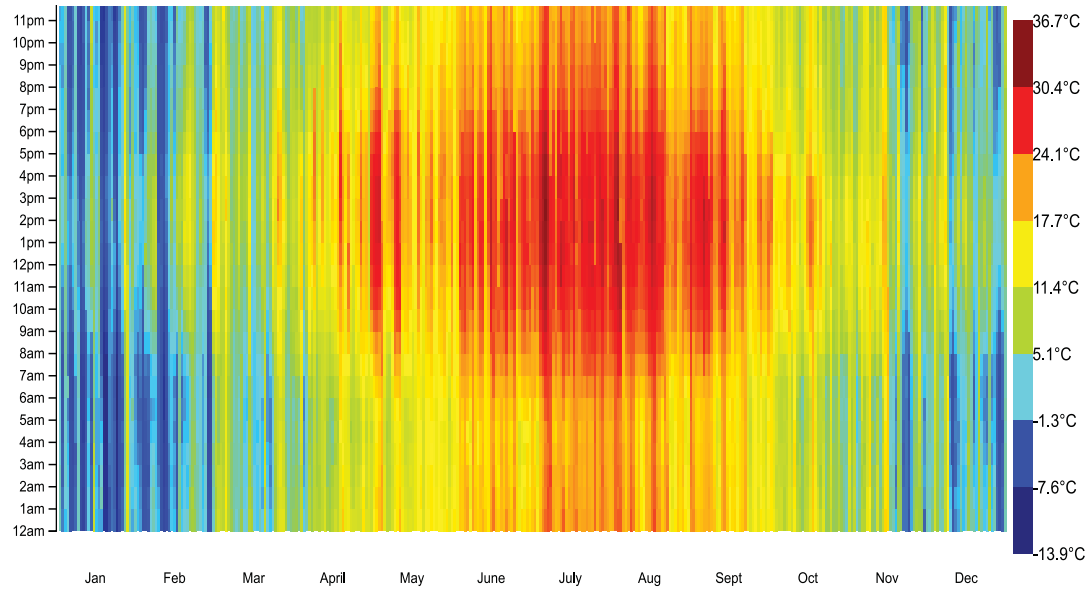
Philadelphia Intl Airport Weather Data Report

ARCH 633

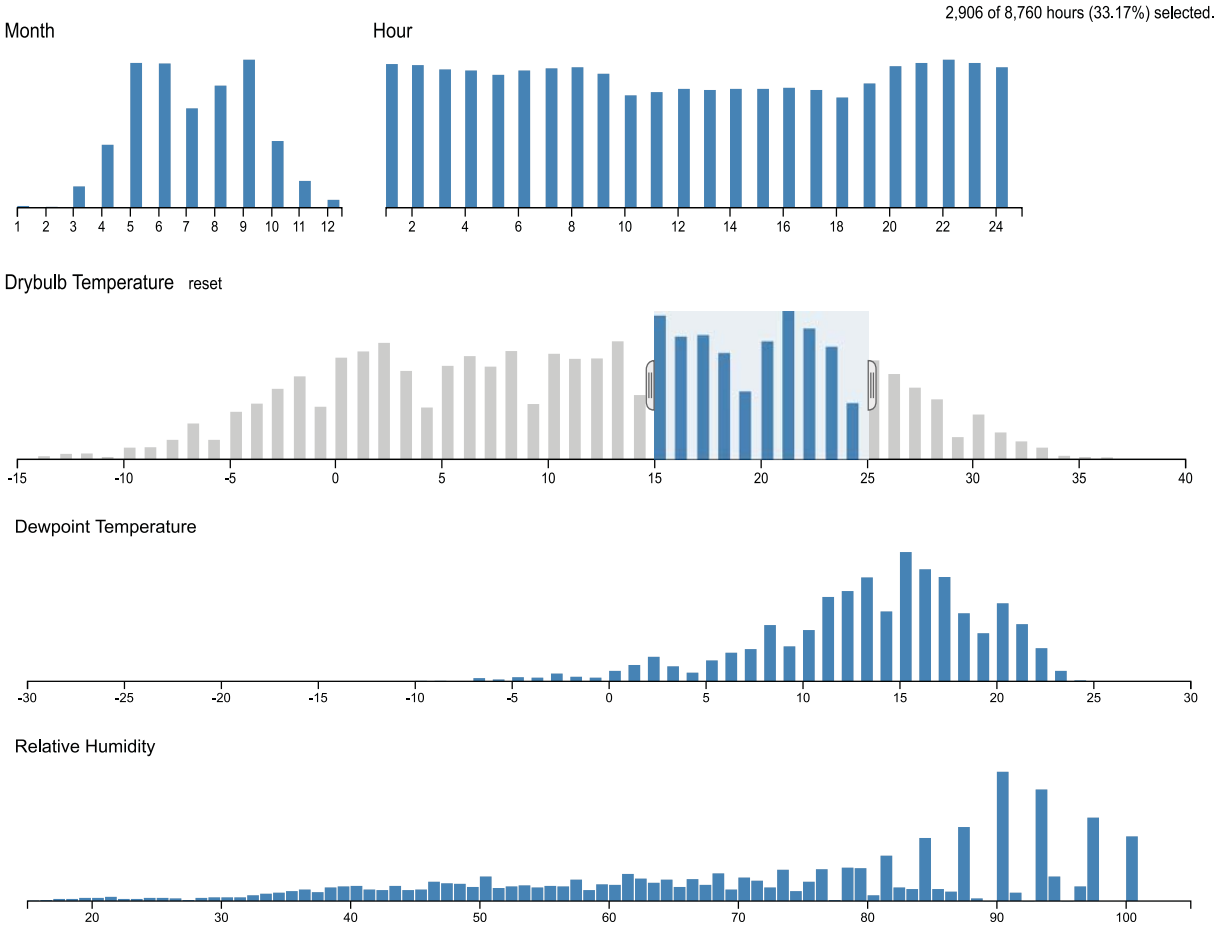
Alexandra Adamski

Drybulb Temperature Floodplot



Thermal Comfort

Hours between 15°C and 25°C.



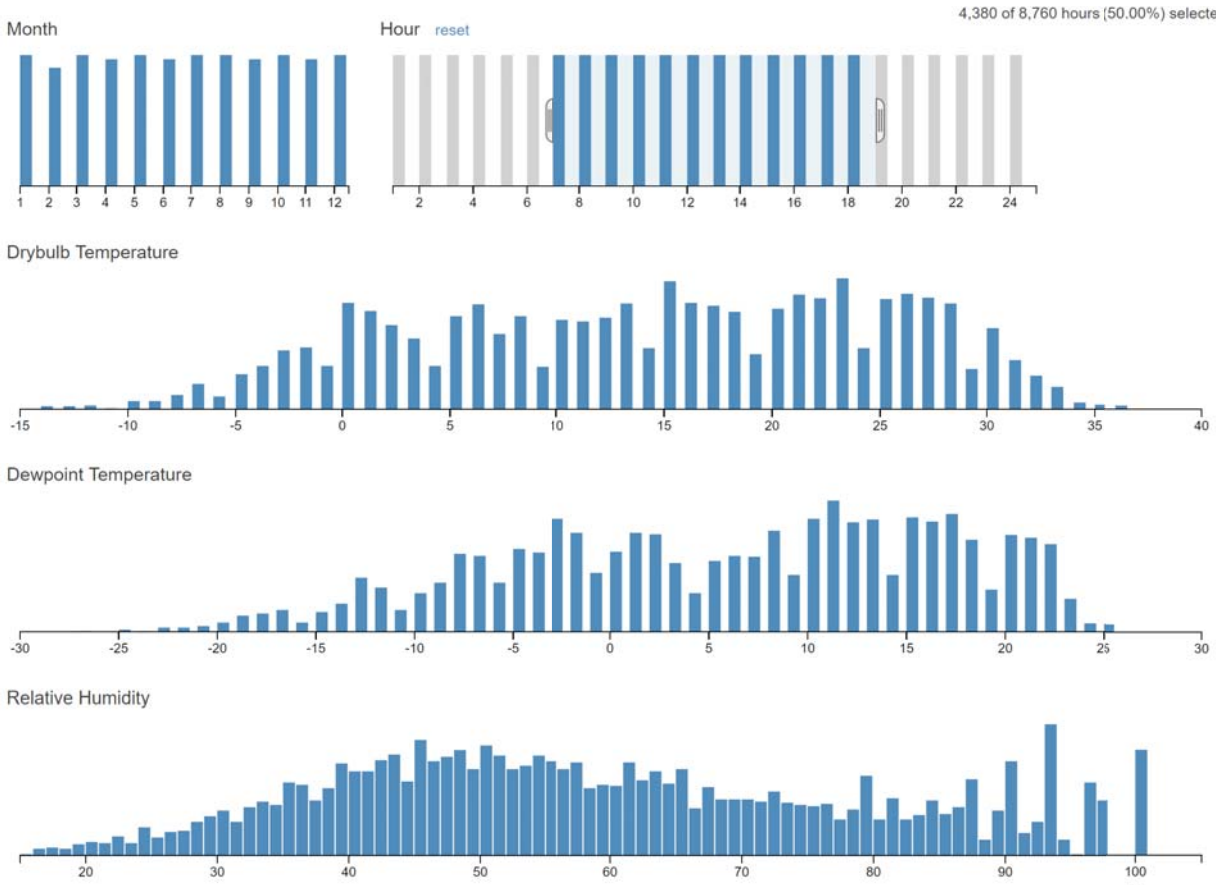
Source: https://mdahlhausen.github.io/epwvis/

Philadelphia Intl Airport Weather Data Report

ARCH 633

Alexandra Adamski

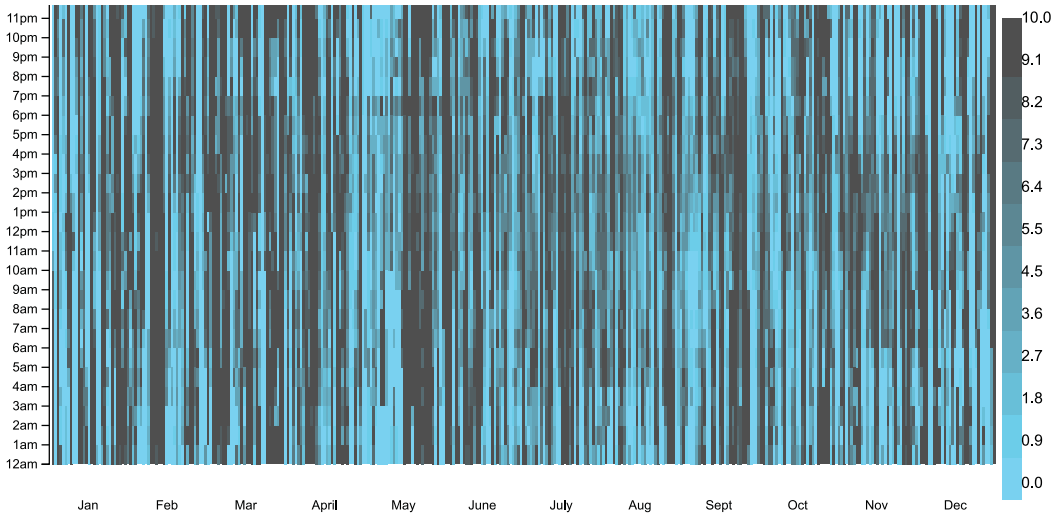
Daylight Hours



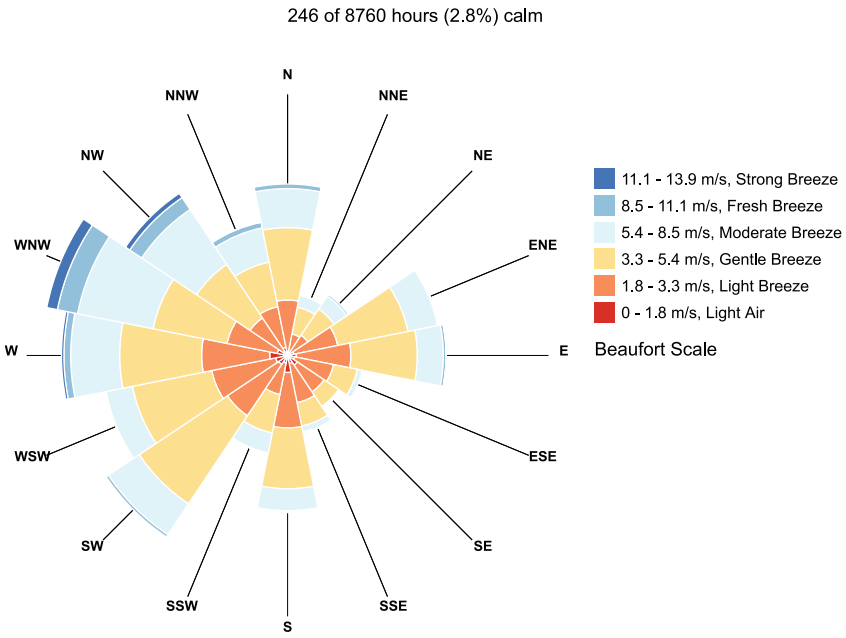
Source: https://mdahlhausen.github.io/epwvis/

Alexandra Adamski

Cloud Cover Floodplot



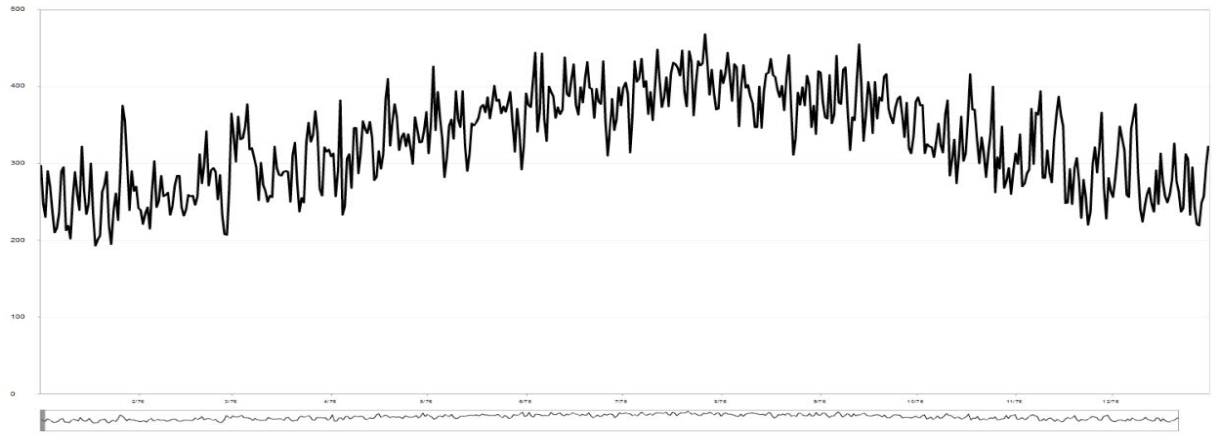
Wind Rose



Source: https://mdahlhausen.github.io/epwvis/

Dry Bulb Temperature (C) + Relative Humidity

Infrared Sky Radation (Wh/m2)

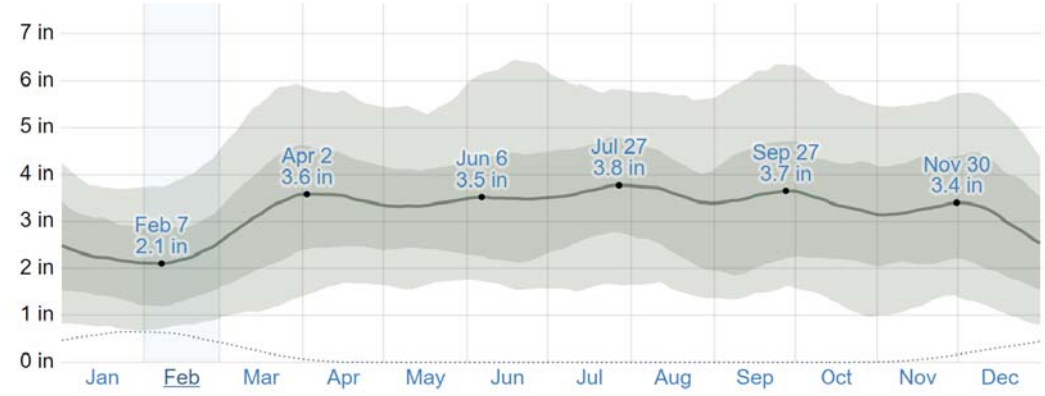


Source: Elements

Daily Chance of Precipitation

The percentage of days in which various types of precipitation are observed, excluding trace quantities: rain alone, snow alone, and mixed (both rain and snow fell in the same day).

Average Monthly Rainfall



The average rainfall (solid line) accumulated over the course of a sliding 31-day period centered on the day in question, with 25th to 75th and 10th to 90th percentile bands. The thin dotted line is the corresponding average liquid-equivalent snowfall.

Source: Weatherspark

Alexandra Adamski

Important Passive Design Strategies

1. Passive Heating / Cooling

Philadelphia experiences a high range of dry bulb temperatures and humidity over the course of a year, so both passive heating and cooling strategies would be relevant to incorporate into building designs. Passive heating takes advantage of solar radiation and captures internal heat gains. Using a well-insulated envelope with elements that minimize energy losses, passive solar heating stores and harnesses solar gains to offset energy requirements. This strategy employs elements such as building orientation to the sun, sun spaces, high-performance windows (clear, low-e), mixed-mode heat recovery ventilation (HRV), low window to wall area ratio (N/E), high window to wall area ratio (S/W), operable external shading, high-performance insulation, thermal mass, and minimized infiltration.[1]

Passive cooling blocks solar gains and removes internal heat gains with methods such as using cool external air for ventilation, or storing excess heat in thermal mass. Passive cooling can utilize earth-tempering ducts, passive evaporative cooling, stacked windows, nocturnal cooling, passive ventilation, low window to wall area ratio (S/W), and operable external shading.[2]

2. Ventilation

Working together with other passive cooling strategies, passive ventilation can be used to cool buildings in Philadelphia during hot, humid summers. The city experiences the strongest winds from the west at an average speed of 3-8 m/s, so operable windows and openings would perform the best facing this direction. Using naturally occurring air flow around a building, passive ventilation replaces air in occupied spaces while also possibly cooling those spaces. Elements used for this strategy include operable windows, buffer spaces and double-facades, orientation to air flow direction, openings in corridors and other transition spaces, central atriums and lobbies, and wind towers.[3]

3. Daylighting

Philadelphia experiences a moderate amount of cloud cover during a typical year, so passive daylighting strategies could also be important to employ in building design. To reduce the use of artificial lighting, passive daylight strategies maximize the distribution of natural diffused daylight. This strategy employs the use of tall windows with high ceilings, window placement and size, light shelves, clerestories, skylights, and other strategic architectural features.[4]

[1, 2, 3, 4] Source: https://climatecolab.org/contests/2014/buildings/c/proposal/1309226