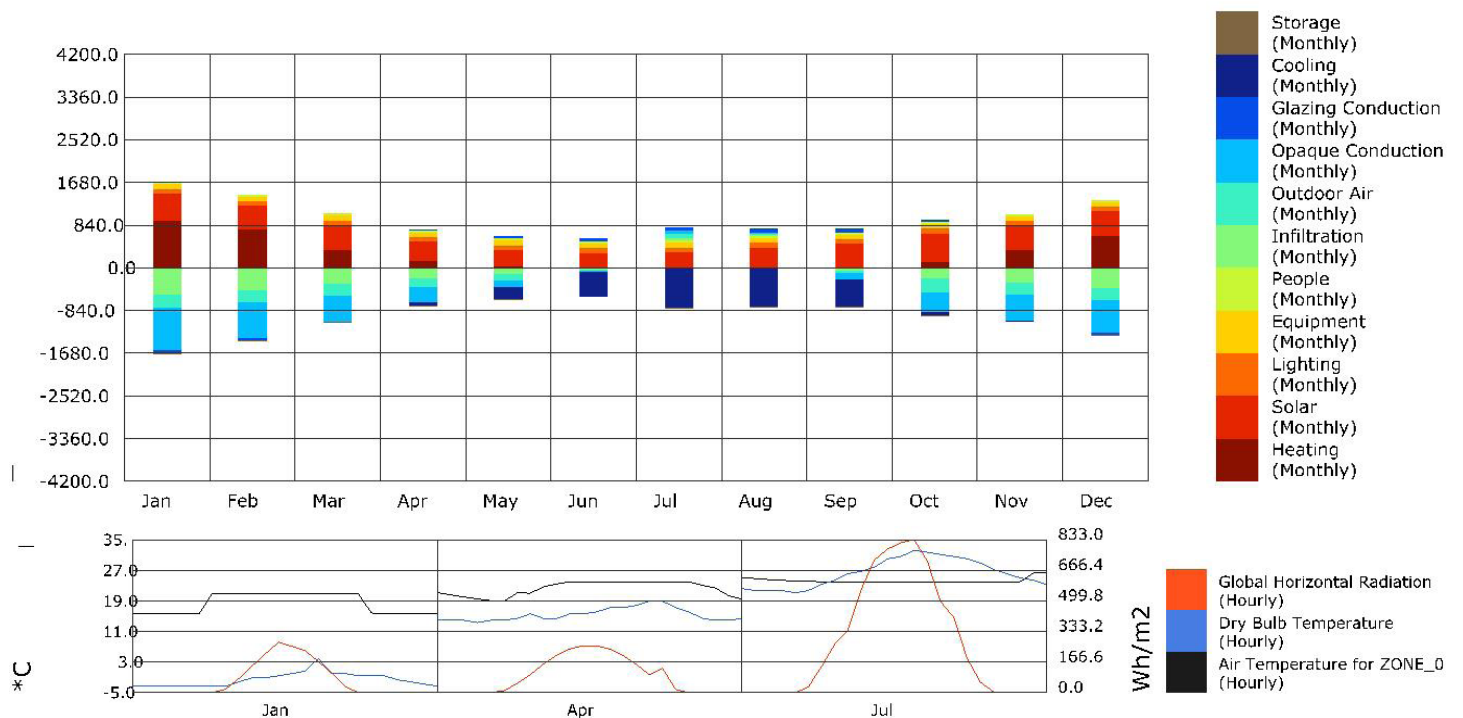
Blinds **0**

Construction

Thermal Mass

Exterior Wall R14.8 | Exterior Window R0.7, SHGC 0.65 | Exterior Roof 34.3

Existing Slab Construction



Parameters of Affecting Energy Load

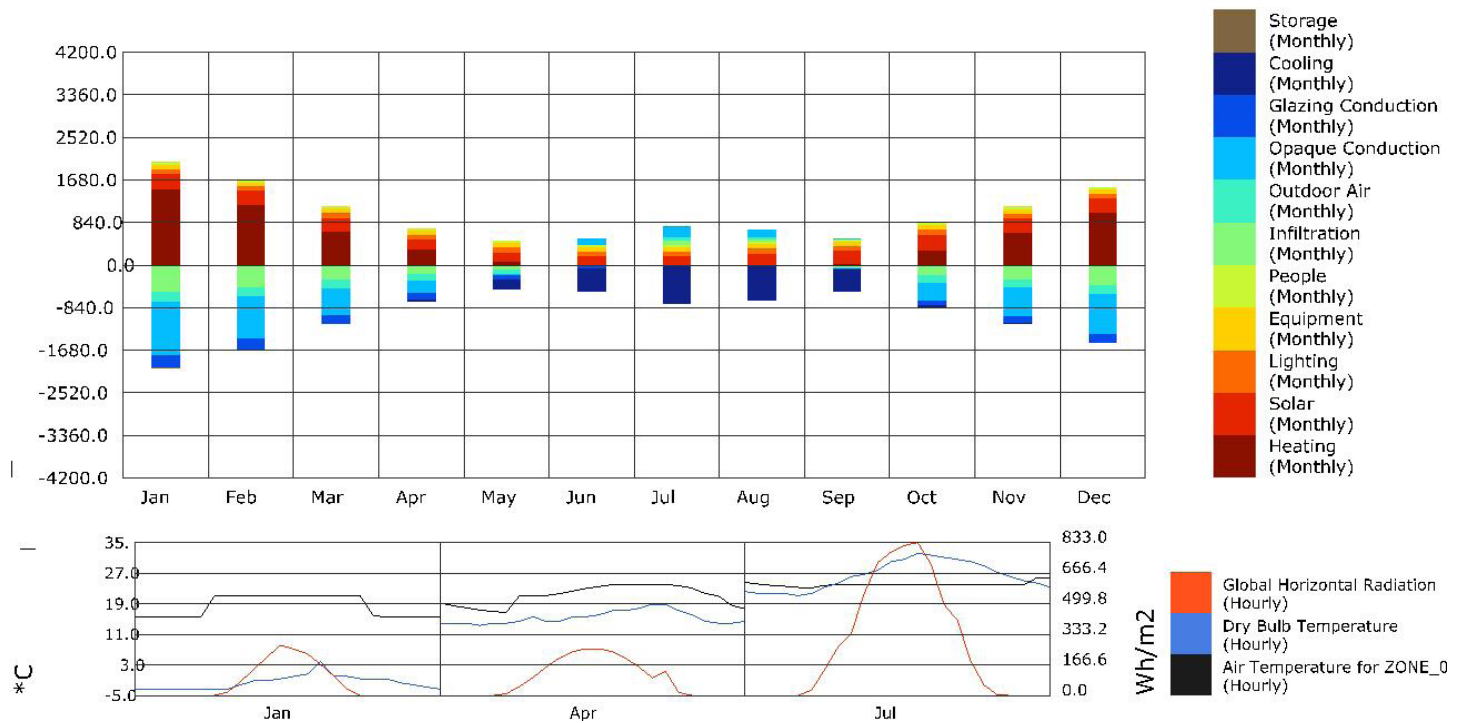
4. Thermal Mass

Basic Data: Window to Wall Ratio **South 0.3**

Blinds **0**

Construction **Exterior Wall R5.5 | Exterior Window R0.7, SHGC 0.65 | Exterior Roof R9.2**

Thermal Mass **+4 Inches Concrete**



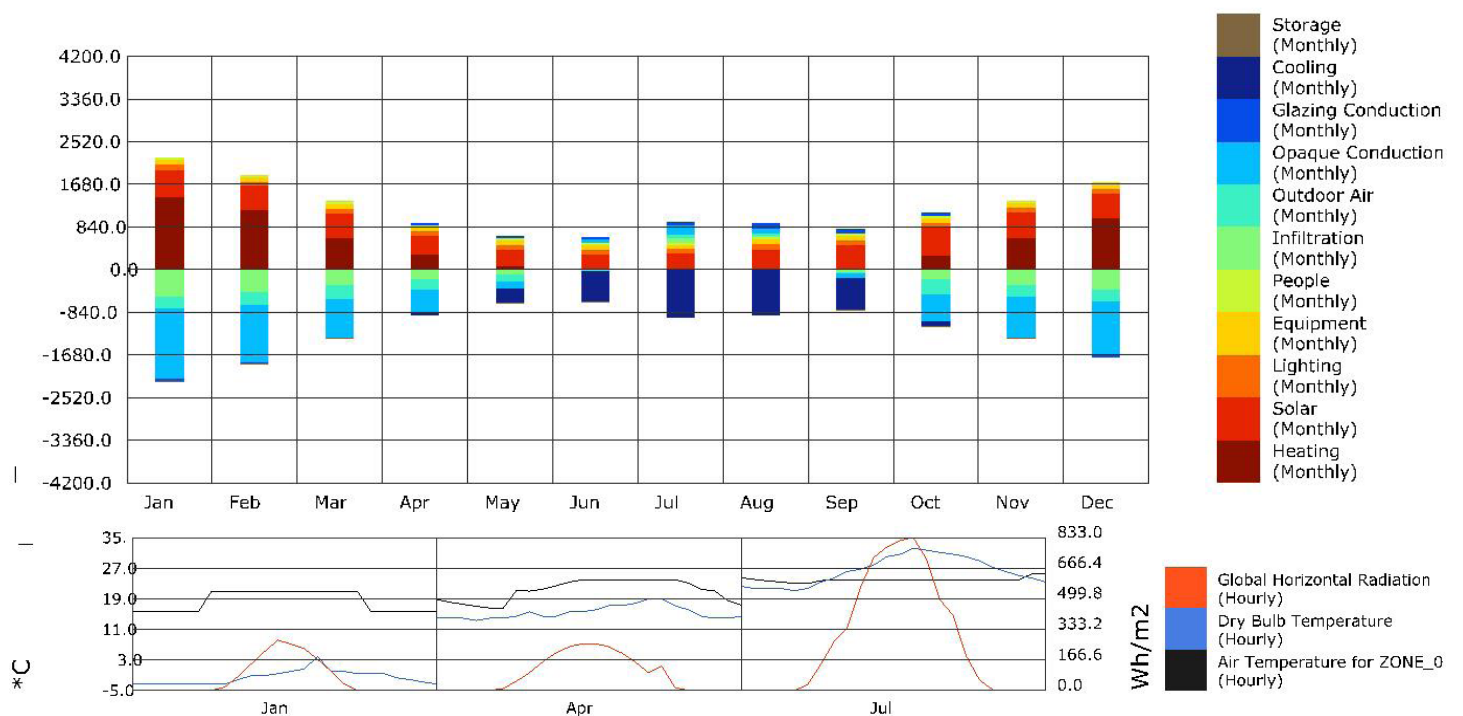
Result: Cooling Load **118.03 kWh/m²**
Heating Load **186.40 kWh/m²**
Total Load **304.43 kWh/m²**

Basic Data: Window to Wall Ratio **South 0.3**

Blinds **0**

Construction **Exterior Wall R5.5 | Exterior Window R0.7, SHGC 0.65 | Exterior Roof R9.2**

Thermal Mass **+8 Inches Concrete**



Result: Cooling Load **118.03 kWh/m²**
Heating Load **186.40 kWh/m²**
Total Load **304.43 kWh/m²**

Parameters of Affecting Energy Load

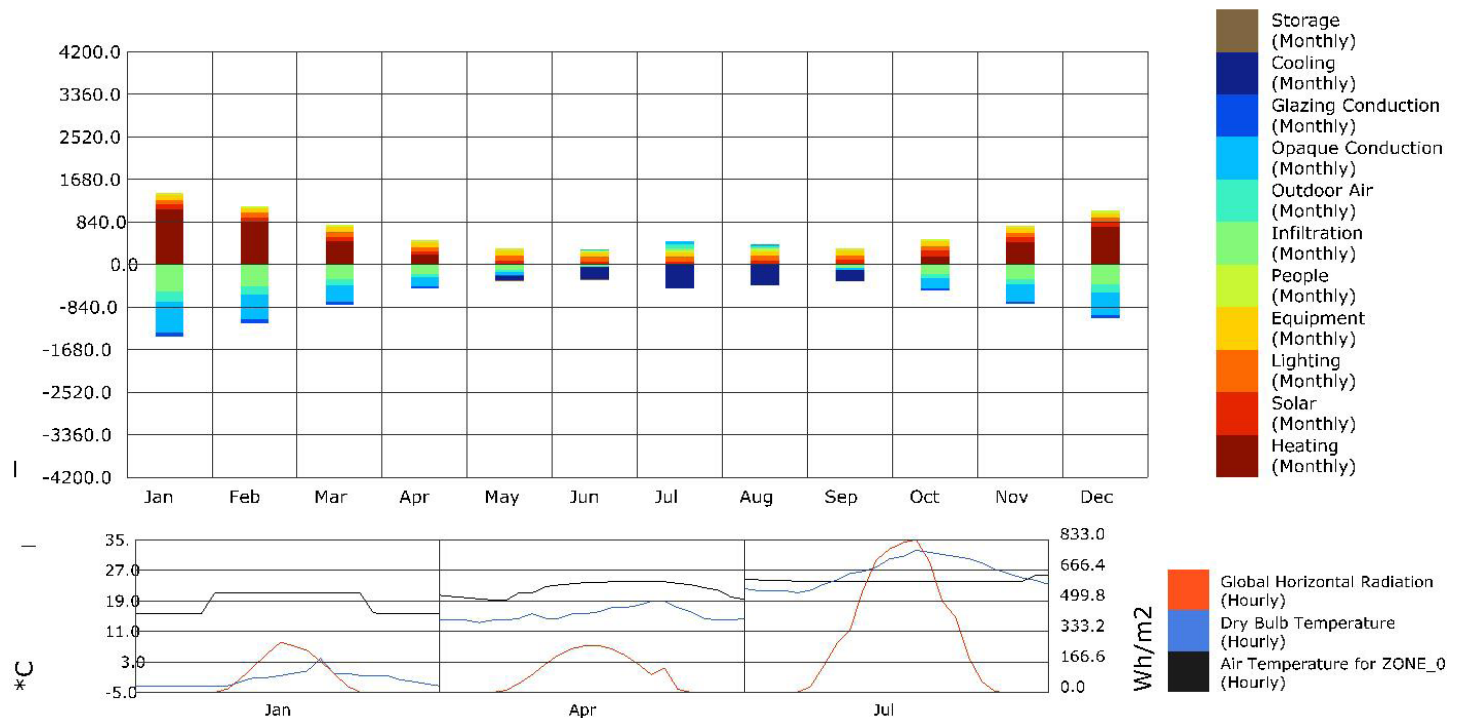
Best Combination to Minimize the Total Load

Basic Data: Window to Wall Ratio **South 0.1**

Blinds **0**

Construction **Exterior Wall R34.4 | Exterior Window R1.9, SHGC 0.39 | Exterior Roof R34.4**

Thermal Mass **Existing Slab Construction**



Result: Cooling Load **47.78 kWh/m²**
Heating Load **133.16 kWh/m²**
Total Load **180.94 kWh/m²**

Summary

Each Parameter:

1. Window to Wall Ratio:

When the WWR increases, the cooling load will rise and heating load will decrease, but the overall total load will decrease a little bit.

2. Blinds:

Blinds will not affect the energy load apparently. Adding more shades with larger depth will generally drop the cooling load but rise the heating load, thus the total loads will be changed with no regularity.

3. Construction:

When different elements with higher R-value, the total load will be reduced effectively, which cooling load will drop slightly but heating load will decrease dramatically. Thus the R-value of construction materials is the most effective parameter.

4. Thermal Mass:

Thermal mass will not have an influence on energy load for this container.

Therefore, The lowest energy load could be get around **180.94 kWh/m²** with lower Window to Wall ratio and maximized R-Value of different construction materials.

The temperature range inside the container in summer is approximately from **24 °C to 26 °C**.

The temperature range inside the container in winter is approximately from **16 °C to 22 °C**.