TALLEST BUILDING IN BOSTON DESIGNED TO ACHIEVE
ZERO NET ENERGY
LEED V4 PLATINUM
100% RENEWABLE ELECTRICITY

HEALTH + WELLNESS
Optimized daylight + views
Glare control from exterior shades and interior blinds
Thermal comfort from triple glazing inertible climaice connects nearly every floor
Generous social and public spaces

TRANSPORTATION
Ideal alternative transportation location (bus, bike, secure bike storage, walk)
126 parking spaces removed (existing site is a parking lot)

RESILIENCE
First floor raised 21’-0” Boston City Base with “bathtub” foundation
Generators support life safety and basic building operation, including heating

WATER EFFICIENCY
35-40% indoor fixture water
70% cooling tower water consumption, due to geothermal

PROJECT TEAM
KPMB Architects
BR+A
Haley & Aldrich
Richard Burck
Dot Dash
Transsolar
The Green Enginee
Nitsch Engineering
Seaburn Engineering
Jensen Hughes
Entuitive + LeMessurier
Suffolk Construction

BOSTON UNIVERSITY CENTER FOR COMPUTING AND DATA SCIENCE
Boston, MA

1,500 FT DEEP CLOSED LOOP
GEOTHERMAL

100% Electric
DOAS
ACTIVE CHILLED BEAMS
EXTERIOR SHADING
FAN COILS
TRIPLE GLAZING

100% RENEWABLE ELECTRICITY
LEED V4 PLATINUM
100% RENEWABLE ELECTRICITY

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36
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ON-CAMPUS SOLAR
OFF-CAMPUS WIND

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DARTMOUTH COLLEGE
ARTHUR L. IRVING INSTITUTE FOR ENERGY AND SOCIETY

Project Description
The 51,000 GSF project, scheduled for completion in 2021, will be the first permanent home for the Irving Institute for Energy and Society. Its design demonstrates and expresses the building’s high-performance while creating a space for interdisciplinary research that focuses on advancing an affordable, sustainable, and reliable energy future for the benefit of society. The institute is a hub of collaboration that brings together multiple different users: institute researchers, the Thayer School of Engineering and Tuck School of Business, the Campus Sustainability Office, the Field Library, and students moving to and from Murdough Center, to which it connects. The main atrium acts as a public living room that provides opportunities for users to formally and informally connect.

Design Objectives
• Design a building that is a global benchmark for innovation and high-performance design.
• Express the energy/sustainability theme in creative and appropriate ways.
• Respond to the site context and respect the aesthetic of other campus buildings.
• Provide places of transparency to place learning and activity on display.
• Integrate landscape and building to improve and promote accessibility through the campus.
• Optimize building efficiency and reduce energy consumption to achieve an Energy Use Intensity (EUI) of 20 or below.

Integrative Design
Dartmouth College and the Irving Institute are committed to creating a sustainable building that promotes and facilitates the research of energy science. The building embodies these goals through its integration of active and passive systems for managing thermal, daylight, and ventilation comfort while also adhering to a strict list of healthy and environmentally friendly materials.

Design Team
ARCHITECT Goody Clancy
ARCHITECT VANZELM Engineers
STRUCTURAL ENGINEER LeMessurier
MEP/FP ENGINEER van Zelm Engineers
CIVIL ENGINEER Engineering Ventures
LIGHTING HLB Lighting Design
LANDSCAPE ARCHITECT Michael Van Valkenburgh
ACoustIC/AV/VIBRATION Acentech
CODE Goody Clancy
ACOUSTIC/AV/VIBRATION Acentech
CODE Goody Clancy

Projected Building Performance
• LEED Targets: Platinum (current LEED score 84)
• Energy Target: 20 kBTU/sf/yr
• Projected Energy Use Intensity: 18.6 kBTU/sf/yr
• Projected Energy Generation: 26.9kBTU/sf/yr
• Net Projected Energy Use Intensity: 83/110
• Net Projected Energy Use Intensity: 83/110

LEED and the 2030 Commitment
The project is aiming to achieve LEED Platinum Certification. Currently the project is tracking 83 points. Many of these points are derived from the reduction of indoor and outdoor water use, optimized energy performance via the double-skin facade, radiant ceilings, and natural ventilation systems, and renewable energy generated from PV panels.

Embodied Carbon
Goody Clancy is signatory to The AIA 2030 Commitment and this project is moving ahead of the 2030 target through 2025 at 90% reduction from the baseline.

Regional Priority
Innovation
Indoor Environmental Quality
Materials & Resources
Energy & Atmosphere
Location & Transportation

LEED Facts
LEED BD+C for New Construction (v4)
Projected: LEED Platinum 83/110

Embodied Carbon
The architectural team is conducting Life Cycle Assessment using Tract and also pursuing LEED credits for reductions to the building’s embodied carbon and other environmental impacts.

Embodied carbon will be reduced through concrete mix design, use of recycled steel, and careful selection of architectural materials such as insulation.

Natural Ventilation System
• Air enters through south and east facades
• Exhaust air transfers into facade
• Operable shading responds to solar angle
• Air exhausted through various groups of double skin and atrium
• Dark sloped roof from exhaust
• Exhaust fan used during fan-assisted natural ventilation mode and for fan assisted or smoke-exhaust
• Control dampers open during passive ventilation or in smoke exhaust mode; closed during rain or snow
• All exhaust through exterior-vertical louvers
• Air enters through south and east facades
• Exhaust air transfers into facade
• Operable shading responds to solar angle
• Air exhausted through various groups of double skin and atrium
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• Control dampers open during passive ventilation or in smoke exhaust mode; closed during rain or snow
• All exhaust through exterior-vertical louvers

Daylighting
• Atrium Skylight provides natural daylight throughout and is completely visible to the sky above and built PV arrays
• Atrium clerestory window provides supplementary natural daylighting to the atrium and integrates with views to the landscape beyond.

Goody Clancy
ARCHITECTURE / PLANNING / PRESERVATION

18.6kBTU/sf/yr
Net projected energy use of proposed building

88% Reduction
in overall energy use of proposed building from 2030 baseline

700,000kg CO₂
Global warming potential offset from the structural system and interior materials

91% of work areas receive natural daylight (sCO₂equiv.)

83% of work areas are served by natural ventilation
This project sets a new standard for school design and high-performing buildings. Completed in August 2019, it is designed as the first Net Zero Emissions school in Massachusetts. The project was the pilot for the City of Cambridge’s Net Zero Action Plan which defines NZE as an all-electric building whose energy use is offset through renewables. The 270,000 sf building includes an elementary school, middle school, school district administration, preschool, public library, public pool, and parking garage. The building was designed to push the envelope on net zero, occupant wellness, site impact, water, and resilience. Despite the heavy daily and year-round use, an ultra low EUI is achieved via innovative space planning strategies, occupant engagement, groundsource heat pumps supplying radiant heating and cooling, displacement ventilation with demand control CO2 sensors, above code r-value, DOAS, daylight controls, LED lighting, and point-of-use hot water. Renewable energy is generated by roof, façade, and sunshade mounted PV, as well as, solar thermal hot water for kitchen use and radiant loop. Water efficiency measures include low flow fixtures and rainwater harvesting for toilet flushing and irrigation.

King Open / Cambridge Street Upper Schools & Community Complex

NET ZERO EMISSIONS / LEED V4 SCHOOLS PLATINUM (pending)

PROJECT TEAM
Client: City of Cambridge
Architects: William Rawn Associates, Architects
Arrowstreet Architecture & Design
MEP/AV Engineer: Garcia, Galuska & DeSousa
Energy Consultant: In Posse
Structural Engineer: LeMessurier Consultants Inc.
Civil Engineer: Nitsch Engineering
Landscape: Copley Wolff Design Group
LEED Consultant: Soden Sustainability
Acoustics / AV: Acentech
Construction Manager: W.T. Rich / KBE Joint Venture

25 pEUI
72% energy reduction over 2030 baseline
190 geothermal wells
1,300 MWh PV
100% water reduction
NIXON PEABODY
53 STATE STREET, BOSTON, MA

20.4% ENERGY COST REDUCTION
from baseline for 22 of 25 available points in Optimize Energy Performance

35.82% WATER USE SAVINGS
estimated to annually save
156,351.26 GALLONS/YEAR
against baseline conditions

ENHANCED REFRIGERANT MANAGEMENT
in kitchen equipment with zero Ozone Depletion Potential and low Global Warming Potential

LOW VOC
and low emitting finishes for healthier indoor air quality

20% Improvement over ASHRAE standards

PROJECT INFORMATION
Owner: Nixon Peabody
Construction Manager: Structure Tone
Architect: Gensler
Engineer: Vanderweil
Project Manager: Newmark Knight Frank
Sustainability Consultant: The Green Engineer
Total Size: 105,507sf
GERDING EDLEN is a national leader in sustainable real estate, creating high quality properties that positively impact tenants’ lives and the environment. In 2016, Gerding Edlen acquired Neponset Landing, a 280-unit apartment building, originally built in 2007. Gerding Edlen successfully executed a sustainability plan which included building system improvements, a sustainable operations platform, and tenant engagement programs. From the beginning, achieving green building certifications was an important goal of the project. In 2018, Neponset Landing received both LEED Gold and ENERGY STAR certification.

LEED V4 O&M

In December 2018, Neponset Landing became one of the first existing multifamily properties in the country to earn LEED Gold certification under LEED v4 O&M. The property was certified with a building performance score of 71 and as of September 2019, the property has a LEED Platinum score of 81.

ENERGY PERFORMANCE

Overall energy performance has continually improved under Gerding Edlen’s ownership. In 2018, Neponset Landing used 13% less energy compared to 2017 and 31% less energy compared to similar buildings in similar climate zones. Additionally, the building’s ENERGY STAR score improved from 83 in May 2018 to 97 in September 2019, a total of 14 points (certification for 2019 is pending).

ENERGY OPTIMIZATION HIGHLIGHTS

A combination of energy optimization efforts at Neponset Landing helped to transform the property:

- A real-time utility monitoring system was installed in early 2018.
- An energy audit baselined current performance and helped identify energy-saving opportunities.
- Retro-commissioning focused on optimizing mechanical, electrical and plumbing system performance through a careful review of operational set points.

SUSTAINABLE OPERATIONS & TENANT ENGAGEMENT

Gerding Edlen recognizes the connection between daily actions of building users and the building’s overall environmental footprint.

- Operational policies around landscaping, purchasing, building renovations and janitorial services were implemented with the goal of minimizing environmental impact and conserving resources.
- Tenant engagement initiatives such as web-based gamification and water efficiency challenges have been implemented to encourage behavior change and increase awareness around green building practices.
Project Description

Fort House is the latest demonstration by Placetailor of what can be accomplished with a mission-driven, vertically-integrated company. This “Future Proof Housing” is designed according to the team’s typical standard of low impact, resilient, healthy, and community-oriented buildings. It meets criteria for Net Zero Energy (as defined by the 2019 USGBC report: Zero Energy Buildings in MA). Zero Emissions (as defined by Boston Department of Neighborhood Development), and is Net Carbon Positive from operations through materials and construction footprints.

The project is located in the Fort Hill neighborhood of Roxbury, and continues a decade-long effort here to maximize home ownership opportunities for long-time residents. Fort House contains 5 condos, each with 3 bedrooms and averaging 1700sf each. Private roof decks take advantage of views to the Fort, to Mission Hill, and beyond to the Boston Skyline.

The project utilizes a challenging site with intense grade change, including an existing 20’ granite retaining wall. An extensive stormwater retention system, designed for 100-year storms, drastically reduces runoff to the old wall and to neighboring properties. Heat and drought resistant plants are used to combat unknown future weather patterns, while helping to screen unwanted solar heat gain.

Fort House is highly resilient. Passive House level construction allows for “passive survivability” in an extreme event where no power is available. Additionally, the photovoltaic array covers 75% of regular energy loads, including 100% of all critical systems. Carbon offsets will be purchased annually through the HDO if necessary at the end of the year. Materials were selected to minimize GHG impacts. The construction team is primarily from the neighborhood, which means minimal daily commuting from home to the job site, which can typically account for a majority of construction-related carbon footprints.

Project Info

Typology: Multi-family Residential, 5 or more units
Status: To be completed Fall 2019
Unit Count: 5 units
Number of Occupants: 20
Project Location: Roxbury, MA, 02120
Design Energy Code: IECC-2015
Gross Square Footage: 8,652

Zero Carbon Building & Energy Modeling Results

Baseline US National Average EUI for Similar Projects: 85kBtu/sf/yr
2030 EUI Target: 25.5kBtu/sf/yr (75% Carbon Reduction)
CIF House pS11: 21.5kBtu/sf/yr (75% Carbon Reduction)
This means CIF House uses 75% less carbon on site than other buildings of similar typology. 25% remaining curbed with offsets.

Passive House Requirement

1. Space Energy is electricity pulled from the grid. The grid has an energy loss factor of 25%. The actual annual energy used by Fort House is 60% (85kBtu/sf/yr)
At the heart of Worcester Polytechnic Institute’s pedagogy is project-based, hands-on, collaborative problem solving learning. With this modern approach, WPI leaders identified the need to create new academic space that differed from the traditional classroom style learning. The Foisie Innovation Studio + Messenger Residence Hall will inspire new generations of students through the use of innovative design that engages community learning in unexpected ways.

The design of the new building was an integrated process between Gensler, Arup, WPI’s Office of Sustainability, and a student stakeholder group. The result is a high-performance building envelope and mechanical system that will reduce energy costs by 50%. A daylight modeling optimization process and the use of skylights and LED lighting contribute to the 0.48 watts/sf lighting power density, a 56% reduction from baseline.

Other sustainable attributes of the design and construction process include: 54% reduction in outdoor water use based reduced turf and more ground cover, 37% reduction in interior water use based on high efficiency air cooled chillers, 70% local and 25% recyclable materials were used, and 80% of construction and demolition waste was recycled or diverted from the landfill.

Energy Use Intensity (EUI): 51.00  Lighting Power Density (LPD): 0.48