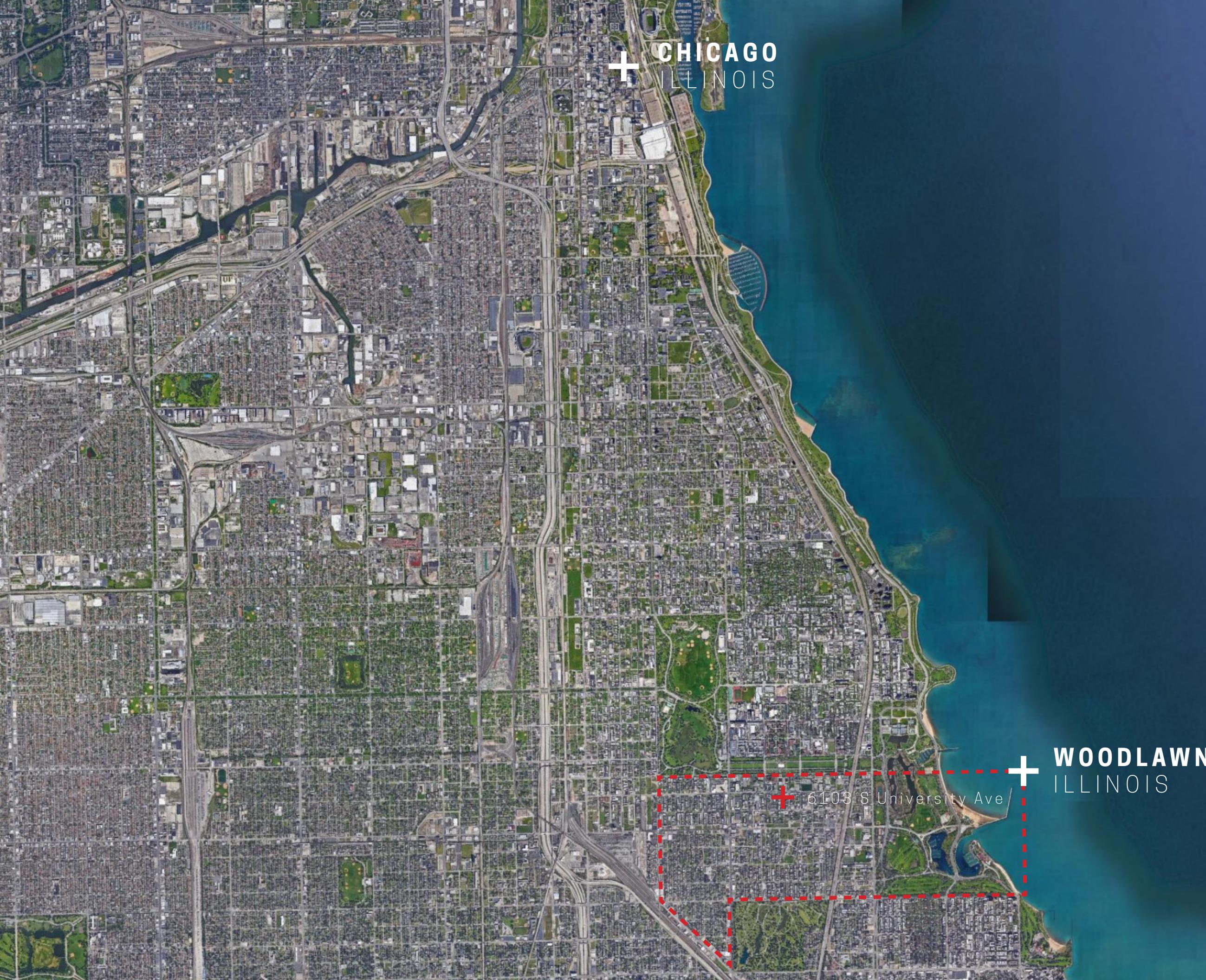




**CHICAGO**  
ILLINOIS

Climate Zone 5



CHICAGO  
ILLINOIS

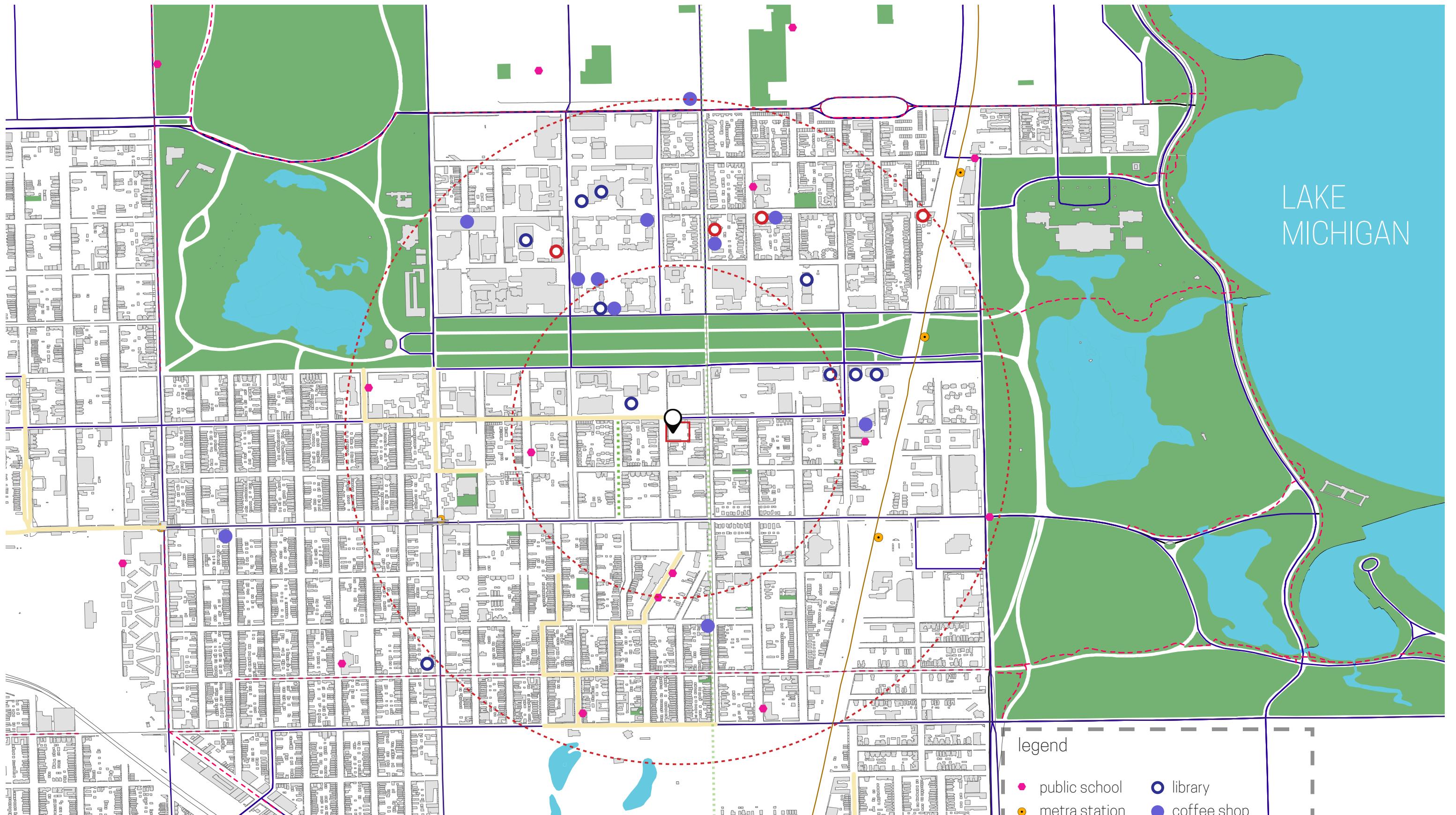
WOODLAWN  
ILLINOIS

6103 S University Ave



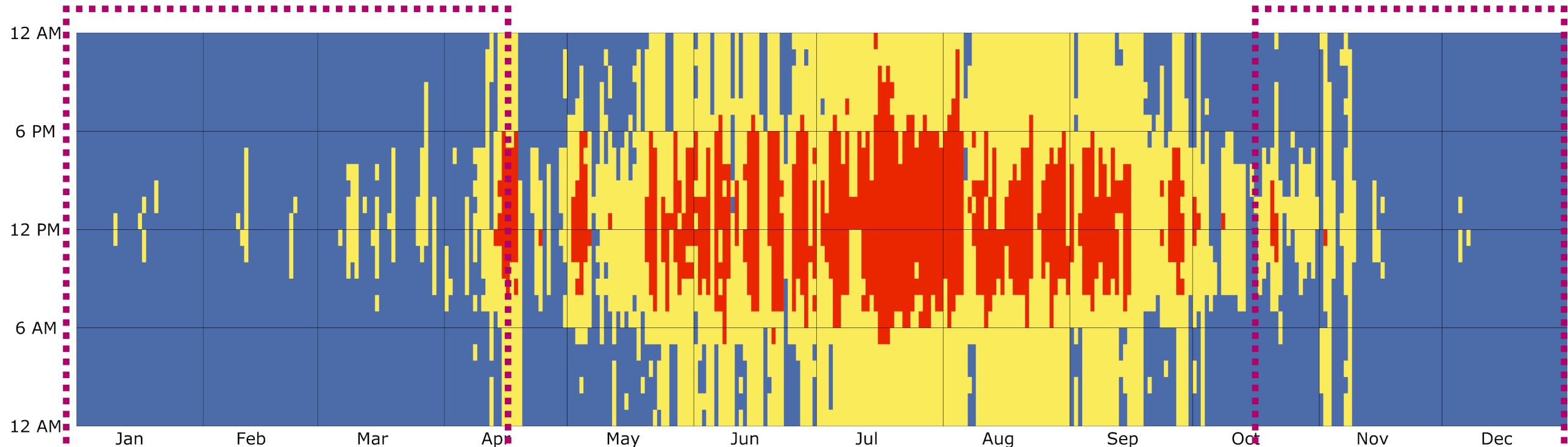
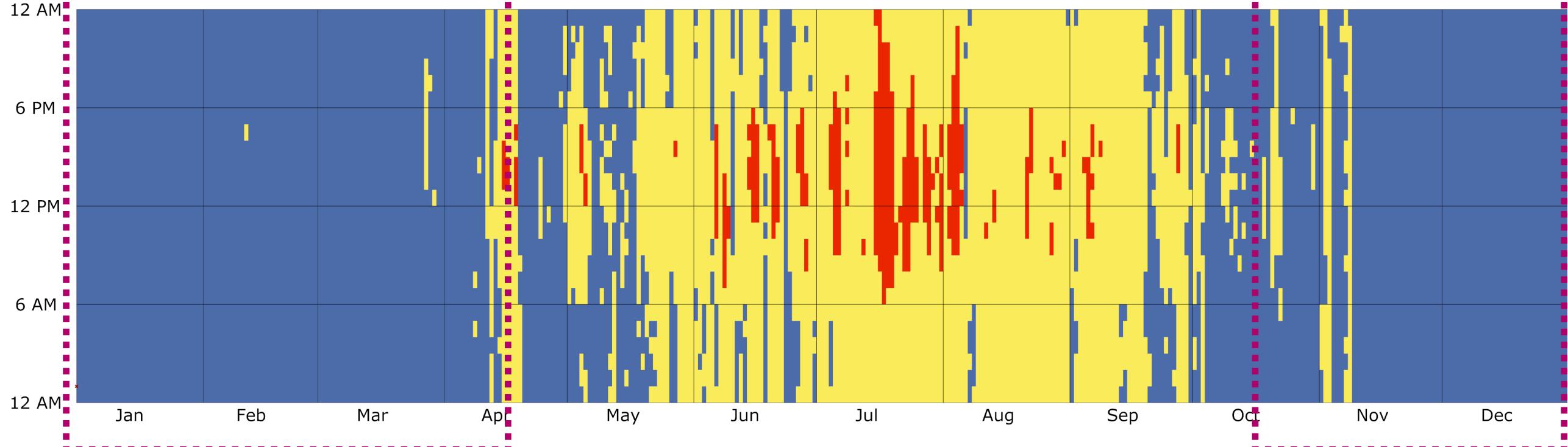
6103 S  
UNIVERSITY AVE

1" = 100'-00"

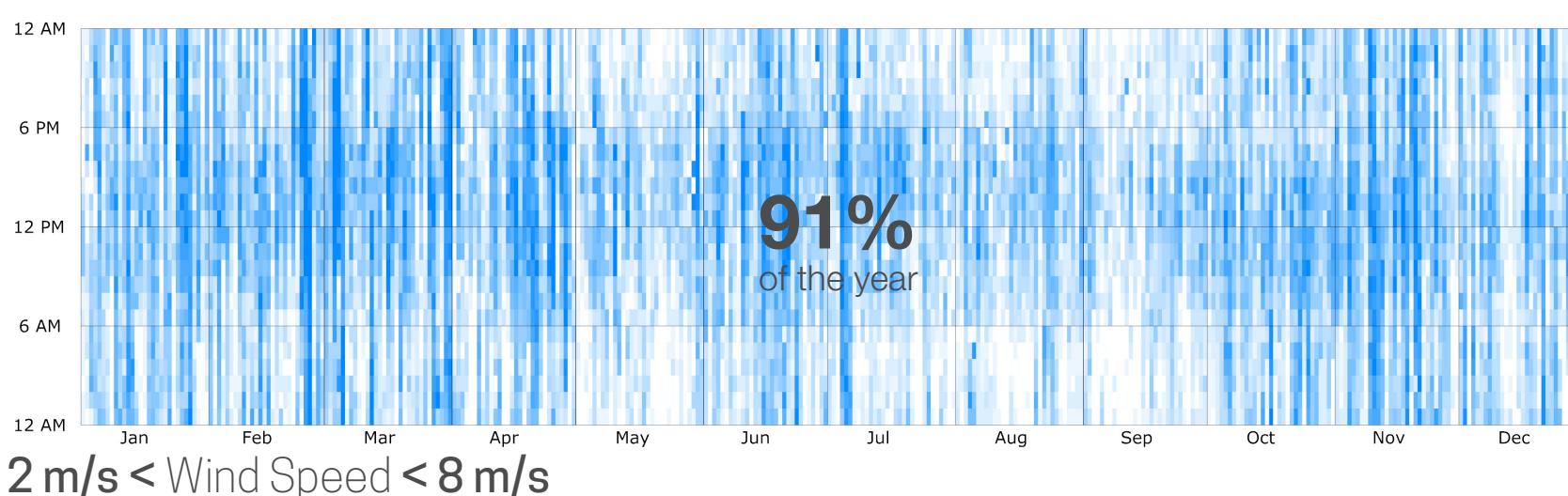
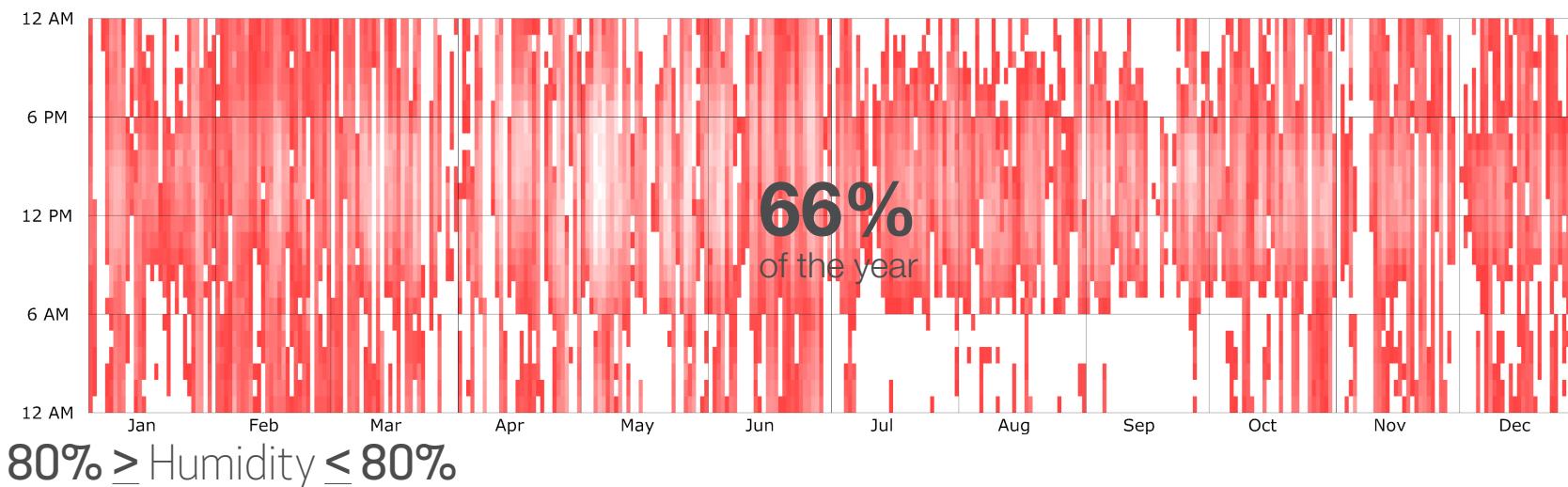
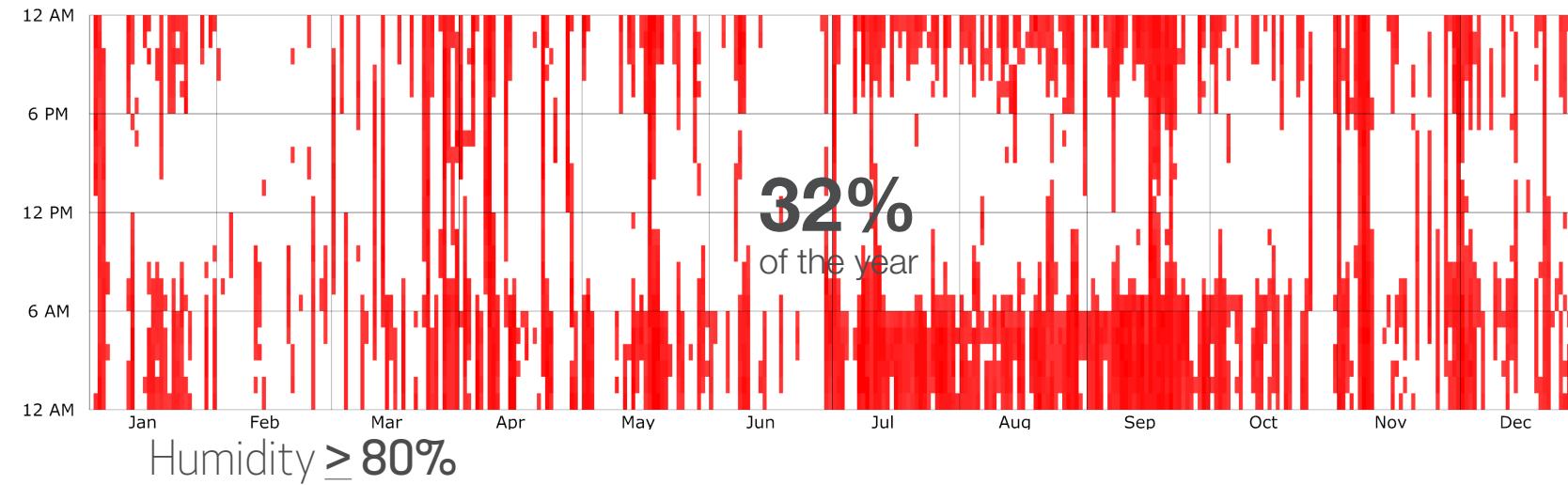


legend

- public school
- library
- metra station
- metra line
- safe passage
- CTA route
- bike route
- pedestrian walkway

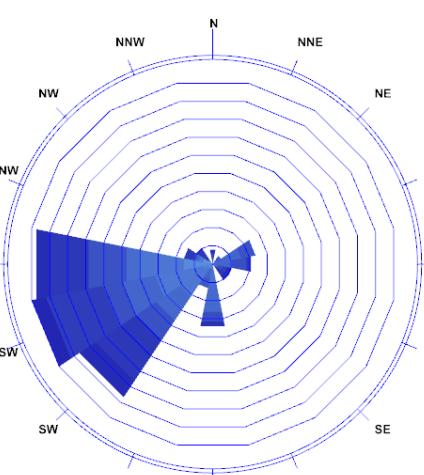
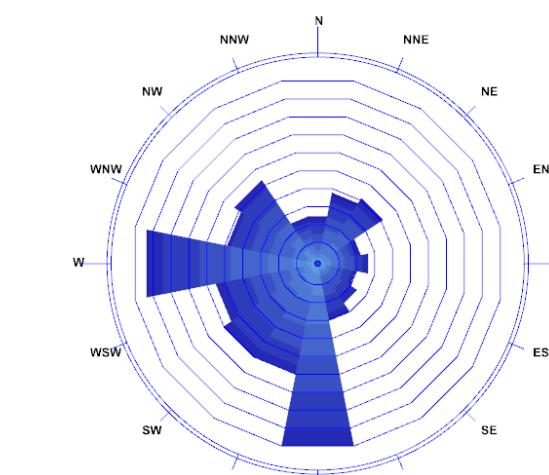
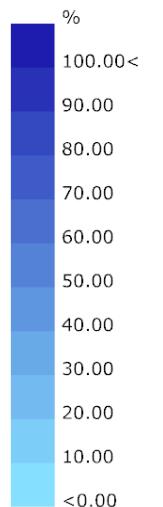
**OUTDOOR THERMAL COMFORT****UNSHADED****32.19%**  
**COMFORTABLE****8.65%**  
**HOT****41.53%**  
**COLD****SHADED****35.68%**  
**COMFORTABLE****1.52%**  
**HOT****45.10%**  
**COLD**

# FACTORS DETERMINING COMFORT

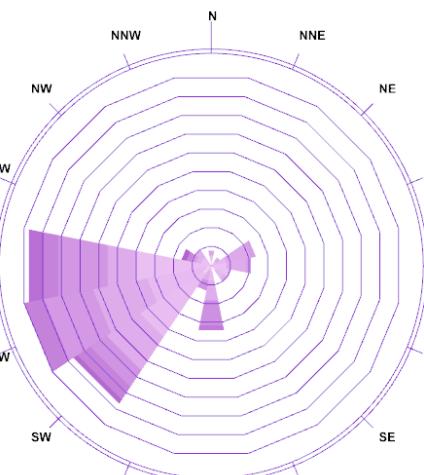
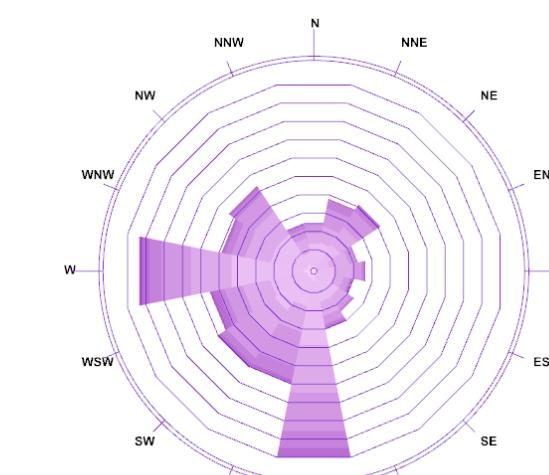
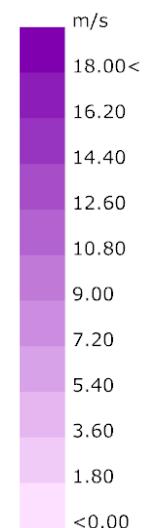


ANNUAL

HOTTEST WEEK



Wind Direction v Humidity



Wind Direction v Wind Speed

# IDEAL CONDITION FOR VENTILATION

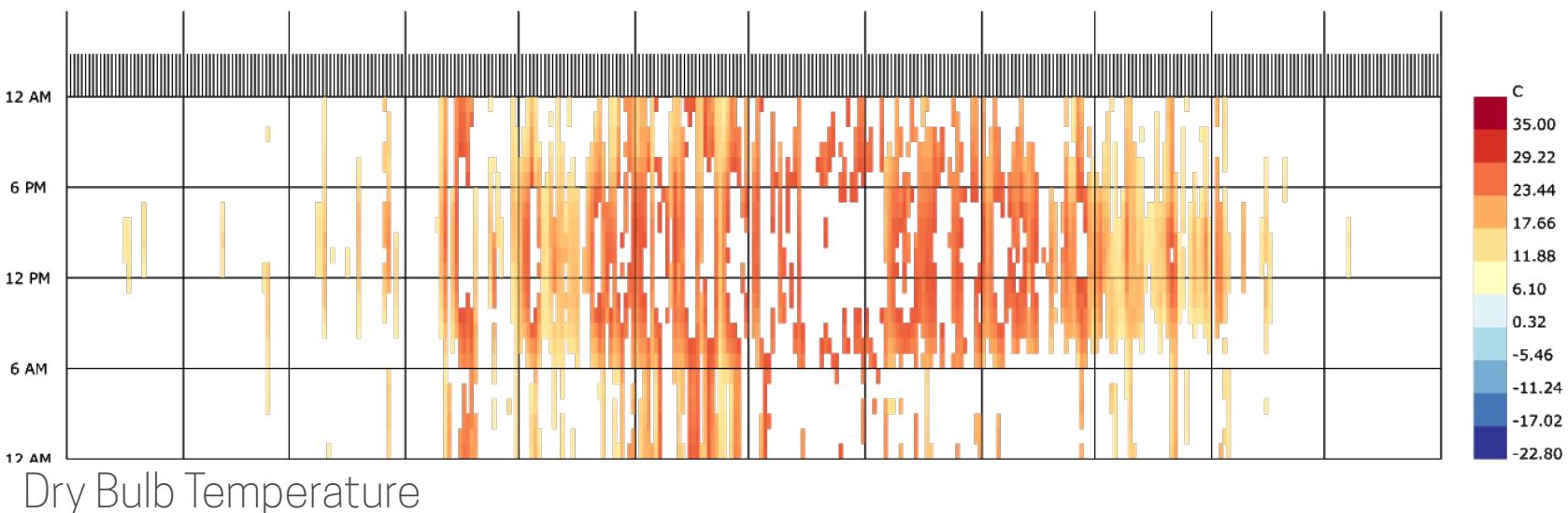
is indicated by the following parameters:

Outdoor Temperature:  $9^{\circ}\text{C}$  ( $42.8^{\circ}\text{F}$ )  $> T_o > 26^{\circ}\text{C}$  ( $78.8^{\circ}\text{F}$ )

Indoor Temperature:  $T_i \geq 24^{\circ}\text{C}$  ( $75.2^{\circ}\text{F}$ )

Humidity:  $20\% > H > 80\%$

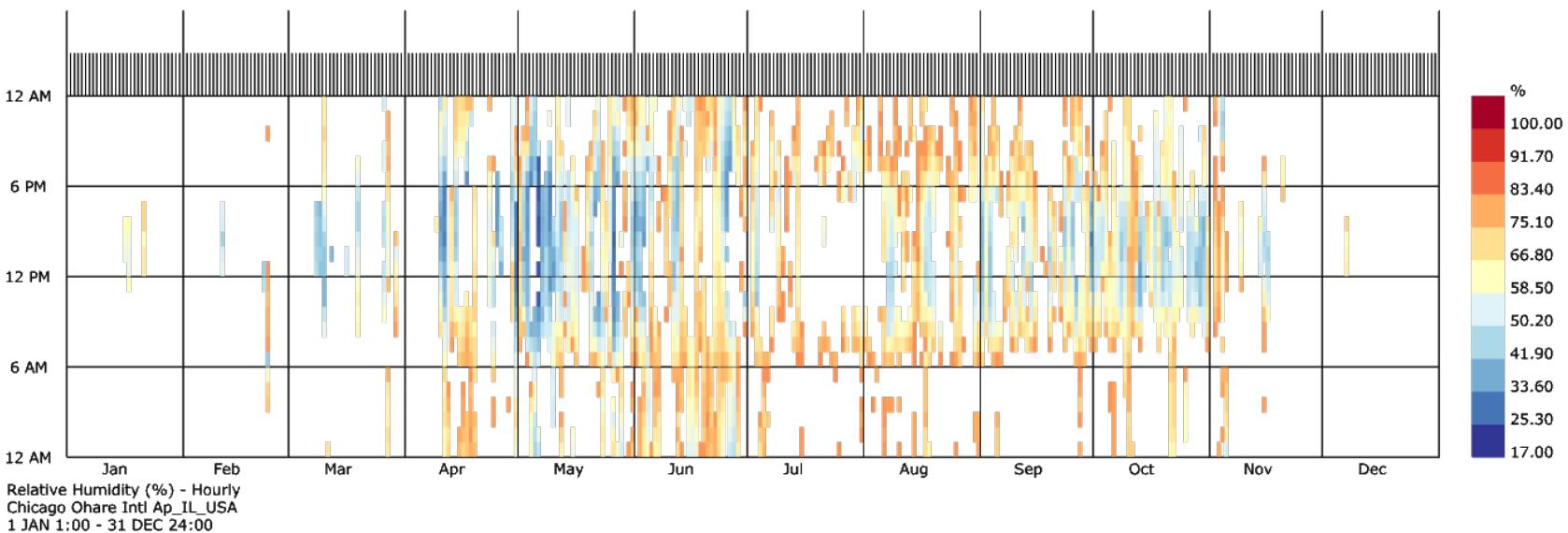
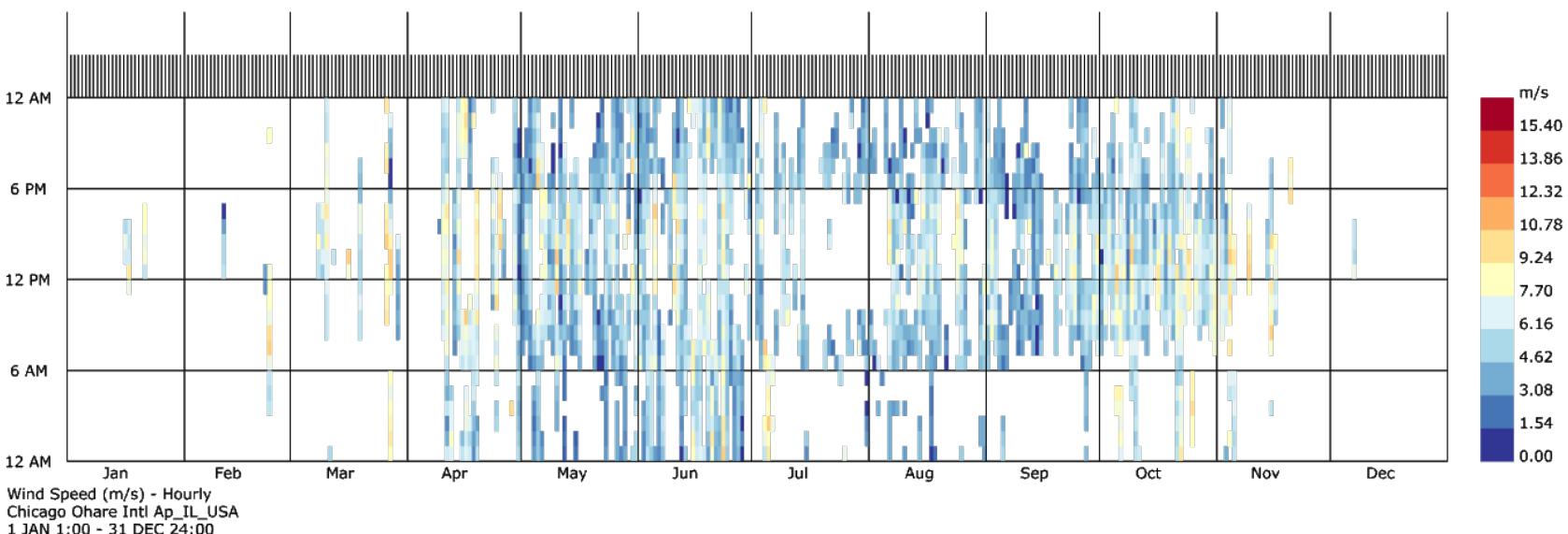
Wind Speed:  $2 \text{ m/s} < \text{Wind Speed} < 8 \text{ m/s}$



**27.5%**

of the year

Ideal for Natural Ventilation



## FACTORS

Chicago experiences **primarily long winters and short summers**, with short shoulder seasons. Approximately **2/3 of the year is considered too cold for comfort**. Even deep in the seasons, **sporadic weather changes happen on an hourly and daily basis**.

## PRIORITIES & GOALS

Our aim is to **maximize thermal comfort in the winter time and cross-checking with summer parameters to prevent overheating**. We also want to **maximize hours of natural daylight throughout the year**.

## DESIGN & TEST

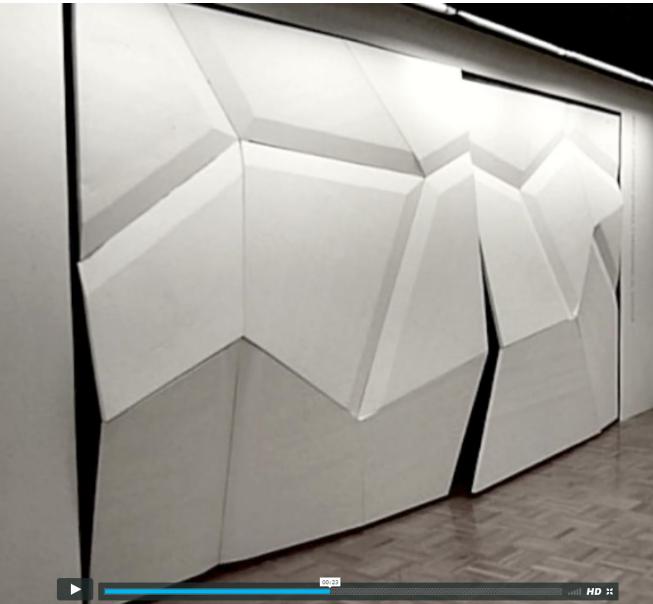
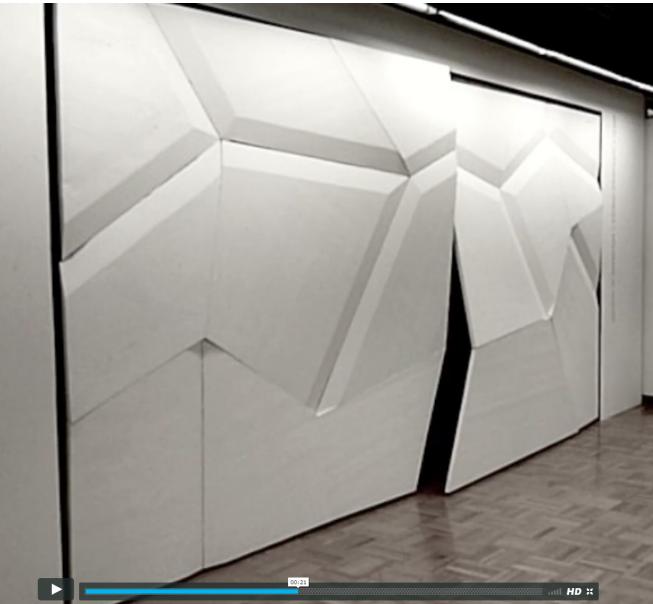
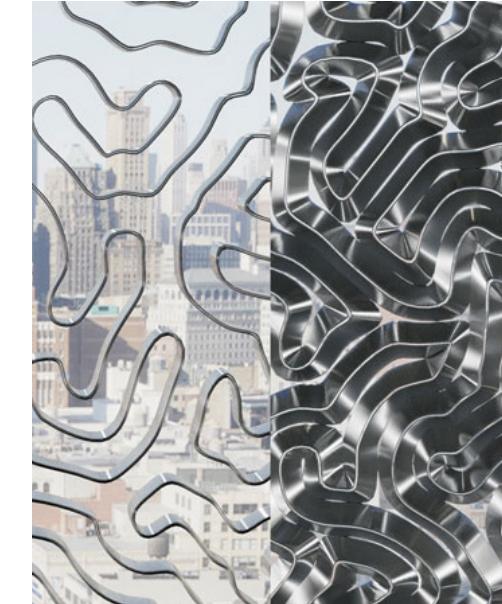
### MASS

- **Increase solar gain (exposure) by increasing south-facing surface area**

### MATERIAL & CONSTRUCTION

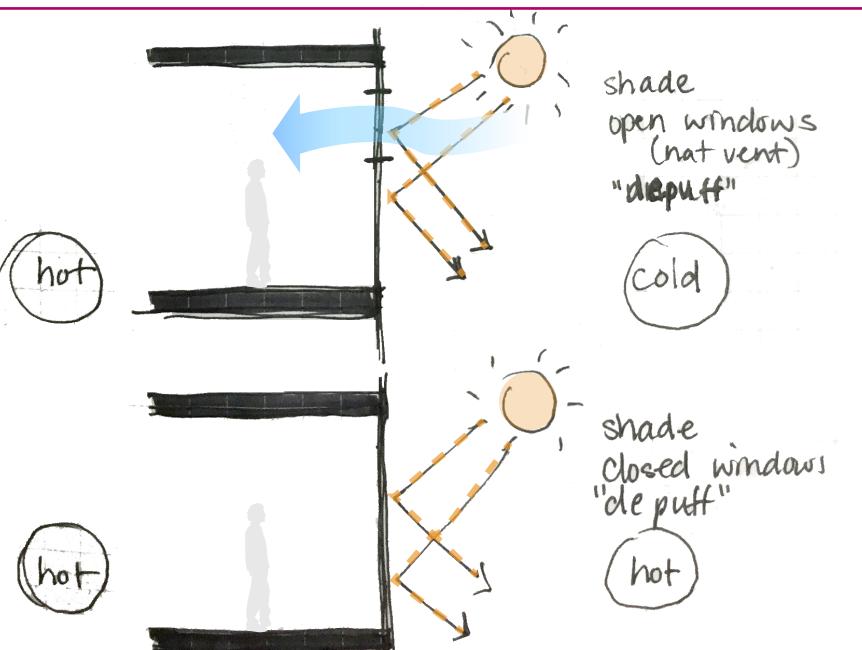
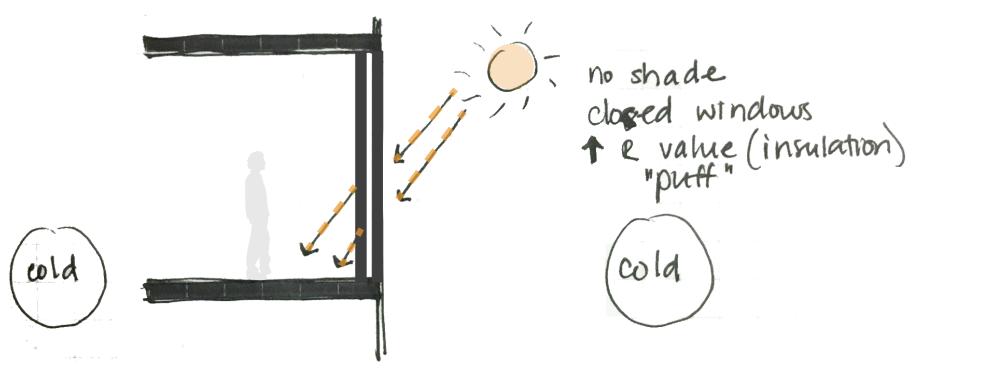
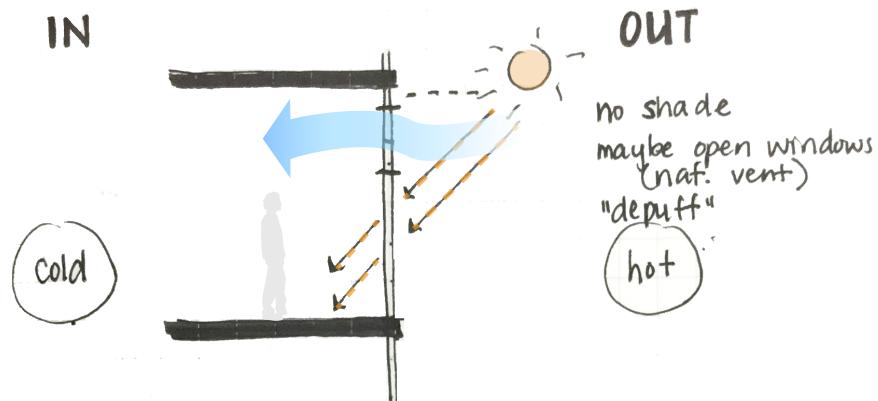
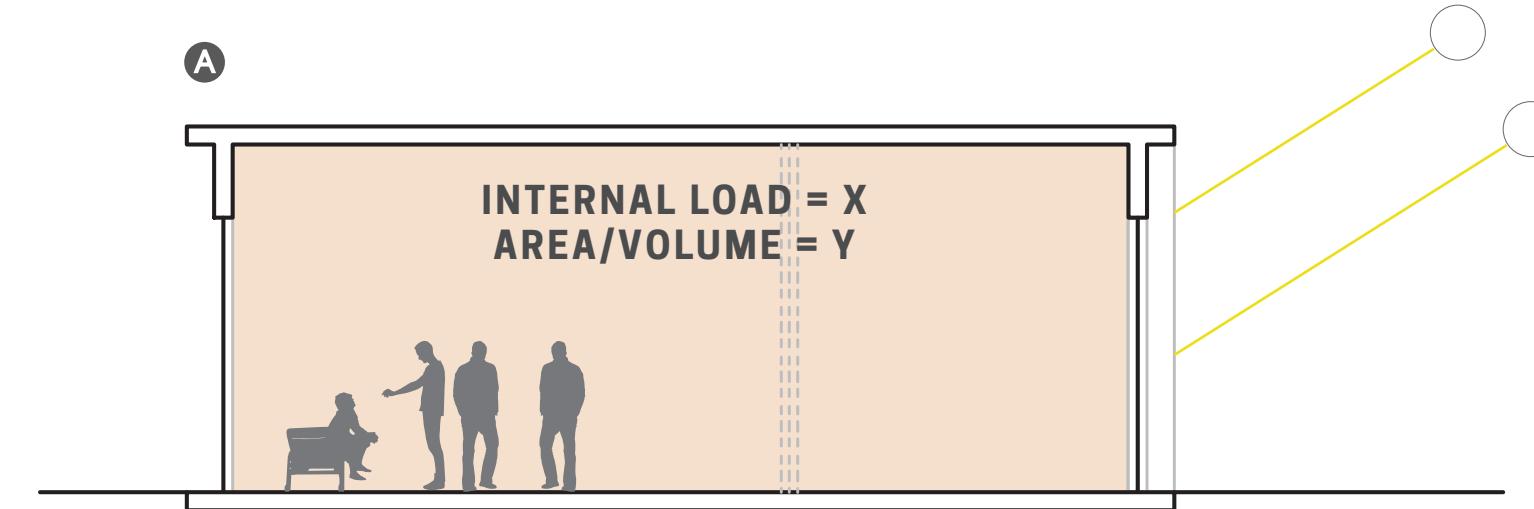
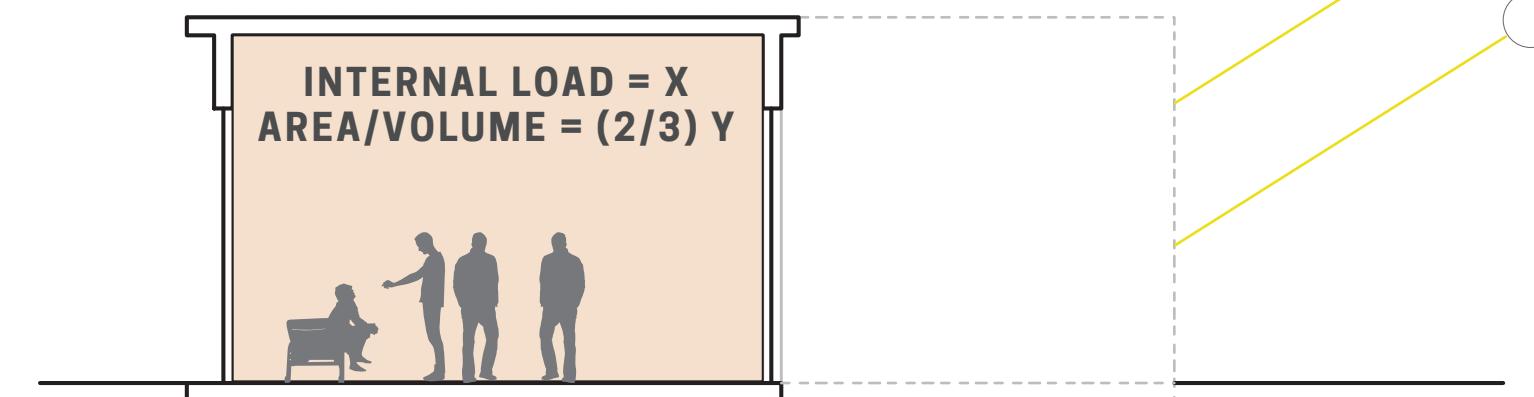
- **Increase insulation (R-value)**
- **Increase solar gain (exposure) by increasing WWR on the south and west**
- **Reduce infiltration (increase air tightness)**
- **Reduce thermal loss**

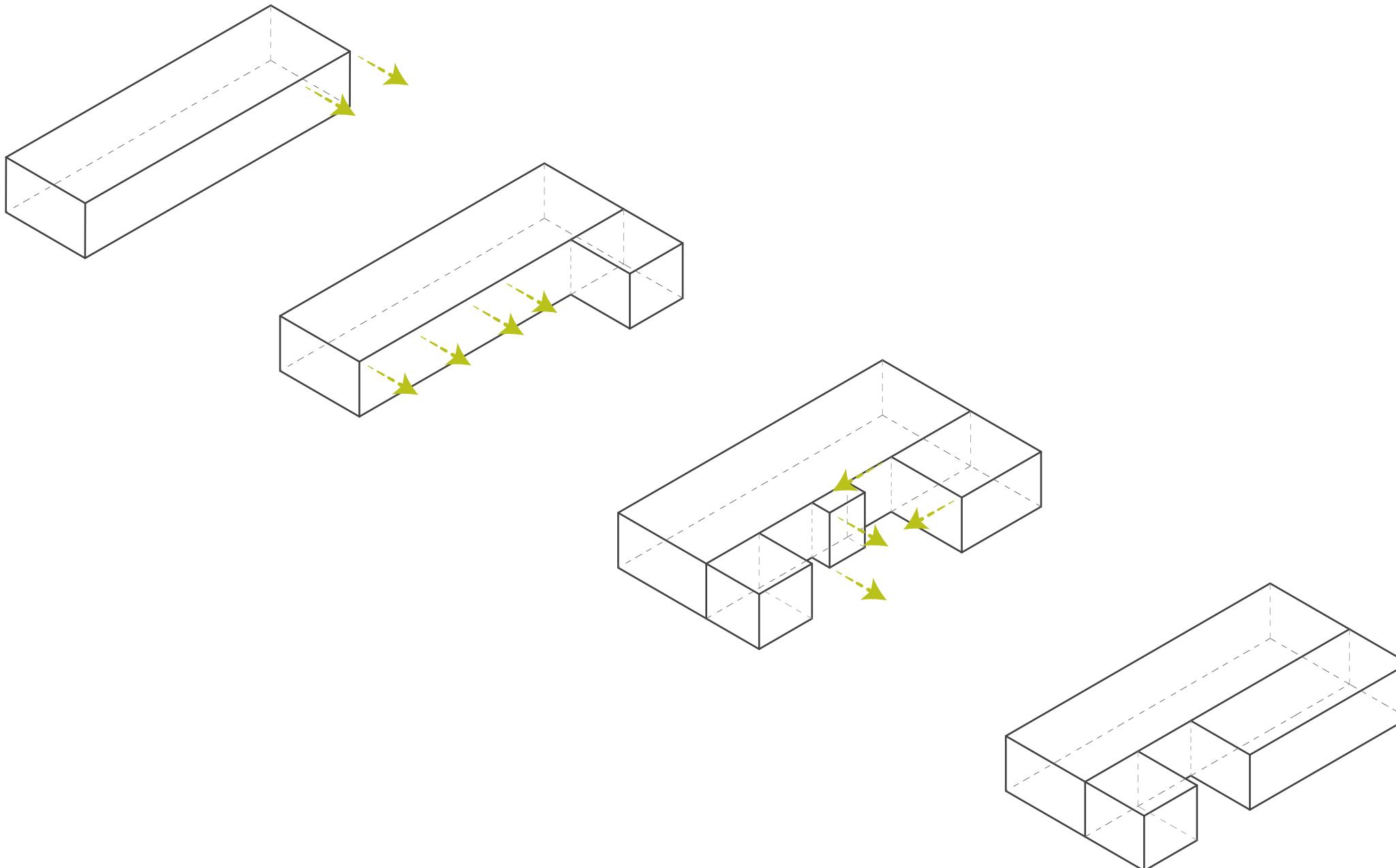
 Climate to Building  
**ENVELOPE** BEHAVIOR INSPIRATIONS



Climate to Building  
**ENVELOPE** MECHANISM INSPIRATIONS

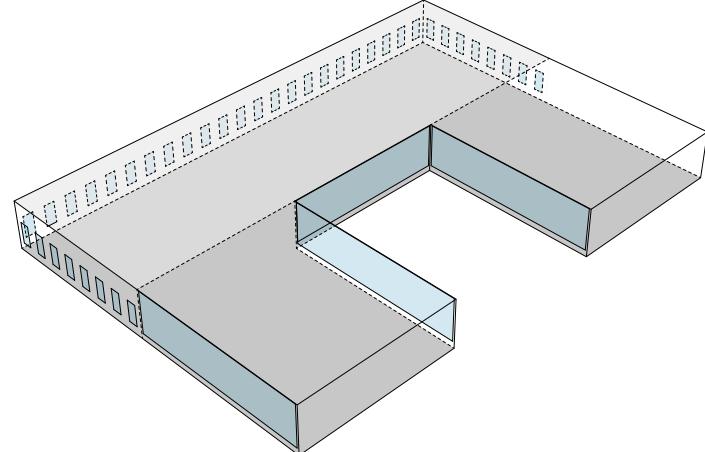
# NARRATIVE OF BUILDING PERFORMANCE AND OCCUPATION

**IN****A****B**

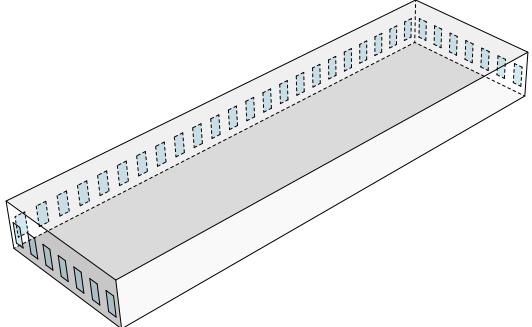


**1 BASE U**

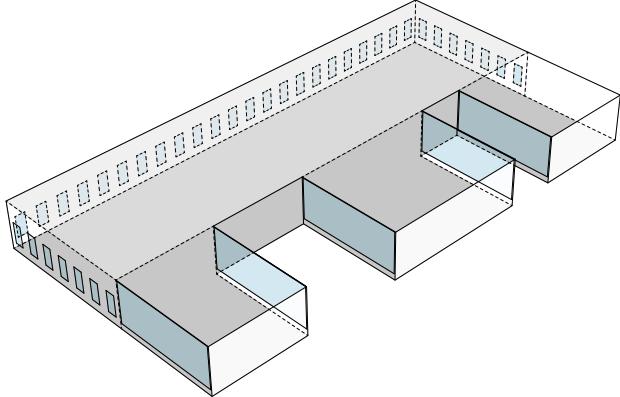
(1,207 SF)

**2 BAR**

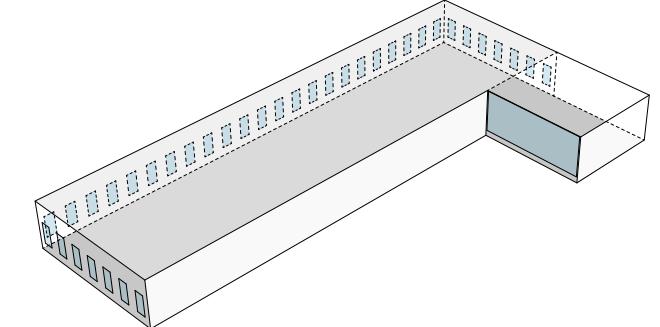
(627 SF)

**3 BAR FULL EXPANSION**

(953 SF)

**4 BAR FIXED AUDITORIUM**

(720 SF)

**[Construction Tested]**

CZ-5

CZ-8

Passivhaus

Passivhaus

Passivhaus

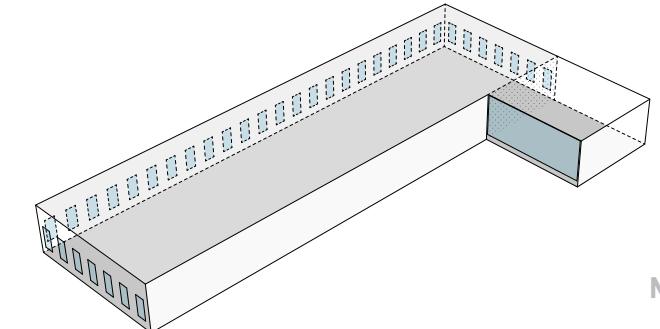
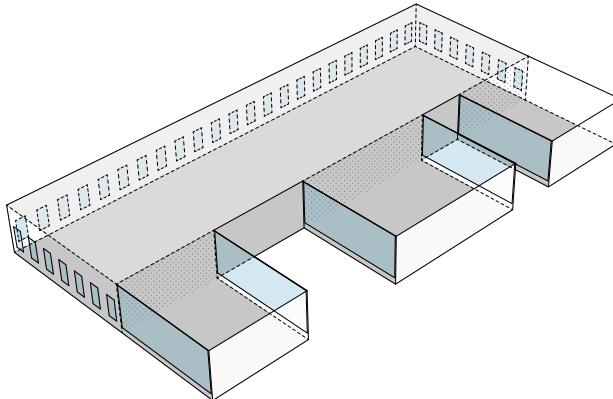
Passivhaus

**[Fixed Parameters]**

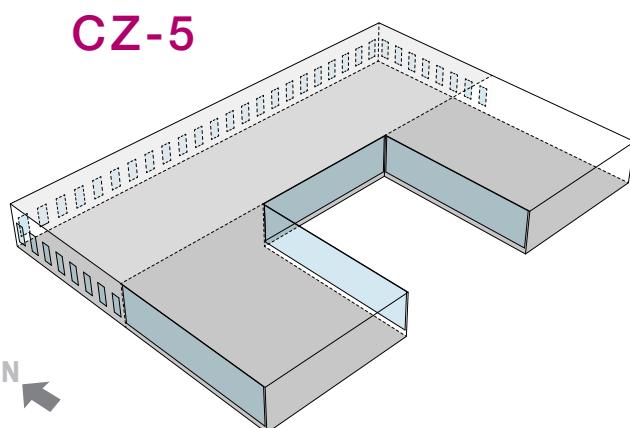
- Adiabatic Floor
- Adiabatic Ceiling/Roof
- Glazing: Triple-pane, Low-e, Argon: R(IP)-4.919

- 2" Aerogel: R(IP)-41.335
- Passivhaus Wall Construction: R(IP)-41.335
- Enclosure: Triple-pane, Low-e, Argon: R(IP)-4.919

N

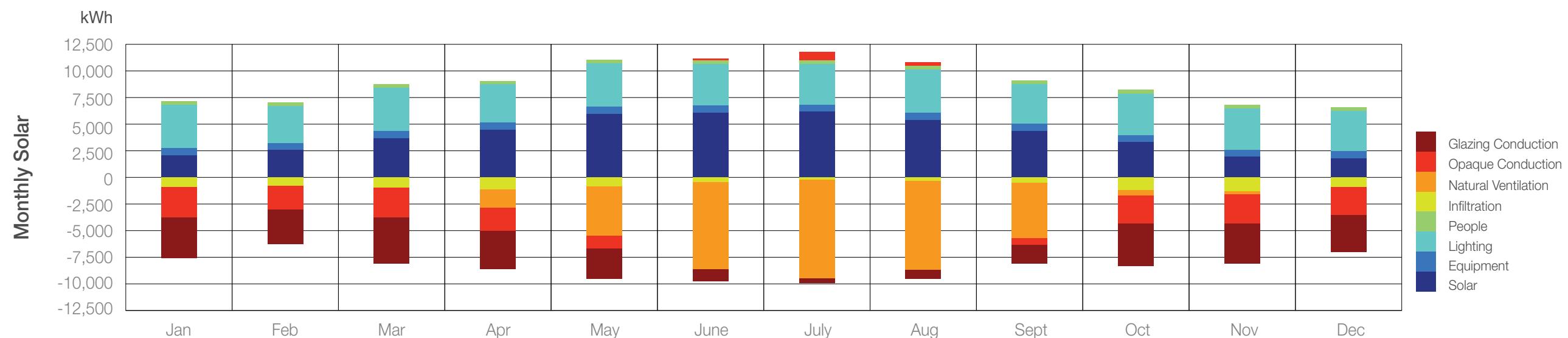
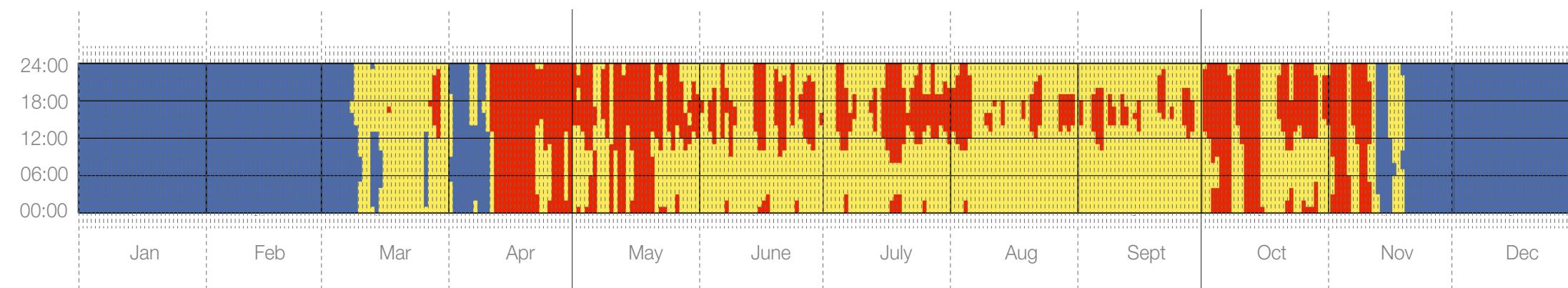


# 1 BASE U OPEN SPACE (1,207 SF)

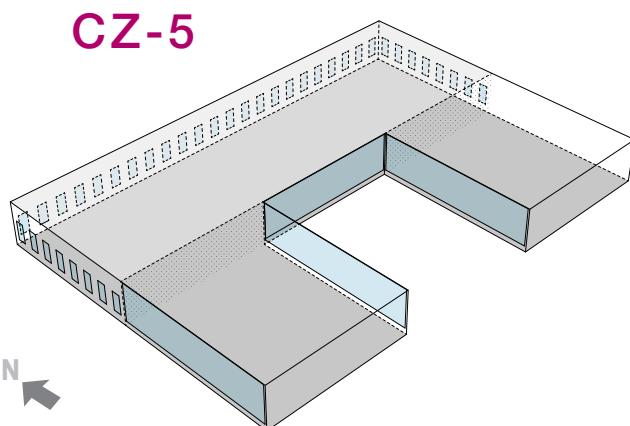


**ANNUAL**

COMFORTABLE	<b>43.02%</b>
HOT	<b>22.90%</b>
COLD	<b>34.08%</b>

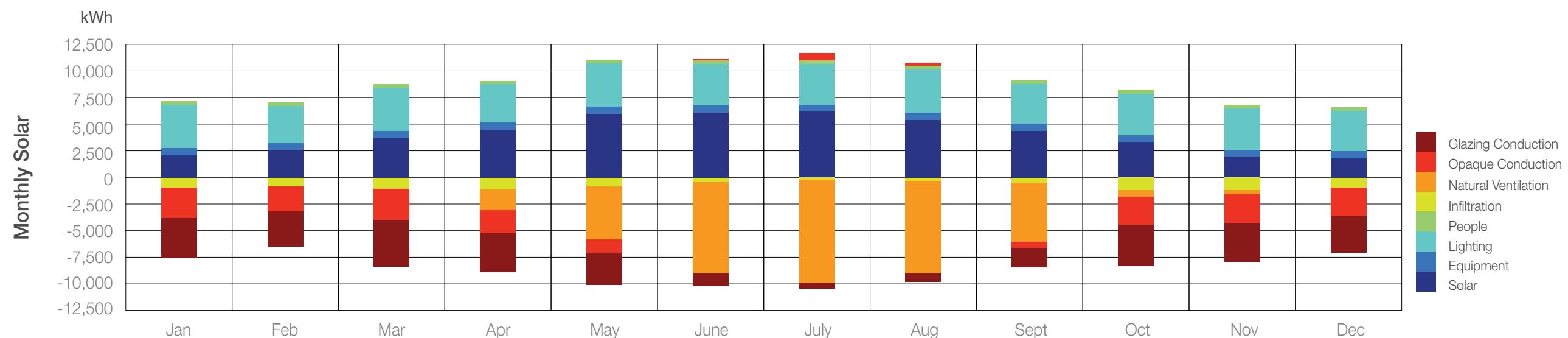
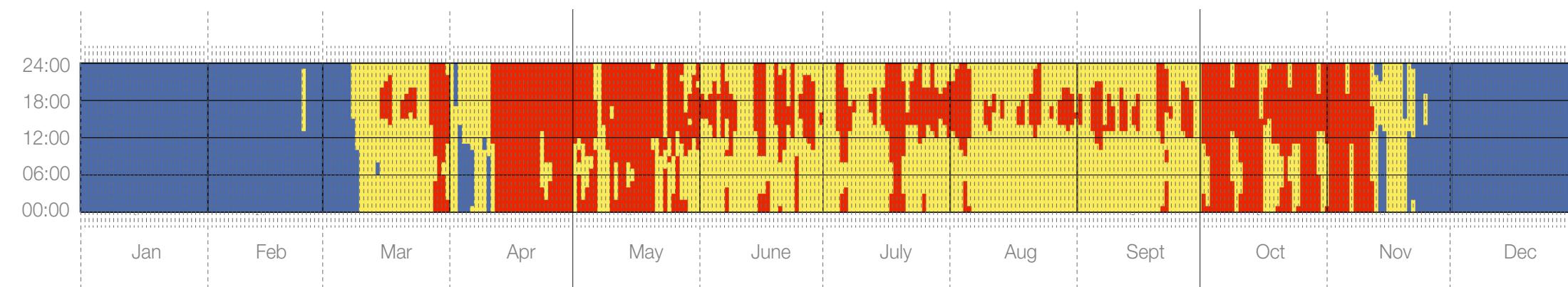


# 1 BASE U ENCLOSED SPACE (1,207 SF)

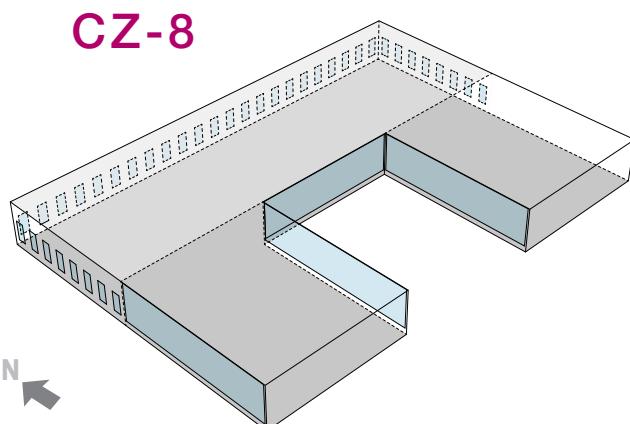


**ANNUAL**

COMFORTABLE	39.64%	⬇️
HOT	28.08%	⬆️
COLD	32.28%	⬇️

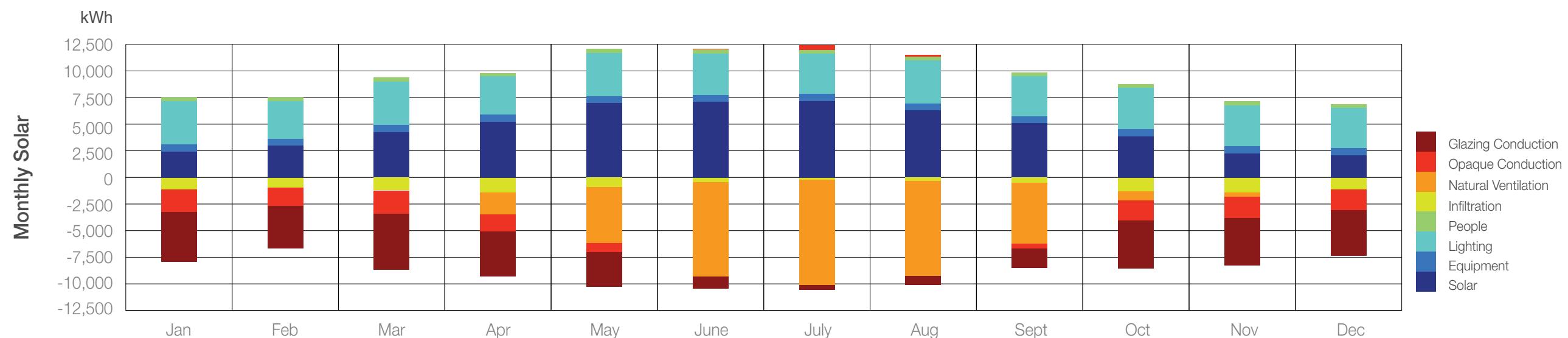
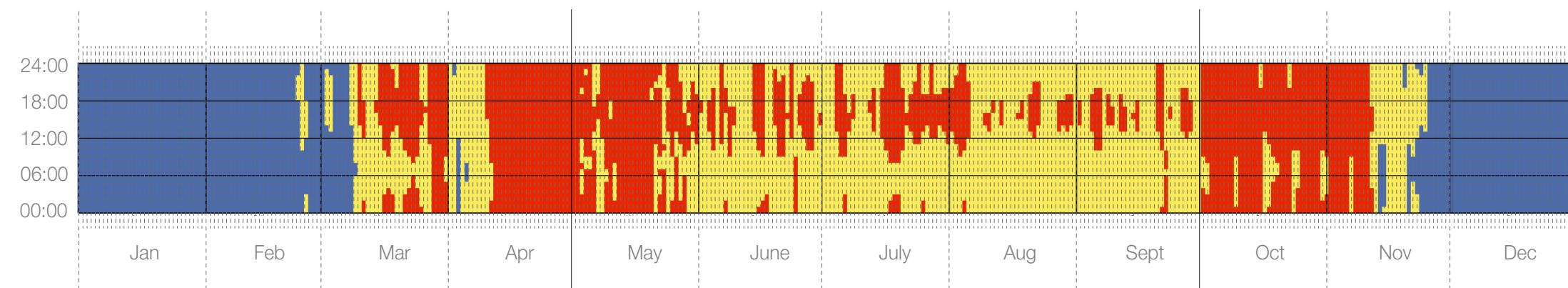


# 1 BASE U OPEN SPACE (1,207 SF)

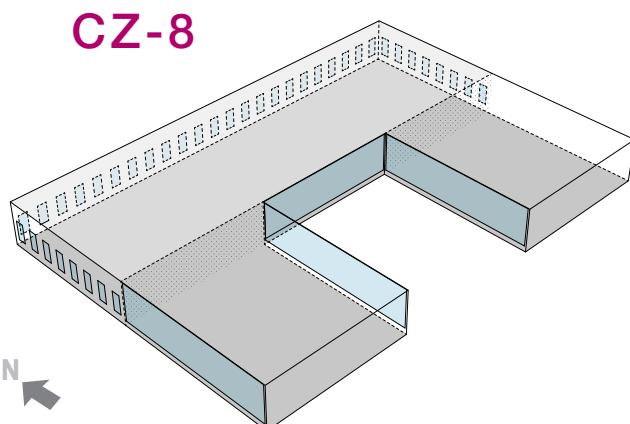


**ANNUAL**

COMFORTABLE	38.38%	⬇️
HOT	32.47%	⬆️
COLD	29.15%	⬇️

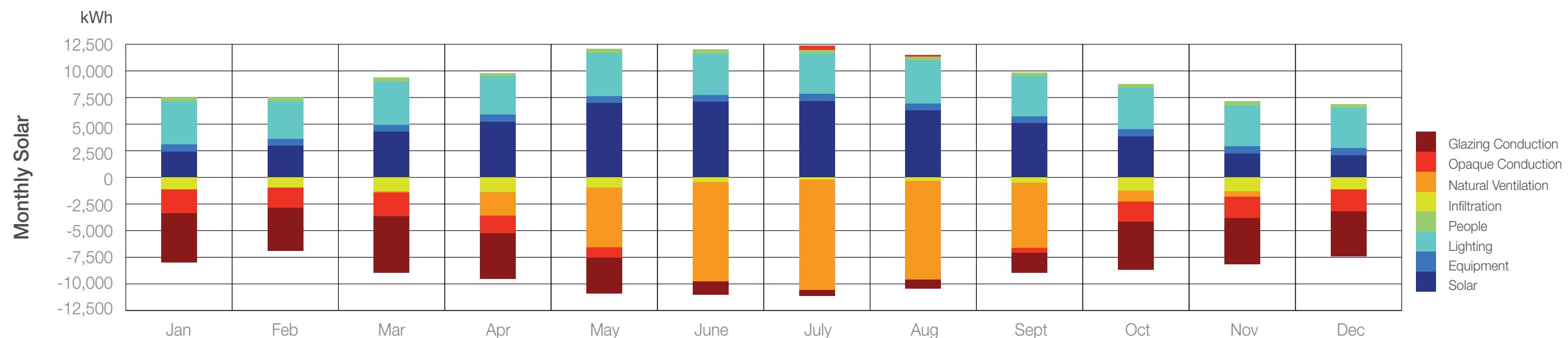
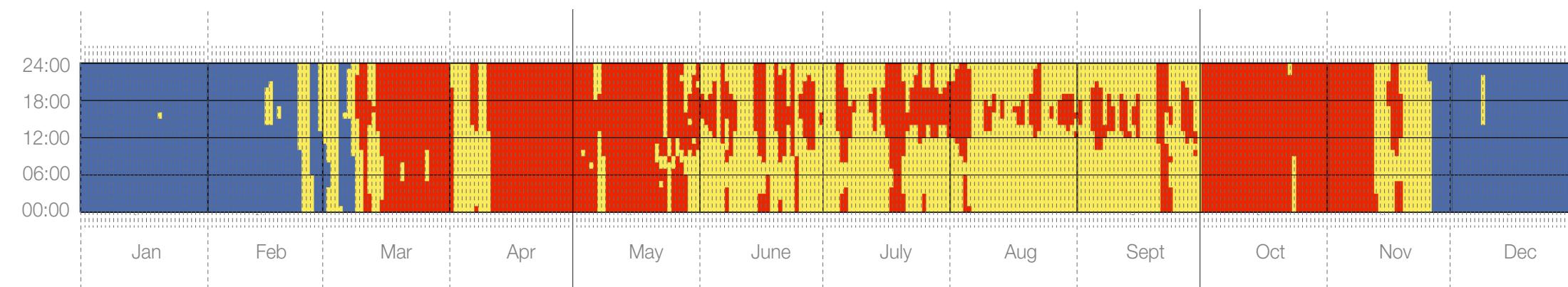


# 1 BASE U ENCLOSED SPACE (1,207 SF)

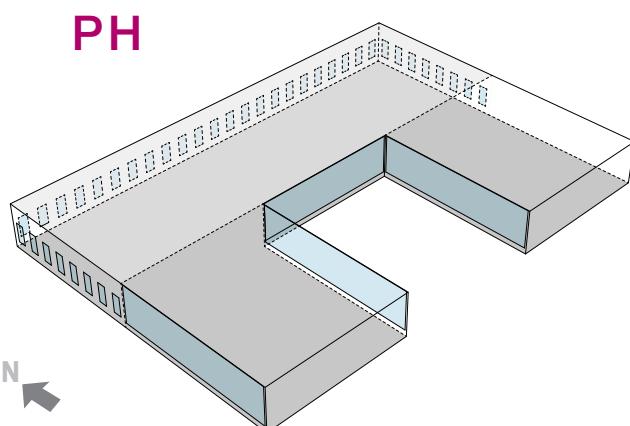


**ANNUAL**

COMFORTABLE	35.66%	⬇️
HOT	36.99%	⬆️
COLD	27.35%	⬇️

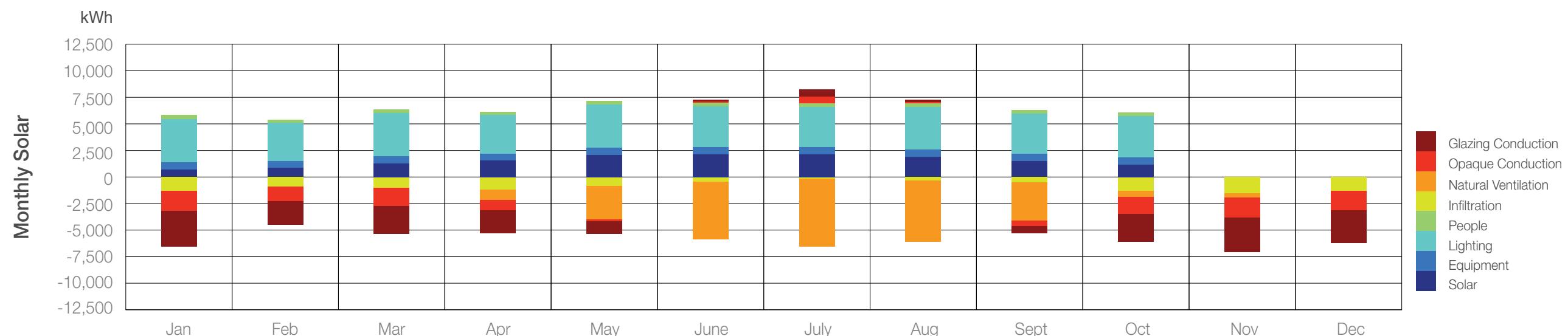
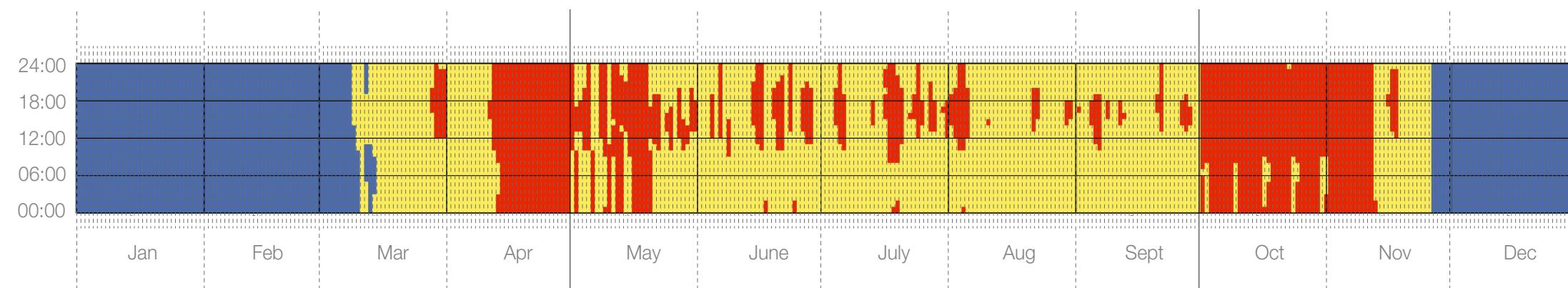


# 1 BASE U OPEN SPACE (1,207 SF)

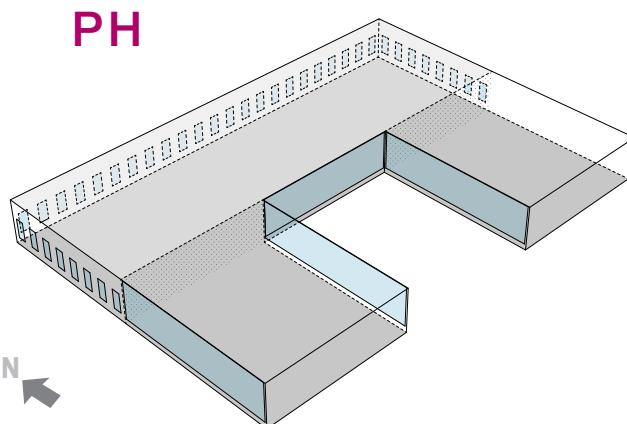


	ANNUAL	COLD PERIOD OCT 1 - APR 30	HOT PERIOD MAY 1 - SEPT 30
COMFORTABLE	46.04%	22.28%	78.96%
HOT	25.01%	28.03%	21.04%
COLD	28.86%	49.68%	00.00%

**HOT PERIOD**  
MAY 1 - SEPT 30



# 1 BASE U ENCLOSED SPACE (1,207 SF)



COMFORTABLE  
HOT  
COLD

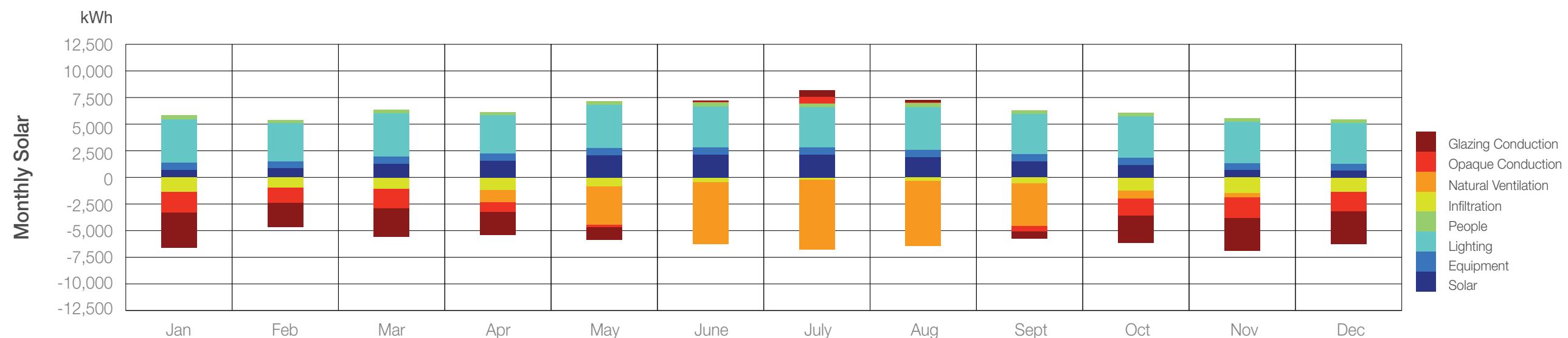
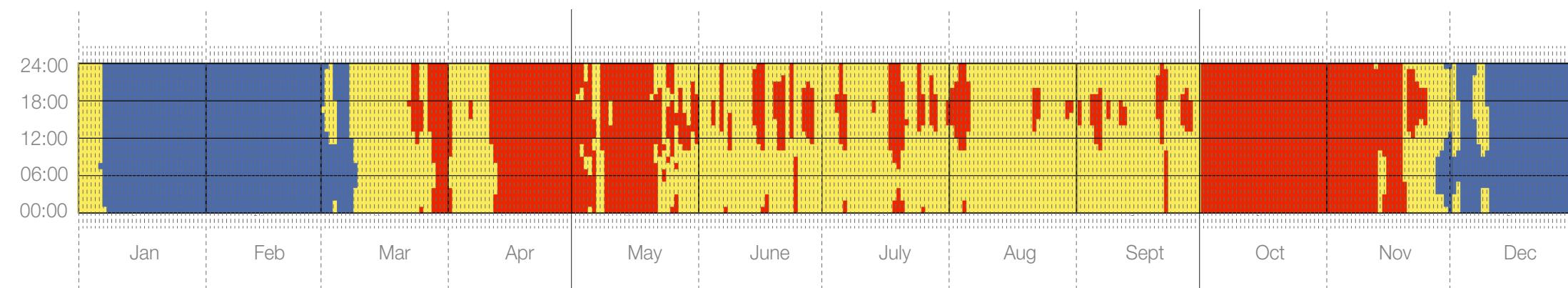
ANNUAL	
44.73%	⬇️
29.14%	⬆️
26.14%	⬇️

COLD PERIOD  
OCT 1 - APR 30

23.45%  
31.55%  
44.99%

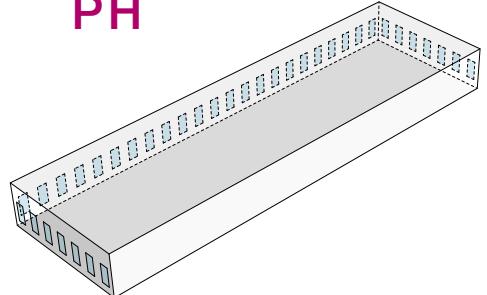
HOT PERIOD  
MAY 1 - SEPT 30

74.21%  
25.79%  
00.00%



**2 BAR**

(627 SF)

**PH**

N

**ANNUAL**

COMFORTABLE

36.88%



HOT

63.12%



COLD

00.00%

**COLD PERIOD**

OCT 1 - APR 30

11.22%

88.78%

00.00%

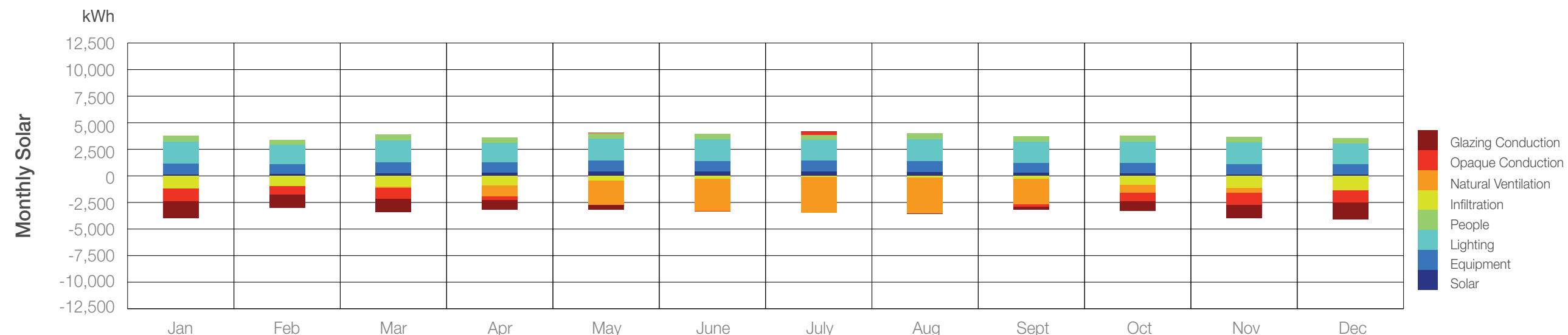
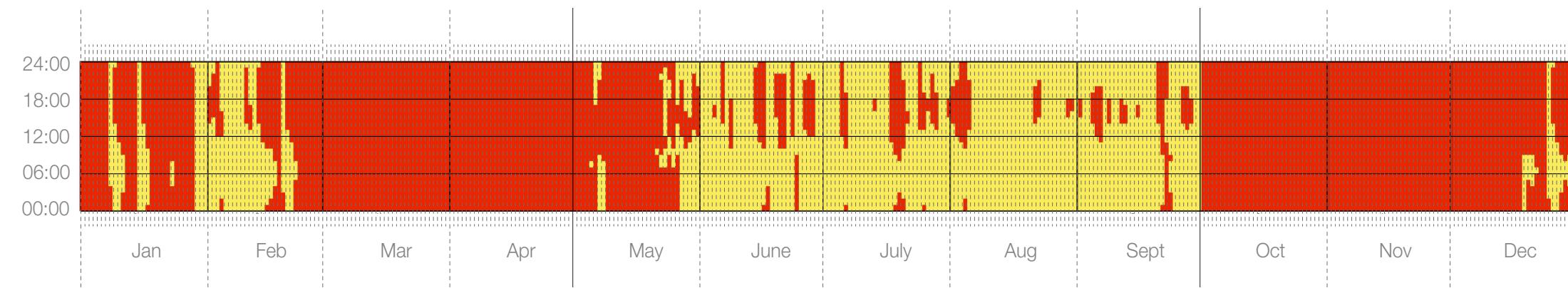
**HOT PERIOD**

MAY 1 - SEPT 30

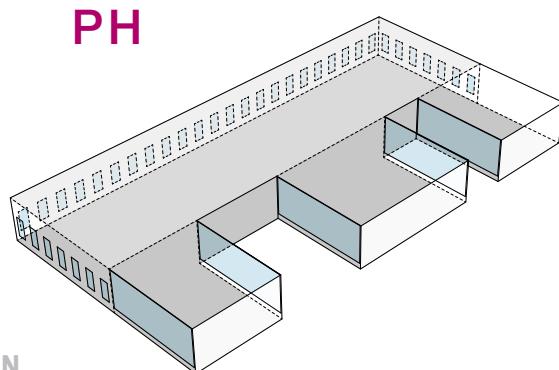
72.45%

27.55%

00.00%



### 3 BAR FULL EXPANSION OPEN SPACE (953 SF)



COMFORTABLE  
HOT  
COLD

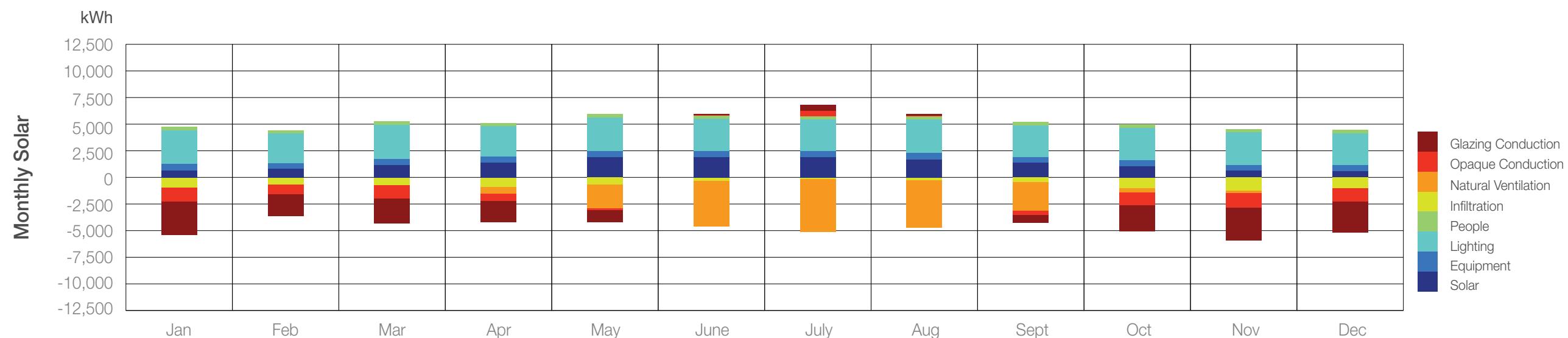
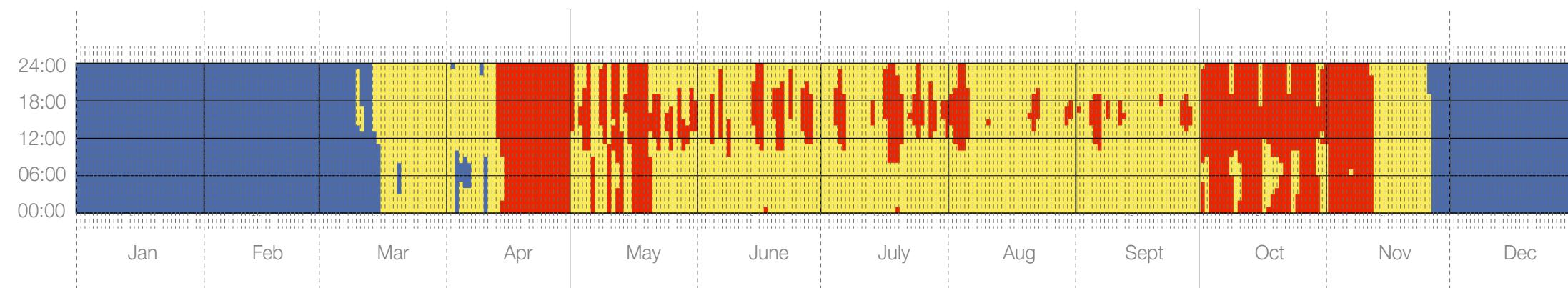


**COLD PERIOD**  
OCT 1 - APR 30

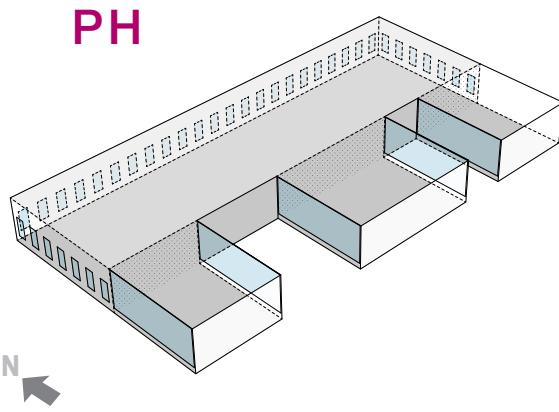
23.32%  
23.80%  
52.88%

**HOT PERIOD**  
MAY 1 - SEPT 30

81.12%  
18.87%  
00.00%

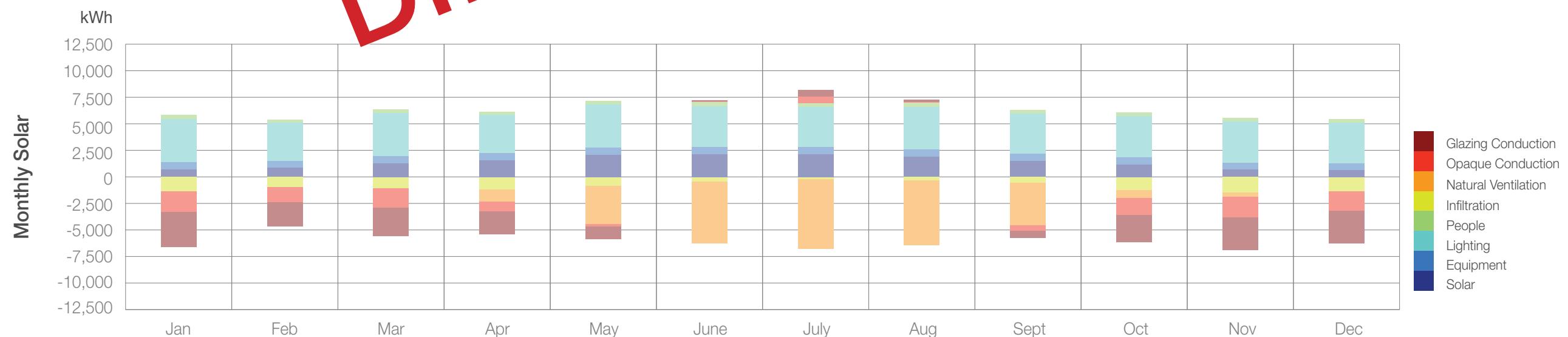
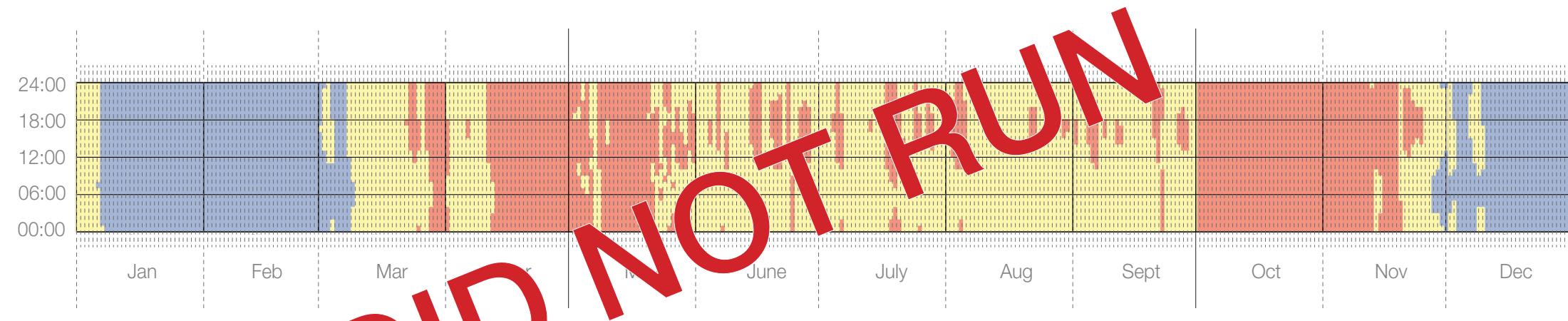


### 3 BAR FULL EXPANSION ENCLOSURE SPACE (953 SF)

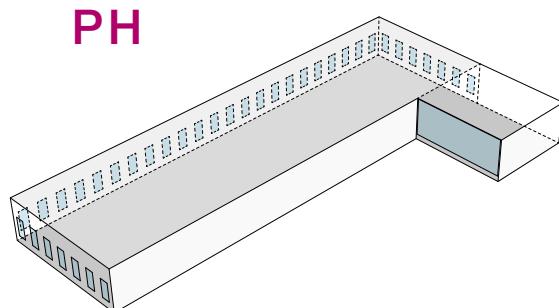


	ANNUAL	COLD PERIOD OCT 1 - APR 30	HOT PERIOD MAY 1 - SEPT 30
COMFORTABLE	<b>47.55%</b>	<b>45.58%</b>	<b>67.84%</b>
HOT	<b>21.74%</b>	<b>23.01%</b>	<b>18.44%</b>
COLD	<b>30.71%</b>	<b>31.41%</b>	<b>13.73%</b>

**HOT PERIOD**  
MAY 1 - SEPT 30

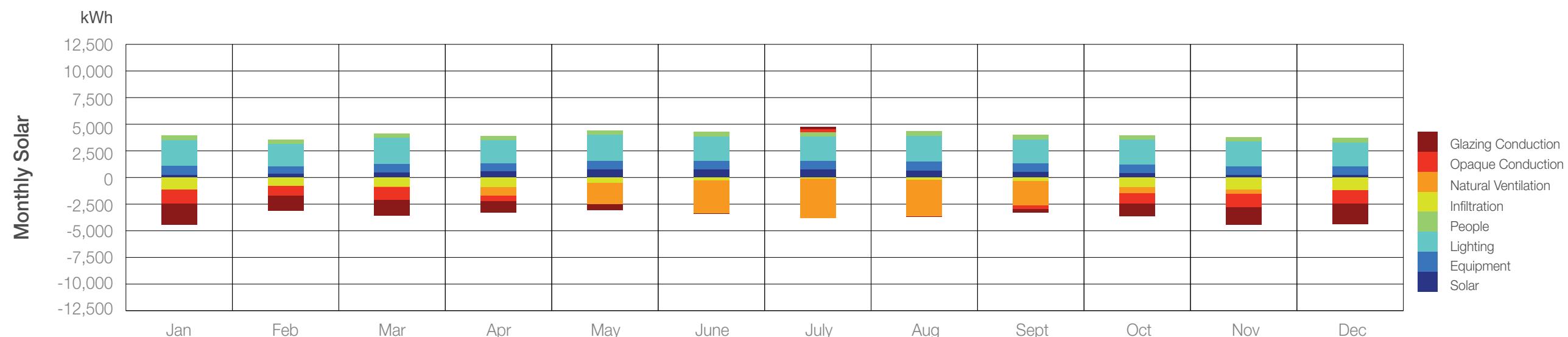
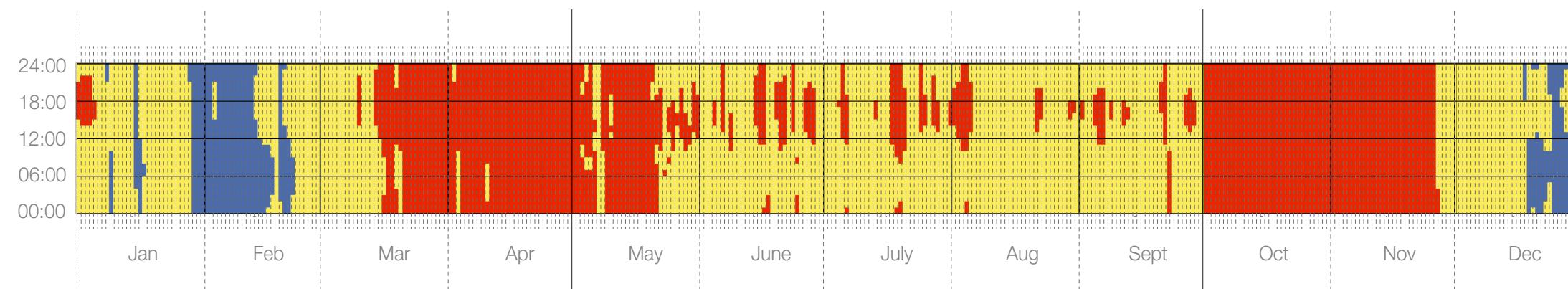


## 4 BAR FIXED AUDITORIUM OPEN SPACE (720 SF)

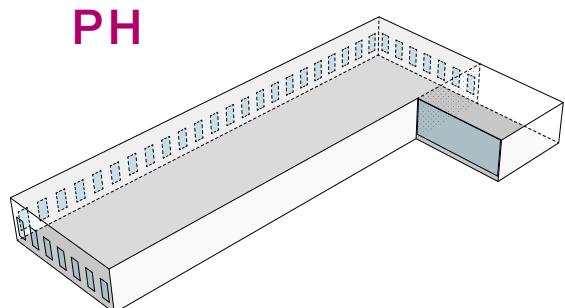


N ↗

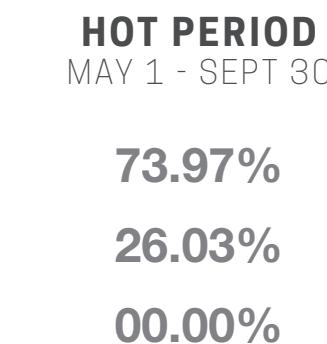
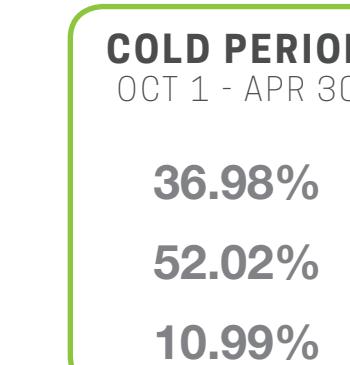
	ANNUAL	COLD PERIOD OCT 1 - APR 30	HOT PERIOD MAY 1 - SEPT 30
COMFORTABLE	53.24%	36.54%	76.39%
HOT	38.09%	48.53%	23.61%
COLD	08.67%	14.93%	00.00%



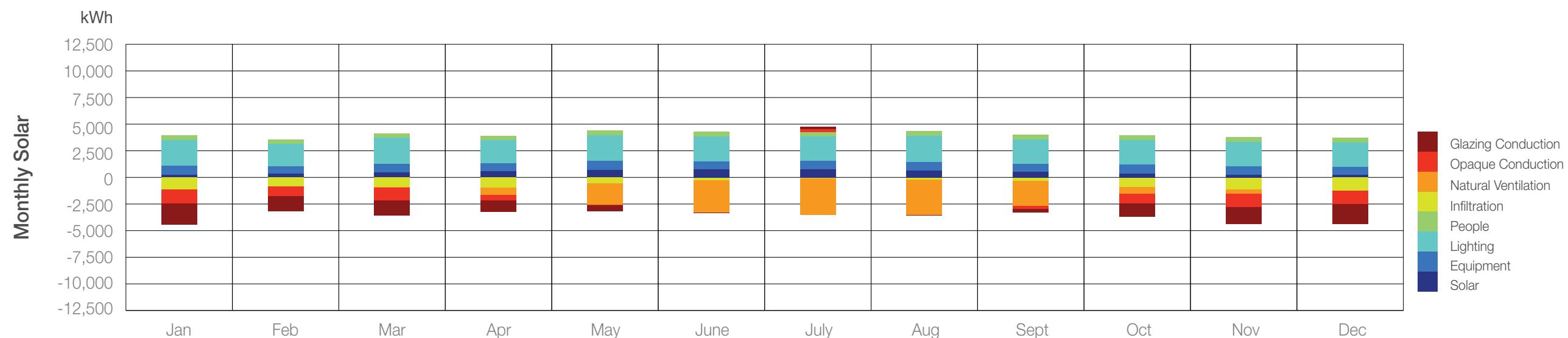
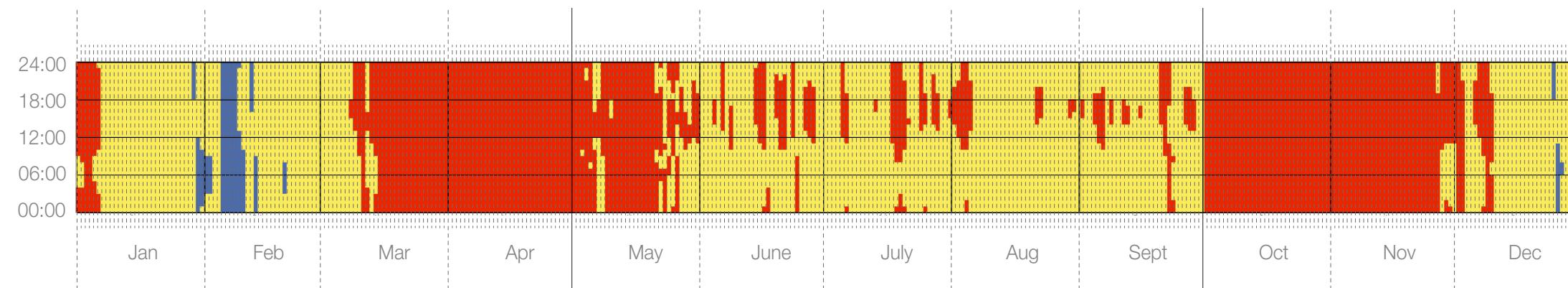
## 4 BAR FIXED AUDITORIUM ENCLOSURE SPACE (720 SF)

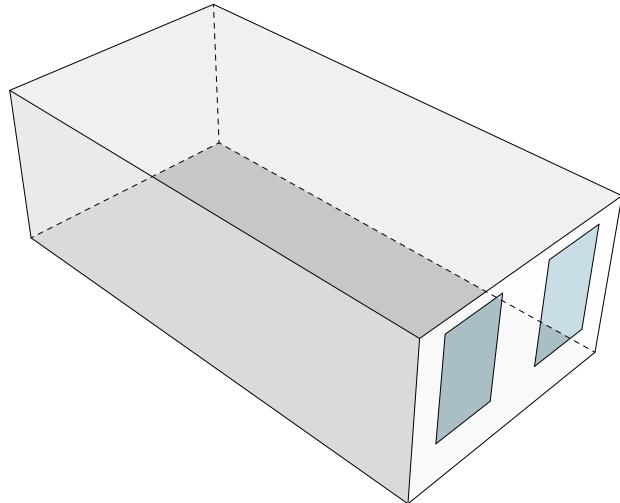
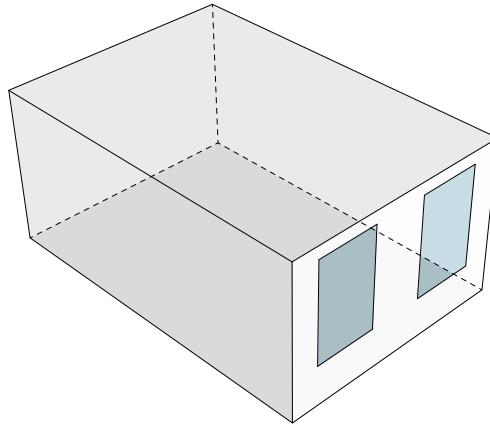
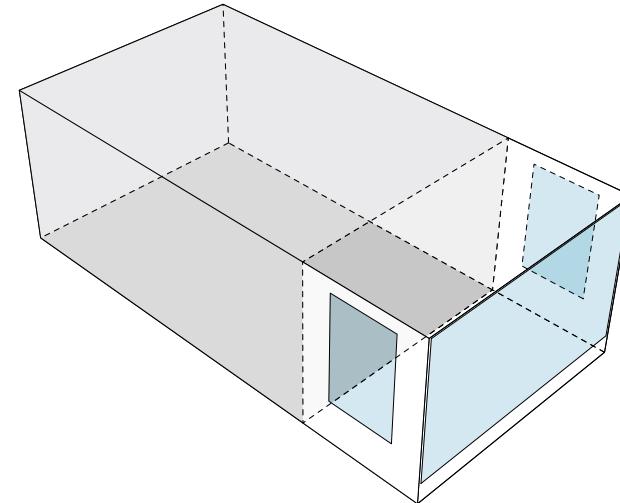
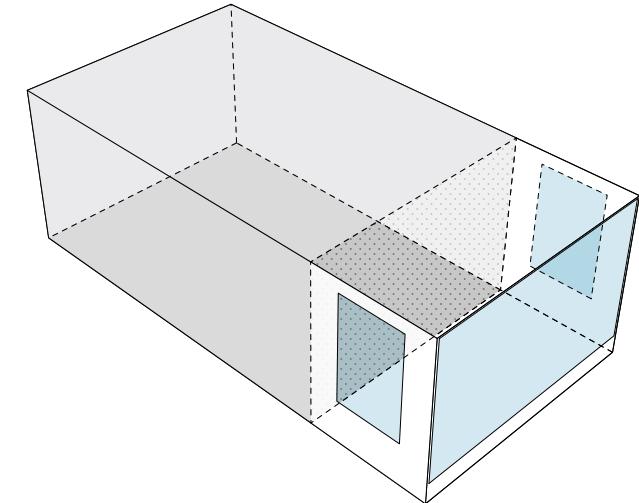


COMFORTABLE  
HOT  
COLD



N ↗



**1 RESIDENTIAL UNIT**  
(442.5 SF)**2 25% REDUCTION**  
(330 SF)**3 EXPANDED SKIN**  
(442.5 SF)**4 EXPANDED DOUBLE SKIN**  
(330 + 112.5 SF)**[Construction Tested]**CZ-8  
PassivhausCZ-8  
PassivhausCZ-8  
PassivhausCZ-8  
Passivhaus**[Fixed Parameters]**

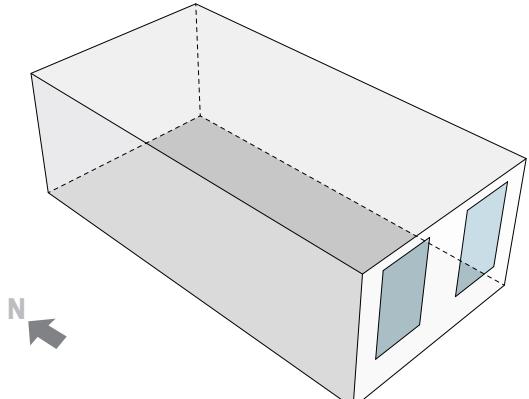
- Adiabatic Floor
- Adiabatic Ceiling/Roof
- Glazing: Triple-pane, Low-e, Argon: R(IP)-4.919

- 2" Aerogel: R(IP)-41.335
- Passivhaus Wall Construction: R(IP)-41.335
- Enclosure: Triple-pane, Low-e, Argon: R(IP)-4.919



**1 RESIDENTIAL UNIT**

(442.5 SF)

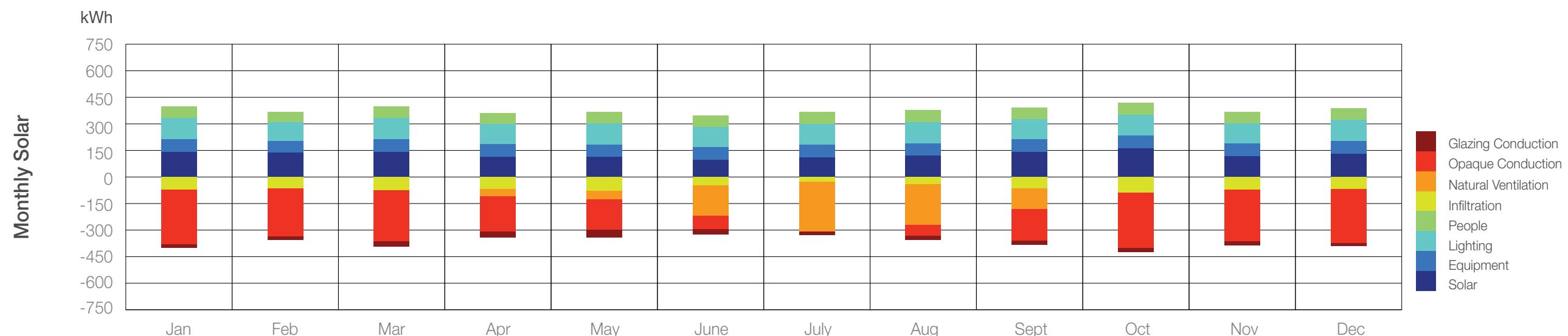
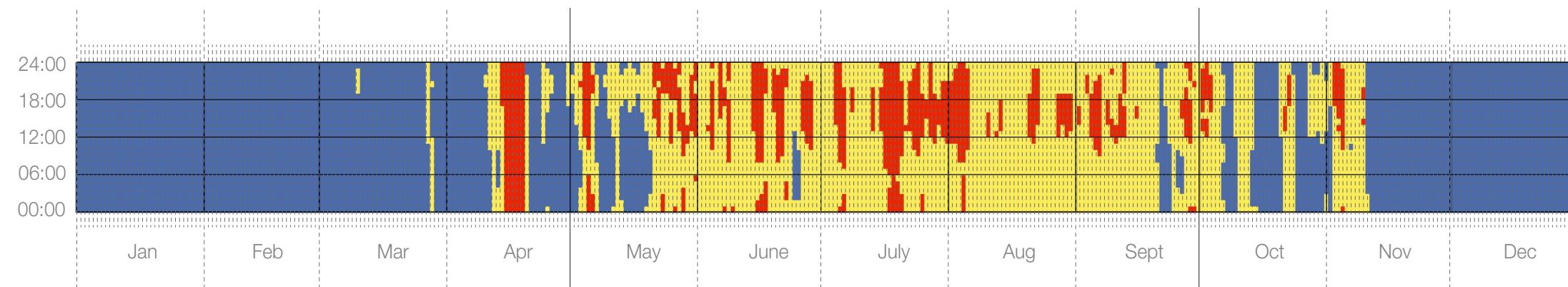
**CZ-8**

COMFORTABLE

**ANNUAL**

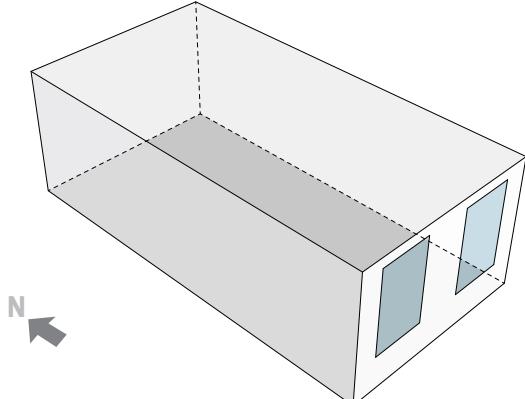
HOT

COLD

**36.67%****11.13%****52.20%**

**1 RESIDENTIAL UNIT**

(442.5 SF)

**PH**

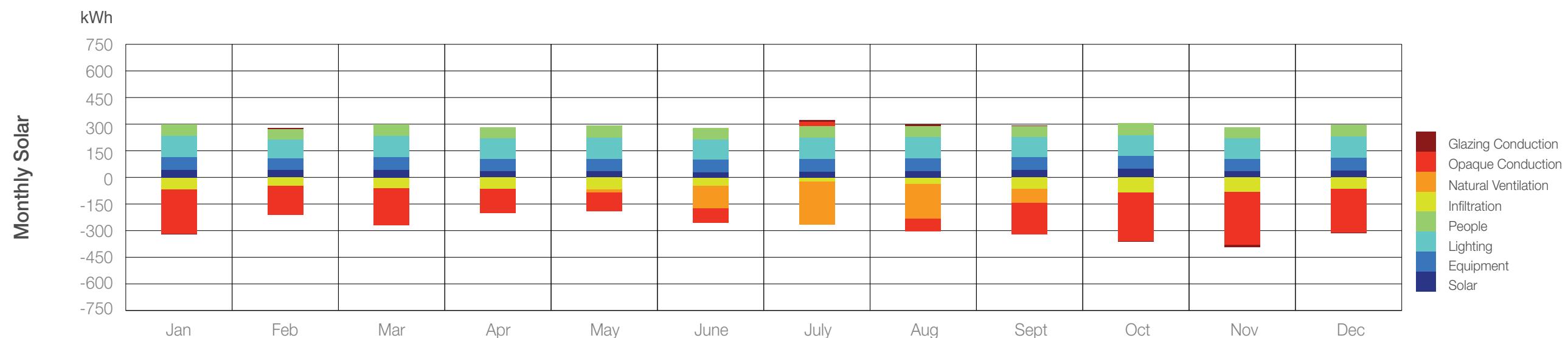
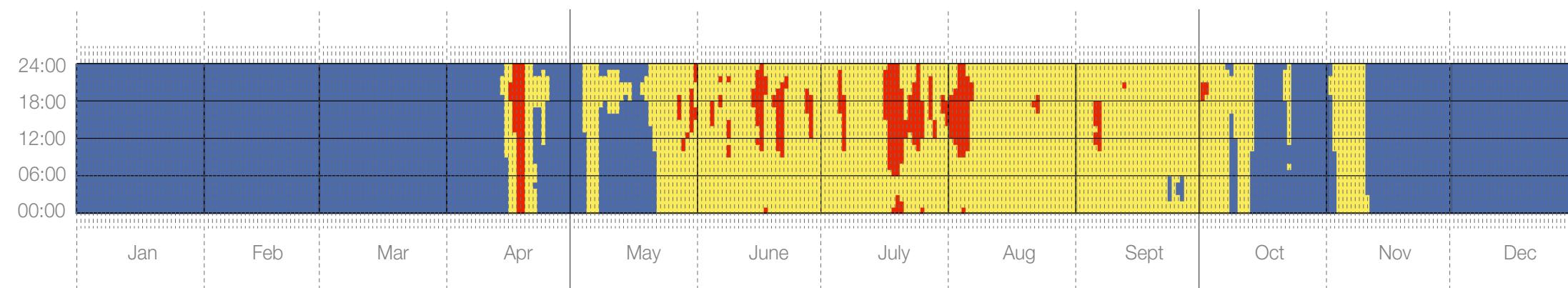
COMFORTABLE

**40.89%**

HOT

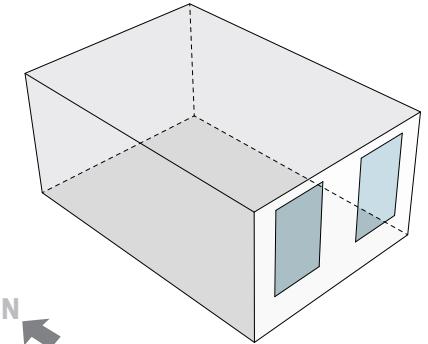
**04.57%**

COLD

**54.54%****ANNUAL**

**2 25% REDUCTION**

(330 SF)

**CZ-8**

N

**ANNUAL**

COMFORTABLE

**58.28%**

HOT

**09.21%**

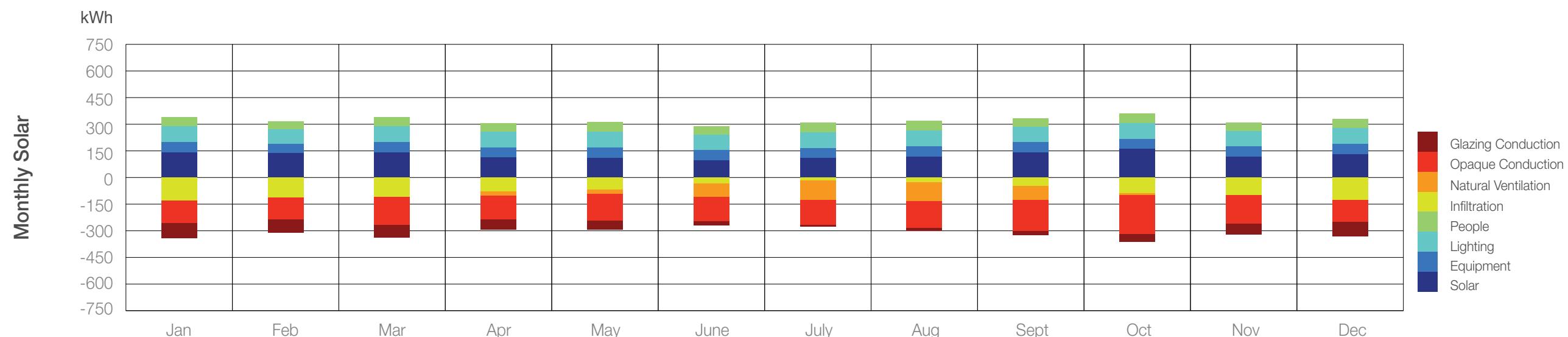
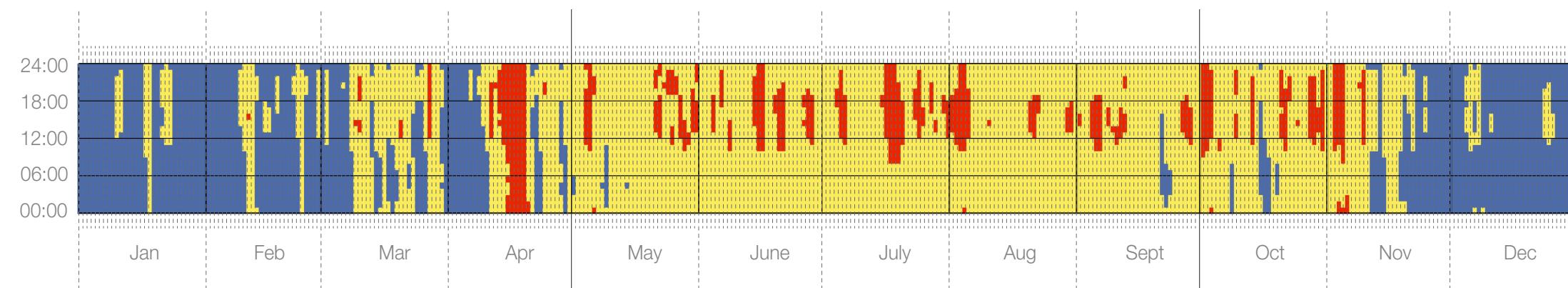
COLD

**32.51%****COLD PERIOD**

OCT 1 - APR 30

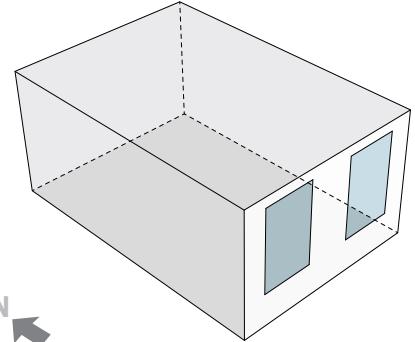
**37.69%****07.09%****55.21%****HOT PERIOD**

MAY 1 - SEPT 30

**86.79%****12.15%****01.06%**

**2 25% REDUCTION**

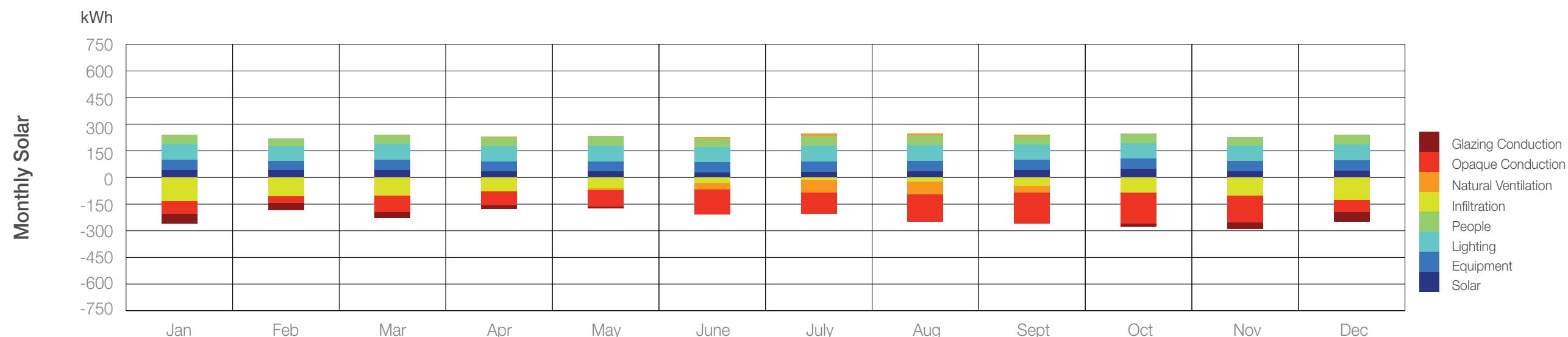
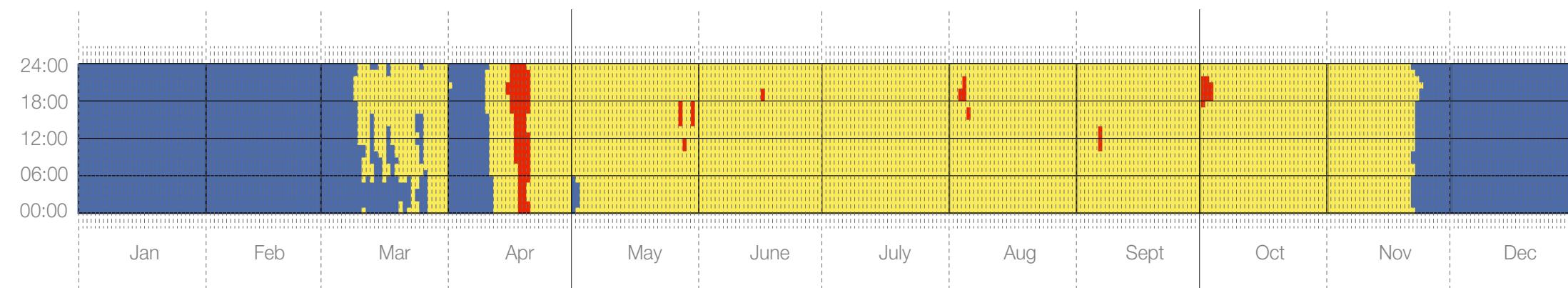
(330 SF)

**PH****ANNUAL****COMFORTABLE****64.60%****HOT****01.45%****COLD****33.95%****COLD PERIOD**

OCT 1 - APR 30

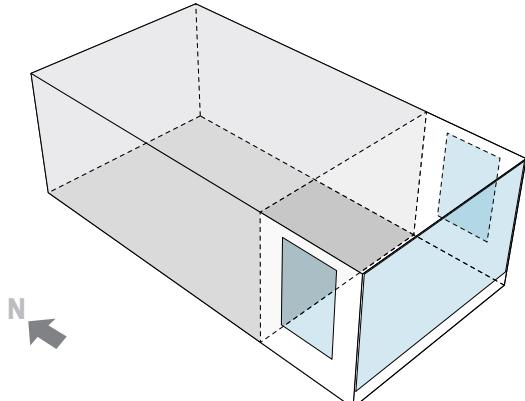
**39.72%****02.02%****58.25%****HOT PERIOD**

MAY 1 - SEPT 30

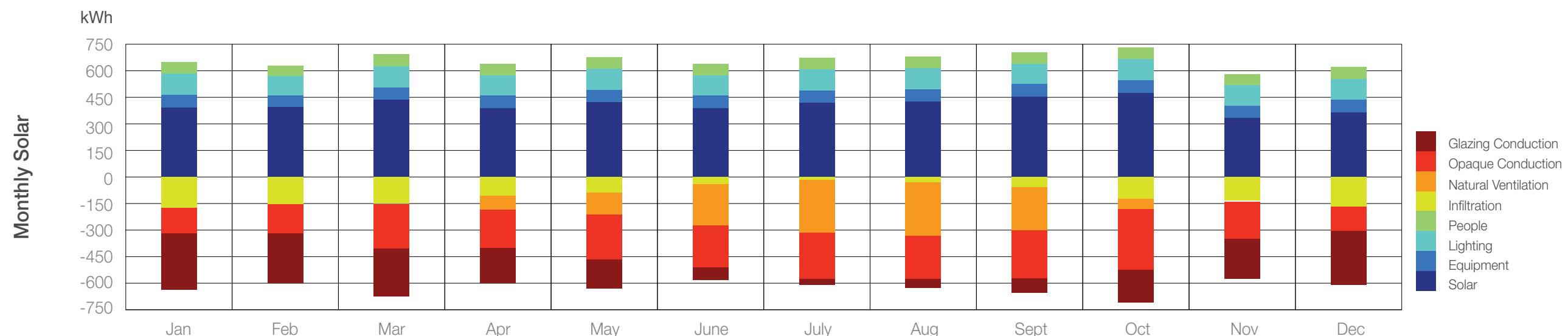
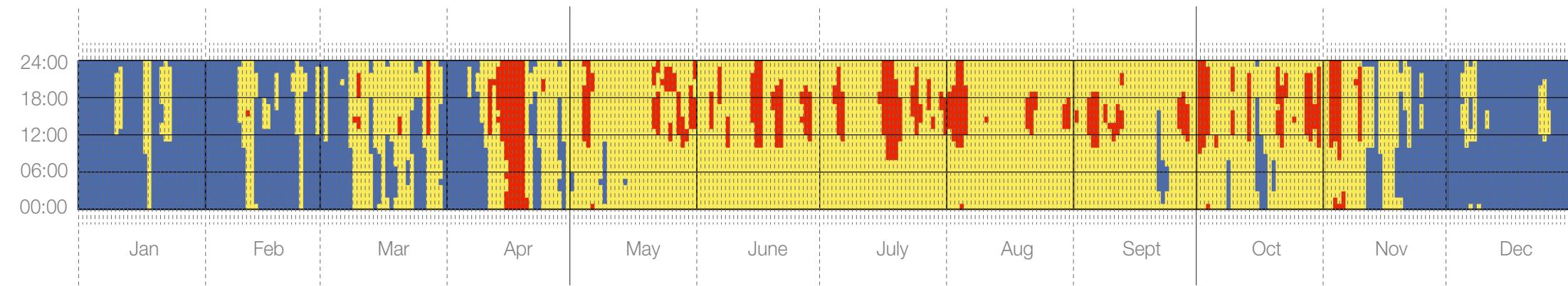
**99.07%****00.65%****00.27%**

**3 EXPANDED SKIN**

(442.5 SF)

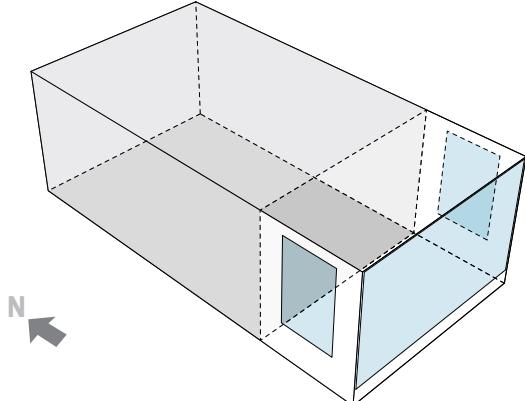
**CZ-8**

	<b>ANNUAL</b>	<b>COLD PERIOD</b> OCT 1 - APR 30	<b>HOT PERIOD</b> MAY 1 - SEPT 30
COMFORTABLE	51.84%	31.85%	79.52%
HOT	16.50%	15.27%	18.19%
COLD	31.67%	52.86%	02.29%



**3 EXPANDED SKIN**

(442.5 SF)

**PH****ANNUAL**

COMFORTABLE

60.03%

HOT

04.53%

COLD

35.43%

**COLD PERIOD**

OCT 1 - APR 30

36.46%

02.89%

60.65%

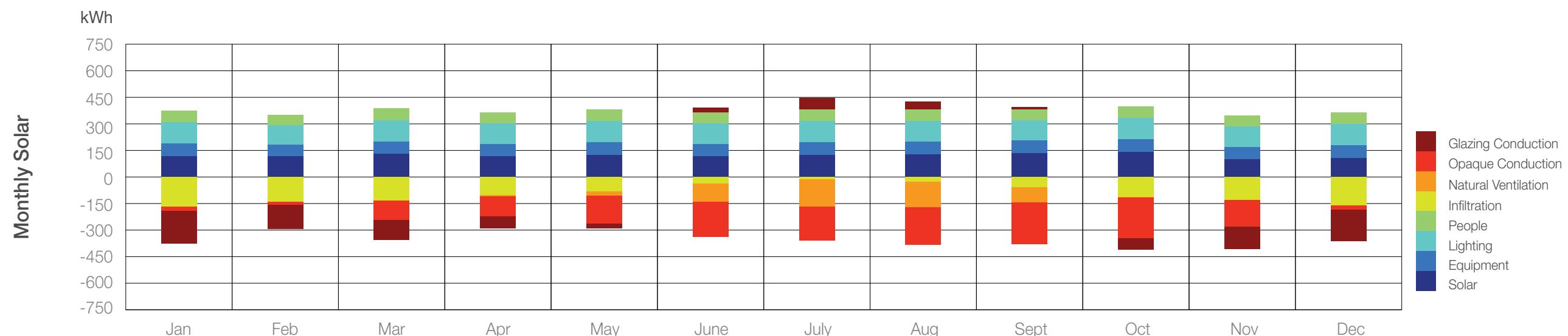
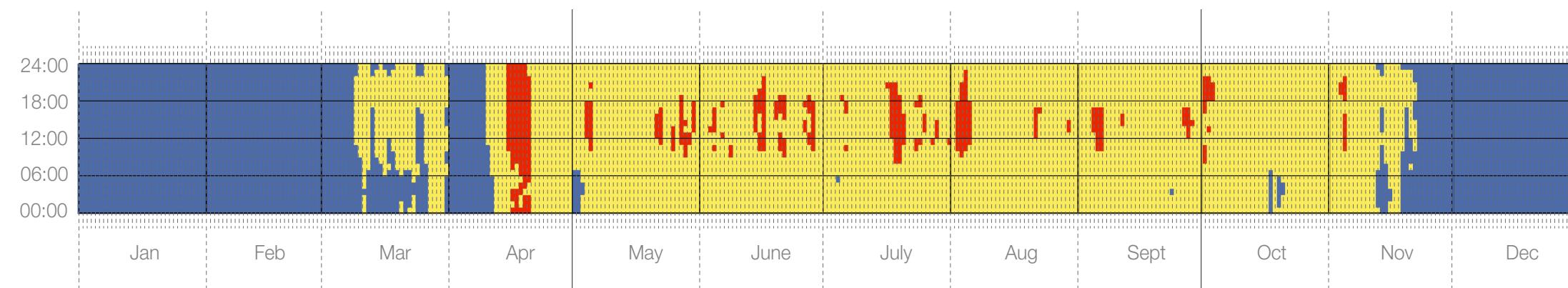
**HOT PERIOD**

MAY 1 - SEPT 30

92.70%

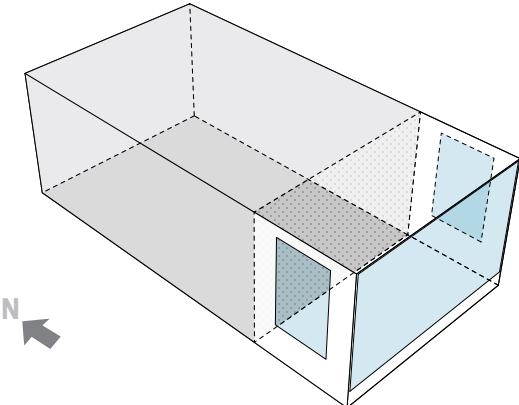
06.81%

00.49%



## 4 EXPANDED DOUBLE SKIN (330 + 112.5 SF)

CZ-8



COMFORTABLE

ANNUAL

**COLD PERIOD**

OCT 1 - APR 30

**HOT PERIOD**

MAY 1 - SEPT 30

HOT

COLD

51.84%

16.50%

31.67%

26.92%

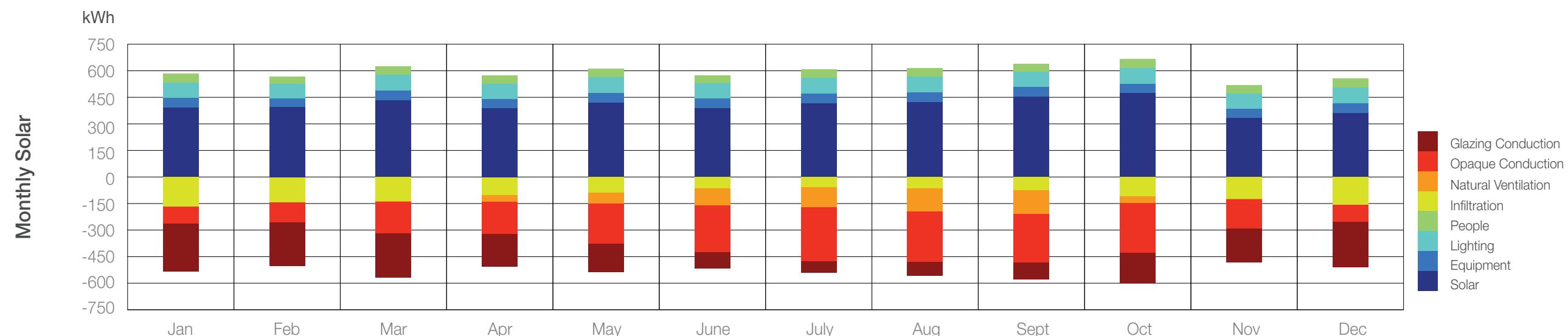
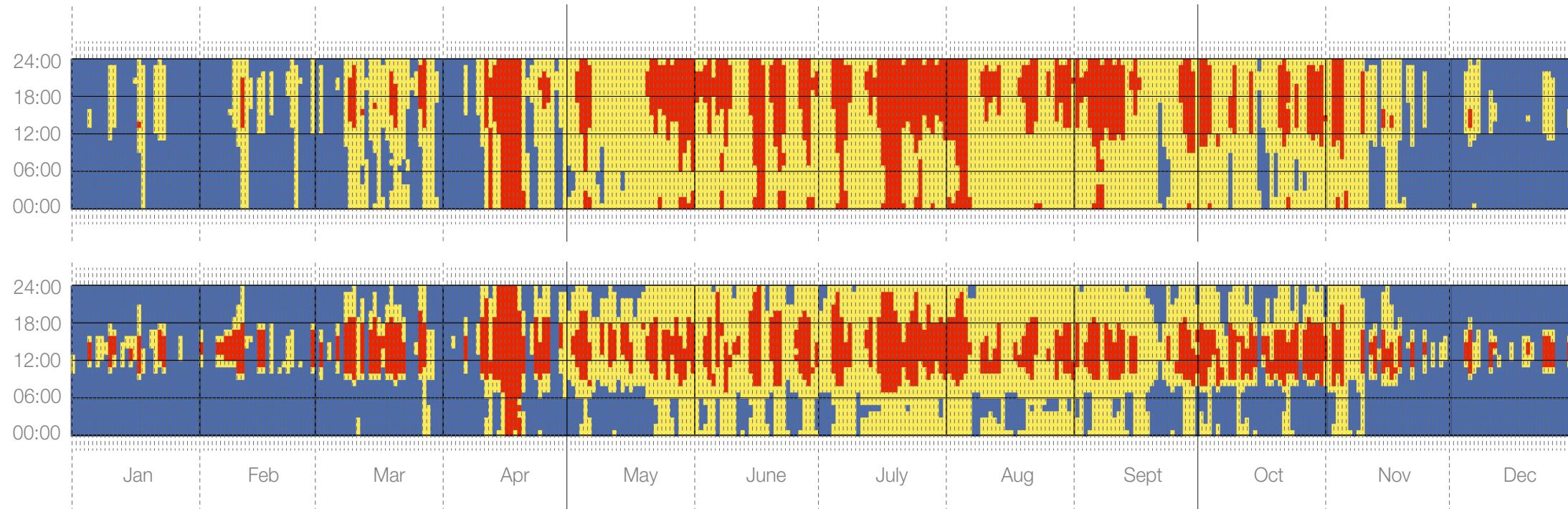
11.44%

61.64%

64.09%

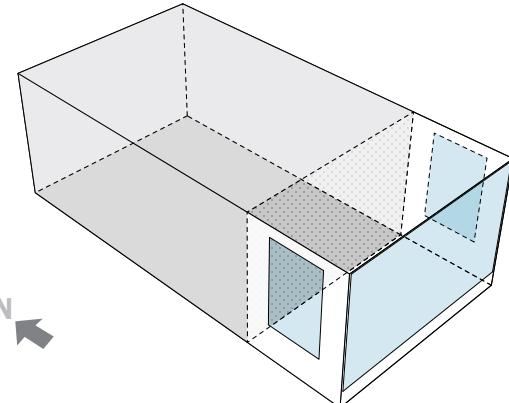
27.63%

08.27%



## 4 EXPANDED DOUBLE SKIN (330 + 112.5 SF)

PH



COMFORTABLE

ANNUAL

51.84%

16.50%

31.67%

COLD PERIOD  
OCT 1 - APR 30

27.19%

02.65%

70.16%

HOT PERIOD  
MAY 1 - SEPT 30

85.40%

08.31%

06.29%

