**Project Description**

This $13,000 USD project, scheduled for completion in 2023, 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 Feldberg Center, and students moving to and from Memorial Library. It is a public living room that provides opportunities for users to formally and informally coalesce.

**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 aesthetics 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.

**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. Goody Clancy is a signatory to The AIA 2030 Commitment, and this project is tracking ahead of the 2030 target through 2025 at 90% reduction from the baseline.

**Embodied Carbon**

The architectural team is conducting Life Cycle Assessment using Energy-7 to develop the LEED credits for reductions to the building’s embodied carbon and other environmental impacts. The architectural team is conducting Life Cycle Assessment using Energy-7 to develop the LEED credits for reductions to the building’s embodied carbon and other environmental impacts. Embodied carbon will be reduced through concrete mix architectural materials such as insulation.

**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.

**Projected Building Performance**

- **LEED Target:** Platinum (current LEED score 83)
- **Energy Target:** 20 kBTU/sf/yr
- **Projected Energy Use Intensity:** 26.9 kBTU/sf/yr (not including PV)
- **Projected Energy Generation:** 125,105 kWh/yr
- **Net Projected Energy Use Intensity:** 18.6 kBTU/sf/yr

**Natural Ventilation System**

- Air enters through south and east facades
- Dark sloped roof heats exhaust air
- Upblast fan used during fan-assisted ventilation or smoke exhaust
- Operable shading responds to solar angle
- Dark impacted wall vents exhaust on control for natural and fan-assisted ventilation mode
- All exhaust through exterior vertical louver
- All exhaust through exterior vertical louver
- Atrium clerestory window provides supplementary natural daylight into the building and an atrium area with views to the landscape beyond

**Daylighting**

- Atrium skylight provides natural daylight (sDA)
- Work areas receive natural daylight (sDA)

**LEED Facts**

**LEED BD+C for New Construction (v4)**

- **Energy & Atmosphere:** 33/33
- **Indoor Environmental Quality:** 10/16
- **Materials & Resources:** 8/13
- **Sustainable Sites:** 8/10
- **Location & Transportation:** 5/16
- **Innovation:** 6/6
- **Regional Priority:** 4/4

**Projected Building Performance**

- **Energy Target:** 20 kBTU/sf/yr
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- **Net Projected Energy Use Intensity:** 18.6 kBTU/sf/yr

**18.6 kBTU/sf/yr**

Net projected energy use of proposed building

**88% Reduction**

in overall energy use of proposed building from 2030 baseline

**700,000 kg CO₂**

Global warming potential offset from the structural system and interior materials

**83%**

of work areas are served by natural ventilation

**91%**

of work areas receive natural daylight (sDA≥50%)
Design Team

Architect: Goody Clancy
Acoustics: Acentech
Civil Engineer: Engineering Ventures
Cost Estimator: Faithful + Gould
Fire Protection + Code: Jensen Hughes
Landscape Architect: Michael Van Valkenburgh
Specifications: Long Green Specs
MEP/FP Engineer: VanZelm
Structural Engineer: LeMessurier
Sustainability Consultant: TransSolar
LEED: Steven Winter Associates

Project Description

This 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 Feldberg Library, and students moving to and from Murdock Center, to which it connects. The main atrium acts as a public living room that provides opportunities for users to formally and informally coalesce.

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.

Embodied Carbon

The architectural team is conducting Life Cycle Assessment using Tally 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.

Building Performance

- LEED Target: Platinum (current LEED score 83)
- Energy Target: 20 kBTU/sf/yr
- Projected Energy Use Intensity 26.9kBTU/sf/yr (not including PV)
- Projected Energy Generation: 125,105 kWh/year
- Net Projected Energy Use Intensity: 18.6 MBTU/sf/yr
Understanding the Site

The existing building, Murdough, retreats from Tuck Mall and sinks down into the ground. The proposed building, however, will be more integrated with the surrounding context.

Architectural Design

- Thermal Envelope:
  - SHGC: < .25
  - CENTER OF GLASS:
  - U-VALUE: < .21
- Rigid Insulation
- Roof R-Value: R40
- Raw material for the manufacturing of select pieces of furniture in the atrium will be sourced from The Grant, a sustainably managed forest maintained by Dartmouth's Woodlands Office.

Energy Model Preliminary Results

- 18.6kBtu/sf/yr
- 88% Reduction
- 700,000kg CO₂
- 83% Renewable Resource Depletion
- 91% Global Warming Potential

Life and Planning Development

- Architectural Ideas:
  - Fresh eyes on site
  - New building integrated
  - Image of Woodland Offices
  - Window Recess (2nd-3rd floors)
- Initial LCA of structural system performed through Tally showing the relative impacts of each material across five environmental impact categories:
  - Global Warming Potential
  - Ozone Depletion
  - Renewable Resource Depletion
  - Acidification Potential
  - Eutrophication Potential
  - Smog Formation Potential
  - Non-Renewable Energy Consumption

Developing the design for the thermal envelope facade the design encompassed multiple elements of our energy goals for the building, namely the thermal performance, natural ventilation, and mechanical ventilation.

- Thermal Vent
  - Provides prominent visual and thermal separation
  - Enhancing stack effect of natural ventilation
  - Enhancing stack effect of natural ventilation

- Double Skin Facade
  - Provides a secondary path for ventilation
  - Natural ventilation

- Recessed Windows
  - Ventilation comfort while also adhering to building codes and mechanical ventilation

- External Operable Blinds
  - Control solar heat gains
  - Provide shade for windows

- Operable Windows
  - Provide natural ventilation
  - Natural ventilation and enhance occupant experience

- Storage
- Type of storage
  - Copy
  - Equipment
  - Production
  - Interior Equipment
  - Equipment
  - Interior Equipment
  - Production
  - Interior Equipment
  - Production

- Conference 12-Person
  - Conference 8-Person
  - Conference 4-Person
  - Breakout 8-Person
  - Rest Room/Lab 12-Person
  - Storage Pod
  - Rest Room 8-Person

-verständliche Sicht: Ihr Name

- Ihr Name
**Natural Ventilation System**

- **A**: Air enters through south and east facades
- **B**: Exhaust air transfers into facade
- **C**: Operable shading responds to solar angle
- **D**: Air exhausts through dampers at top of double skin and atrium
- **E**: Dark sloped roof heats exhaust air
- **F**: Upblast fan used during fan-assisted natural ventilation mode and for smoke exhaust
- **G**: Control dampers open during passive natural ventilation mode, closed during fan-assisted ventilation or smoke exhaust
- **H**: All exhaust through exterior vertical louver

**Daylighting**

- **1**: Atrium Skylight provides natural daylight throughout building and provides views to the sky above and hosts PV arrays
- **2**: Atrium clerestory window provides supplementary natural daylight into the building and connects users with views to the landscape beyond

*View QR panoramas in portrait mode*