BUILDINGENERGY NYC


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Northeast Sustainable Energy Association (NESEA)
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September 15, 2022
Building Energy NYC
The Buildings of Excellence (BOE) Design Competition was initiated by NYSERDA in 2019 to recognize and reward the design, construction, and operation of carbon-neutral multifamily buildings that are healthier, more comfortable, and more resilient.
Design Quality & Co-benefits Takeaways

1. Occupant Demographics
   Many design teams aimed to support specific disadvantaged communities, such as formerly housing challenged, low-income seniors, and people with chronic illnesses.

2. Adaptive Reuse
   Teams noted the importance of including a Passive House consultant and a properly trained general contractor in the early design phases.

3. Site Context
   Most Round 1 projects are located within walking distance of public transportation and/or provide access to community amenities and resources.

4. Occupant Health, Comfort, and Productivity
   All projects were designed to deliver a higher indoor environmental quality of living.

5. Resiliency
   Round 1 resiliency features include maintaining stable internal temperatures, planning for electrical power outages, providing continuous access to clean water, and more.
Occupant Demographics

31 of the 42 Round 1 and 2 projects provide LMI housing

- Reducing the risk of air quality related health problems for residents and community
- Providing services, such as health clinics, day care, and job training
- Offering community facility space
All Round 1 projects were designed to deliver a higher indoor environmental quality of living.

- Eliminate risks of onsite emissions
- Filtered ventilation
- Thermal comfort
- Quieter spaces, better acoustics
- Daylighting and visual comfort
- Promoting active lifestyles
- Addressing mental health
Indoor Air Quality

Tighter envelopes require careful ventilation design, resulting in enhanced indoor air quality.

Benefits:
• Support occupants with pre-existing conditions (e.g., asthma)
• Protect occupants from outside pollution
• Reduced airborne illness transmission
• Reduced risk of mold/ mold formation

Strategies:
• IAQ monitoring
• Energy recovery ventilation
• Advanced filtration (e.g., MERV13)
• Compartmentalization
• Low-VOC finishes
• Reduced contaminants (e.g., lead, radon mitigation)
• Limited combustion
Resiliency

Round 1 and Round 2 projects incorporate many different aspects of resiliency, with a general focus on:

- Stable internal temperatures in extreme weather
- Planning for electrical power outages through tight envelopes, onsite back up power and storage
- Providing continuous access to potable water
- Storm water management
- Siting critical systems above the 500-year flood plain
- Urban heat island reduction
- Food security (community gardens)
**Goals and Motivations**

The most frequently stated goals were to create a building that enhances the lives of residents and provide more affordable housing.

**Integrated Teams**

Integrated and experienced project teams are critical to the success of high-performance design and construction.

**Design Feasibility**

Passive House design is possible in urban areas and high-rise construction, and is a feasible practice for the LMI rental market.

**Replicability**

Project teams with a focus on replicability note the importance of creating models for future developments to create a pathway for others to follow.
Replicability Strategies

All Round 2 projects are aiming for all-electric design. Other strategies:

- Integrated, experienced teams
- Shortening learning curves
- Simple, replicable design
- Design tradeoffs
- Cost-effective systems
- Quality installation and commissioning
# Design Energy & Carbon Emissions Takeaways

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<tr>
<th>1</th>
<th>Understanding Tradeoffs</th>
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<td>Design and performance of envelopes, HVAC, and PV systems are all interdependent</td>
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<th>Energy Modeling</th>
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<td>Early design modeling allows integrated teams to iteratively design to find the best balance of performance and cost effectiveness</td>
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<th>Passive Design</th>
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<td>Passive design strategies can capture solar energy in the winter and shade in the summer to lessen the use of mechanical or electrical devices</td>
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<th>4</th>
<th>Embodied Carbon</th>
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<td>Projects can use design strategies to reduce embodied carbon or minimize construction and material waste</td>
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Passive Design

All projects focused on a high-performance envelope, which is central to Passive House design:

• Willingness to design innovative wall assemblies.
• Focus on very tight construction, low U-factors, avoiding thermal bridging, and moisture concerns (both during and after construction).
• Simple roof and foundation designs, with familiar designs that are easy to quote and install.
• Balance labor and material costs, ease of installation, and durability.
• Common solutions: Prefabricated elements, double or triple pane low-e windows, exterior shading for passive solar design
Embodied Carbon

Most Round 1 and all Round 2 projects implemented embodied carbon reduction strategies, including:

- Adaptive reuse
- Material selection
  - Locally sourced materials
  - Concrete mixes
  - FSI certified wood
  - Envelope assemblies (e.g., foam removal)
- Reduced GWP refrigerants
- Labeling systems (e.g., Red List and Environmental Product Declarations)
- Embodied carbon calculators
Thank you!

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BOE Case Studies:
https://www.nyserda.ny.gov/All-Programs/Multifamily-Buildings-of-Excellence/Winners/Resources
THE RISE – CONTEXT

VITAL BROOKLYN INITIATIVE - SITE J

NY State’s comprehensive community development strategy to address social, economic, and health disparities in Central Brooklyn

8 Integrated Areas of Investment

- Affordable Housing
- Open Space & Recreation
- Healthy Food
- Economic Development & Job Creation
- Education & Youth Development
- Community-based Healthcare
- Violence Prevention
- Resiliency
Xenolith Partners LLC
Community Preservation Corporation
Community Solutions/
Brownsville Partnership

Women’s Prison Association
Osborne Association
Community Capacity Development
Brownsville Think Tank Matters
Spin City Brownsville Plus
Project EATS

Magnusson Architecture and Planning
Bruno Frustaci General Contracting
Bright Power
THE RISE - PROJECT OVERVIEW

- **76,000+ SF new mixed-use building**
- **72 units of affordable housing**
  - 65% supportive for formerly incarcerated individuals & families
  - 35% affordable for households earning 30%-60% AMI
- **13,000+ SF community facility space**
  - On-site Supportive Services
    - Women’s Prison Association & The Osborne Association
    - Local organizations:
      Education, job readiness, employment training, violence reduction, health/wellness, fitness, arts, gardening
      - Community Capacity Development
      - Brownsville Think Tank Matters
      - Spin City Brownsville Plus
- **7,000+ SF green space - rooftop farm/garden**
  - Project Eats
- **3,000 SF One Brooklyn Health System (office)**

- Design Principles: Sustainability, Trauma Informed Design, Design for Health & Wellness, Active Design, Universal Design
PRINCIPLES OF THE NEW NORMAL

5 CORE PRINCIPLES OF HEALTHY, EFFICIENT, DURABLE, AND SUSTAINABLE BUILDINGS:

- **Continuous, Robust Thermal Control**: Most basic level of energy efficiency, hold on to the heat you've paid for.
- **Air Tightness**: Next level of thermal control, necessary to truly ensure energy efficiency.
- **Energy Recovery Ventilators**: Fresh air is critical for air tight buildings. Without this measure owners risk mold and resident respiratory issues. Added benefit recovers additional energy for use.
- **Efficient Electrification and Loads**: If building an air tight structure and using technologies like ERVs, electrification can be cost effective for developers and healthier for residents.
- **Healthy Materials**: There are good choices and bad ones for materials. Everything from paint and caulk to flooring and counter tops can impact the health of residents and ecosystems.

**Vs. CODE MIN**

- **Without Thermal Control**: Heat escapes through exterior.
- **Without Air Sealing**: Conditioned air passes through exterior and water/moisture infiltrates causing damage (durability issues) and mold growth (health issues).
- **Without Fresh Air Supply**: Stale/used air pulled from corridors, other apartments and through exterior walls. "Air change" not achieved. Unhealthy levels of CO2 and poor humidity control.
- **Natural Gas**: Gas combustion produces a variety of pollutants which can lead to and worsen respiratory diseases.
- **Unhealthy Materials**: Materials can leach or off gas endocrine and hormone disrupting chemicals. They can damage lungs, hearts, nervous and immune systems and increase embodied carbon.
CURRENT CODE

NON-AIRTIGHT ENCLOSURE + EXHAUST ONLY VENTILATION =

“FRESH AIR” FROM LEAKY WALLS!

IMAGE SOURCE: BUILDING SCIENCE CORP
AIRTIGHTNESS + BALANCED VENTILATION
**THERMAL ENVELOPE**

**Triple Pane Windows**
- U 0.10 (COG)
- SHGC 0.32
- Window/Wall Ratio:
  - 24% at Residential
  - 35% with Community Facility

**Thermal insulation**
- Above Grade Wall R20 (U=0.05)
- Roof R50 (U=0.02)
- Foundation Wall R16 (U=0.06)
- Below grade slab – no insulation

**Thermal bridges**
- Thermal pads
- Aerated concrete block
- Stand off clips

**Air sealing**
- 0.033 cfm/sf enclosure
TERRACE DETAIL

- R50 HFO XPS insulation and IRMA roofing
- Autoclaved aerated concrete
- Thermal pad at sunshade thermal point connection
- Standoff Clip
- UPVC storefront
- R20 stone wool insulation
- Aluminum storefront door
- R50 HFO XPS insulation
- Autoclaved aerated concrete
- IRMA roofing
- Standoff Clip
- High PSI thermal break material
HVAC/REFRIGERANT MANAGEMENT

HORIZONTAL DISTRIBUTION
(ex. heat recovery)

19,500 LF (5,749,000 kgCO2e)

VERTICAL DISTRIBUTION

9,500 LF (2,800,000 kgCO2e)
MATERIALS/EMBODIED CARBON

Locally produced as much as possible
• Aggregate for concrete

Recycled content as much as possible
• Gypsum – Recycled content info
• Structural Steel – avg 25% Recycled Content

Construction waste management
• Min. 75% diversion rate

Alternate Materials
• Stone wool and in lieu of typical XPS insulation
• Reduce the cement in concrete, CMU and precast plank: Increase curing time, Alternate SCMs (Slag)

Material Transparency
• Calling for EPD in specs
INDOOR ENVIRONMENTAL QUALITY

**Ventilation**
- ERV – balanced filtered fresh air

**Contaminant control**
- No interior combustion
- Smoke free building
- Walk off mats at entrances
- Apartment Compartmentation

**Healthy Materials**
- No/Low VOC
- FloorScore or Green Guard finishes
- Calling for HPD in specs
- Solid surface
- Simplified material palette
INTERIOR

RESIDENTIAL ENTRY LOBBY

COMMUNITY ROOM AT TERRACE
PERFORMANCE

SOURCE ENERGY USE INTENSITY (EUI)
(w/o renewables)

Goals for Building As Proposed: 21.26 kBtu/sf/yr
1.80 kgCO₂/sf
SITE EUI: 17.25 kBtu/sf

Avg NYC Multifamily Bldg: 112 kBtu/sf/yr
Code Building (2020): 90 kBtu/sf/yr
PHIUS Primary Energy: Approx 34 kBtu/sf/yr
PHI Primary Energy: Approx 23.3 kBtu/sf/yr
LL97-2024 limit: 6.75 kgCO₂/sf
LL97-2030 limit: 4.07 kgCO₂/sf

Certification Goal: PHI
ENGINE 16
223 EAST 25TH STREET
MANHATTAN, NY
Passive Firehouse Retrofit

TEAM
MICHAEL INGUI, AMY FAILLA, JOEY CHEMELLO, ASHLEY GRIFFITH, Baxt Ingui Architects
R SUTTON & CO., General Contractor
KEVIN BRENNAN, Brennan & Brennan Air Sealing
ROBERT DIVILIO, RJD ENGINEERING, Mechanical
ED MAY AND JOHN MITCHELL, BLDTYP, Passive House Consultants
A SYSTEMATIC APPROACH TO COST-EFFECTIVE CARBON NEUTRAL BUILDINGS

BAXT INGUI’S SYSTEMATIC APPROACH INCLUDES THESE CRITICAL STEPS:

1. Educating the client on passive house in an effective way.
2. Involving the passive house consultant before or during schematic design.
3. Start the certification process with your certification body early and harness their feedback as early as possible.
4. Select and involve a contractor as early as possible, and get them and their team certified/trained.
5. Hold weekly meetings.
6. Use the blower door as a tool.
7. Openly share knowledge & receive feedback with the community.

SCHEMATIC DESIGN PHASE ENERGY MODEL OF SUMMER PERIOD WINDOW NET ENERGY BALANCE. COURTESY OF BLDGTYP, LLC.
COLLABORATIVE PROCESS + EDUCATIONAL EVENTS
1. NYSERDA Buildings of Excellence has given us a platform to increase our efforts to share information on our Passive House process.

2. The program was right for our clients because it provided the support they needed to complete their project and achieve their goal of spreading Passive House.
ENGINE 16

1. PHOTO: CIRCA 1950
2. PHOTO: CIRCA 1925
3. RENDERING, PROPOSED FRONT FACADE
CREDIT: PERSPECTIVE ARTS
NOTES
1. PLOT PLAN (PROPOSED)
2. SITE PLAN CONTEXT
3. PHOTO: SIDE ELEVATION

LEGEND
- 223 E. 25TH
- SUBWAY STOP
- BUS STOP
- CITIBIKE STOP
- RESTAURANT/BAR/ENTERTAINMENT (WITHIN HIGHLIGHTED AREA)
- PARK
- PUBLIC FACILITIES + INSTITUTIONS (INCLUDING NYU, BARUCH COLLEGE, SVA)

ENGINE 16 | 223 E. 25TH
FRONT FACADE ELEVATIONS

- Decommissioned firehouse building, converted into a church in 1974.
- Ground floor was used for religious facilities while upper floors fell into disrepair.
- New owners purchased in 2018.
- Adaptive reuse project as a 4-family residence with a community facility on the ground floor.
REAR FACADE ELEVATIONS

1. PHOTOS: EXISTING REAR FACADE (NORTH FACING)
2. ELEVATION: EXISTING REAR FACADE (NORTH FACING)
3. ELEVATION: PROPOSED REAR FACADE (NORTH FACING)
HISTORIC + RESTORED ELEMENTS

1. HISTORIC FIREHOUSE HOSE HOOPS
2. FRONT ADDITION EMULATES HISTORIC CAST IRON
3. HISTORIC WOOD RAILINGS
4. REPURPOSED WOOD FLOOR JOISTS
5. RESTORED WOOD FLOORING
6. HISTORIC STEEL RAILING
7. HISTORIC WINDOWS
8. HISTORIC FIREHOUSE HOOPS
9. RESTORED TIN CEILINGS
EXISTING CONDITIONS: FAÇADE DETAILS
EXISTING CONDITIONS: ADAPT + REUSE

1. EXISTING 2ND-3RD FLOOR STAIRCASE
2. WINDOWS AND DOORS TO BE REUSED
3. EXISTING WOOD FLOORING, PRIOR TO SANDING
PROGRESS PHOTOS: UNCOVERING + RESTORING

1. FIRE COAT HOOKS
2. FLOORS AFTER SANDING
EXISTING + PROGRESS PHOTOS: TIN CEILINGS
PASSIVE DETAIL: FIRST FLOOR GARAGE
SKETCHES: ORIGINAL ENTRY STAIR

1. PHOTO: EXISTING STEEL RAILING AT ENTRY
2. SKETCH: RESTORED STEEL RAILING
3. PROPOSED ENTRY STAIR WITH RESTORED RAILINGS
PROGRESS PHOTOS: ORIGINAL ENTRY STAIR
WINDOW DETAILS

1. WINDOW INSTALL DETAIL: AXON
2. WINDOW INSTALL DETAIL: PLAN + SECTION
3. WINDOW JAMB (FIXED) THERMAL ANALYSIS
4. WINDOW JAMB (OPERABLE) THERMAL ANALYSIS
5. WINDOW HEAD THERMAL ANALYSIS
6. WINDOW SILL THERMAL ANALYSIS
7. PHOTO: WINDOW WELLS PREPPED FOR INSTALL
UNIT 4 TRIPLEX

FEATURES

- 3829 SF TRIPLEX
- 4 BEDROOM, 4 FULL BATHROOMS, 2 POWDER ROOMS
- MASTER SUITE W/ WALK-IN CLOSET
- BONUS OFFICE OR GUEST ROOM
- LAUNDRY ROOM
- 2 PRIVATE ROOF DECKS
- INTERIOR STAIR TO ROOF WITH PRIVATE BULKHEAD CREATES MULTILEVEL SPACE
- INDIVIDUAL ROOM TEMP CONTROL
- TALL CEILINGS AND ABUNDANT NATURAL LIGHT
- DISHWASHER
- RECLAIMED WOOD FLOORS

NOTES

1. AXON
2. SECTION
3. THIRD FLOOR PLAN
4. FOURTH FLOOR PLAN
5. FIFTH FLOOR PLAN
6. SIXTH FLOOR PLAN AND ROOF
PUBLIC + PRIVATE EXTERIOR SPACES

1. ROOF KEY PLAN
2. FRONT ROOF DECK RENDRING
3. UNIT 4 STAIR SKETCH
WALL AND ROOF DETAILS

1. THIRD FLOOR THRESHOLD THERMAL BRIDGE ANALYSIS
2. FIFTH FLOOR THRESHOLD THERMAL BRIDGE ANALYSIS
3. FIFTH FLOOR THRESHOLD THERMAL BRIDGE ANALYSIS

THERMAL BRIDGE ANALYSIS COURTESY OF ED MAY AT BLDGTYP, LLC
UNIT 3 DUPLEX

FEATURES

- 1,165 SF DUPLEX
- 1 BEDROOM, 2 BATH
- DOUBLE-HEIGHT SPACE WITH BONUS MEZZANINE SPACE
- LAUNDRY CLOSET
- INDIVIDUAL ROOM TEMPERATURE CONTROL
- 13' TALL CEILINGS
- LARGE WINDOWS, ABUNDANT NATURAL LIGHT
- DISHWASHER
- RECLAIMED WOOD FLOORS

NOTES

1. AXON
2. SECTION
3. THIRD FLOOR PLAN
4. FOURTH FLOOR PLAN
5. RENDERING: STAIR AND LOFT SPACE
6. PHOTO: UNIT 3 SITE PROGRESS
RETROFIT AIR SEALING DETAILS
CELLAR + 1ST FLOOR PLANS: COMMUNITY SPACE

1. CELLAR PLAN
2. FIRST FLOOR PLAN
3. CELLAR COMMUNITY CENTER AREA = 1113 SF
4. FIRST FLOOR COMMUNITY CENTER AREA = 1400 SF
PROGRESS PHOTOS: CELLAR
ALL-ELECTRIC MECHANICAL UNITS + AMENITIES

1. CONDENSER UNITS: FUJITSU HEAT PUMPS (SEE MECH. PLANS FOR SPECS)
2. ERV: ZEHNDER COMFOAIR 550 ERV
3. WATER HEATER: SANDEN HEAT PUMP
4. ERV: VENTACITY
5. MOTORIZED ROLLER SHADES
6. AIR HANDLERS: WALL-MOUNTED FUJITSU (SEE MECH. PLANS FOR SPECS)
7. COMMON BIKE STORAGE
8. COMMON RECYCLING
9. COMMON COMPOSTING
10. AIR HANDLERS: CEILING-MOUNTED FUJITSU (SEE MECH. PLANS FOR SPECS)
11. PYRAMID SKYLIGHT: LAMILUX
12. PHOTOVOLTAIC SOLAR ARRAY

ALL-ELECTRIC MECHANICALS, ALLOWING ENGINE 16 TO BE FREE OF FOSSIL FUEL USAGE.
SITE UPDATE: WINDOW DELIVERY

1. WINDOWS DELIVERED IN A SHIPPING CONTAINER
2. UNLOADING THE WINDOWS, CARTING THEM THROUGH THE GARAGE DOORS
3. UNLOADED WINDOWS
4. USING A DOLLY TO TRANSPORT WINDOWS
SITE UPDATE: MECHANICAL CHASE WALL AND INTELLO BARRIER
THANK YOU!