AEQUITAS

ASHRAE LowDown Showdown

2020 Building Performing Analysis Conference and SimBuild

Building Type: Mixed Use

Total Floor Area: 300,000 ft2

Location: New York, N.Y.

Total Energy Usage

9,274,562 kBtu

Site EUI

30.9 kBtu/ft^2

Source EUI

108.2 kBtu/ft^2

Total Carbon (2030)

-5 kgCO2e/ft^2

Total Carbon (2050)

-2 kgCO2e/ft^2

Annual Water Usage

17,410,309 Gallons

Annual Energy Costs

1.7 $/ft^2

Annual Water Costs

0.5 $/ft^2

Total Annual Costs

2.2 $/ft

Total Energy Generation

9,274,693 kBtu

Team

Sustainability Specialist / Team Captain
Elizabeth LeRiche

Architect
Michael Hara

Structural Engineer
Ethan Fogle

Mechanical Engineer / Energy Modeler
Graham Linn

Mechanical Engineer / Advisor
Manus McDevitt

Mechanical Engineer / Advisor
Leighton Deer

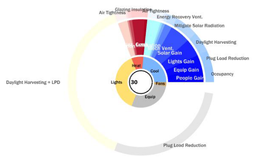
Sustainability Director / Advisor
Ariane Laxo

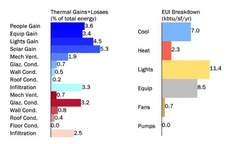
STREET LEVEL EXTERIOR PERSPECTIVE

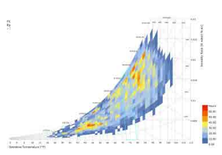
"SKY GARDENS" - EXTERIOR GREEN GATHERING SPACES

ROOFTOP COMMUNITY GARDENS

INTERIOR OF RESIDENTIAL UNIT

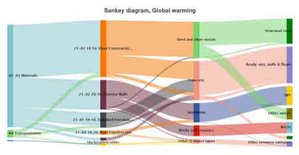


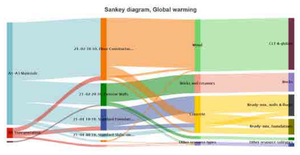




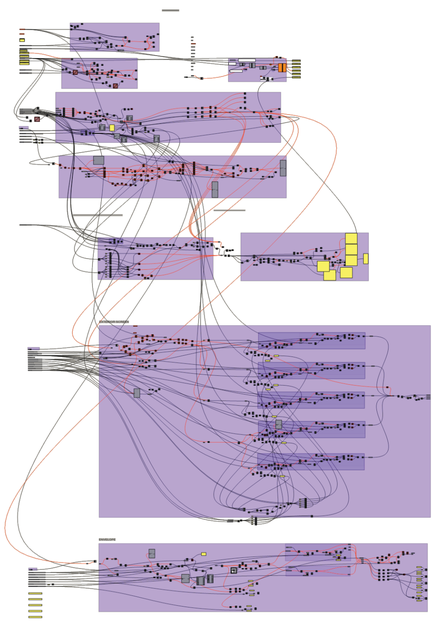
EARLY ENERGY ANALYSIS

2070 PREDICTED NYC CLIMATE CONDITIONS





STANKEY DIAGRAM - BASELINE VS. LOW CARBON ANALYSIS



PARAMETRIC MODEL FOR BUILDING MASSING/FENESTRATION

MODEL DESCRIPTION

This 300,000 square foot mixed-use tower is located in Hunt's Point, New York City, a heavily industrialized and low-income area of the Bronx. Although home to the world's largest wholesale food distribution center in the world, the area has few food or communal amenities to serve it's lower-income population. This tower, in addition to being carbon neutral, aims to be a community hub for local area residents with large urban gardens, community gathering spaces, and other amenities for both the residents of the building and the larger neighborhood, including a child-care and preschool center. In addition, all units are designed with efficiency and economy in mind. Most range between 500-800 square feet and aim to serve the lower income residents of the area. The building is sited on a leftover and forgotten slice of land, positioned between railroad tracks and a highway to one side and a main local thoroughfare on the other. To respond to these very different site conditions, the train-facing side of the building is built of a masonry wall construction to mitigate extraneous noise and vibration, while the southeast facing wall, inspired by local warehouse architecture, is composed of a more delicate timber and window assembly to capture maximum solar energy and daylight. Large communal gardens are planted on the rooftops of the podium level, providing both food to local residents and learning tools for the building's preschool, while "sky gardens" - heavily planted green areas at higher terraces - offer both experiences of nature and dramatic views through and out of the building. The primary vertical circulation core is open air, reducing the heading/cooling load significantly and allowing for natural ventilation to circulate through units. The building employs a variety of different energy harvesting and storing strategies, including solar panel integrated horizontal louvers, a sewer heat recapture system, a piezoelectric ceramic pad beneath the adjacent rail tracks to capture vibrational energy. The building incorporates battery storage located in the mechanical room on the second level for resiliency measures of providing electricity to necessary loads during power outages and protecting the equipment during extreme weather events.

ENERGY SAVING STRATEGIES

- Extensive parametric modeling in Grasshopper and Excel engendered a building massing that - through it's natural orientation and geometry - allows for significant energy savings.
- Extremely narrow residential floor plates with an open-air circulation core between allow for deep light penetration and cross-circulation for natural ventilation in units.
- Horizontal solar louvers on the southeast facade both bring a greater amount of light into rooms and provide enough energy to make the building carbon neutral.
- The Southeast curtain wall and structure extends an additional 80' beyond the top occupied unit, which provides both a dramatic architectural expression and an additional large area for solar panels.
- Green roofs on the podium greatly reduce the urban heat-island effect and reduce runoff through rain absorption
- An urban garden both provides food for residents and produce for the two on-site restaurants.
- Vertical brick "fins" on the southwest facade provide natural vertical louvers, reducing glare in those units through integrated architectural elements.
- A piezoelectric ceramic pad is installed beneath 1500' of train tracks on the Northwest side of the building, providing energy through vibration from trains passing by.
- Waste heat is captured from sewer lines below to provide heat for the building.
- A heavy-timber structure greatly reduces footing requirements and provides a low-carbon alternative to steel or concrete.