



ARTHUR L. IRVING INSTITUTE FOR ENERGY AND SOCIETY

Design Team

Architect: Goody Clancy

Acoustic: 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 Murdough 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
- $\bullet\,$ Provide places of transparency to place learning and
- \bullet 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.

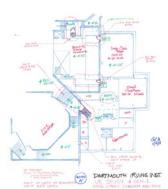
The architectural team is conducting Life Cycle Assessment using Tally and also pursuing LEED credits for reductions to the building's embodied carbon and other environmental impacts.

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

Building Performance

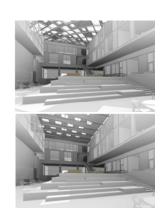
- LEED Target: Platinum (current LEED score 83)
- Energy Target: 20 kBTU/sf/yr
- Projected Energy Use Intensity 26.9kBTU/sf/yr (not including PV)
- Projected Energy Generation: 125,105 kWh/year
- Net Projected Energy Use Intensity: 18.6 kBTU/sf/yr

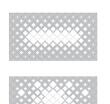










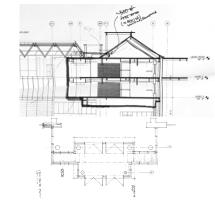






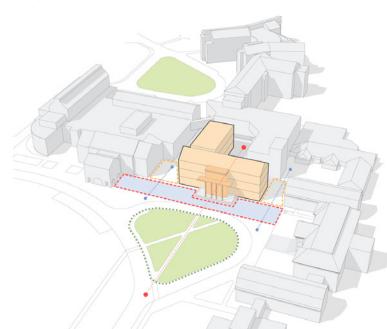








The existing building, Murdough, retreats from Tuck Mall and sinks down into the ground. The proposed



Recognizing the strong axial alignment with Tuck Mall, across from Baker Hall, was an important design decision in establishing a strong presence on the campus. The proposed design addresses this elationship and stands as a new landmark on Dartmouth's Campu



The relationship of our site to Dartmouth's greater campus is in a unique position at the western terminus of Tuck Mall. This was an opportunity to complete the axis with a building that has a strong presence that welcomes students and faculty to the West End.

tegrative 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.

LEED Platinum

The project is aiming to achieve LEED Platinum Certification, Currently the project is tracking 84 points. Many of these points are derived from the reduction of indoor and outdoor water use, optimized energy performance via the double skin facade and natural ventilation systems, and renewable energy collected from PV panels.

Goody Clancy is signatory to The AIA 2030 Commitment, The mission of The AIA 2030 Commitment is to transform the practice of architecture in a way that is holistic, firmwide, project-based, and data-driven, so that the AIA and the participating firms can prioritize energy performance and carbon reductions in the design toward carbon neutral buildings, developments and major renovations by 2030.

This project is tracking ahead of the 2030 target through 2025 at 90% reduction from

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- Building placement and alignment to

Thermal Vent

- Solar gains heat attic plenum, enhancing stack effect of passive ventilation system
- Provides prominent visual marker of natural ventilation

ouble Skin Facade

- Reduces cooling loads in
- adjacent spaces by 50% Houses automated venetian
- blinds that adjust to minimize solar gains while optimizing visual transparency
- Provides a secondary path for natural ventilation

Conducting energy model assessments alongside our iterative design process is integral to designing a building that excels in energy efficiency and reduces overall energy consumption:

Lighting

18.6kBtu/sf/yr

88% Reduction

700.000kg CO₂

Daylight and Solar Analysis

% Occupied hours

- Spatial Daylight Autonomy (sDA) and photo-voltaic potential are key drivers for the atrium skylight geometry.
- Analysis ensures occupants receive comfortable levels of daylight throughout the year.



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.

• Initial LCA of structural system performed through Tally showing the relative impacts of

Acidification Potential, Eutrophication Potential, Smog Formation Potential, Non-

each material across five environmental impact categories: Global Warming Potential,

uctural System - Life Cycle Assessment

renewable Resource Depletion



27,000 acres timber harvesting and recreation

200,000 bdft Grant annually

Thermal Envelope

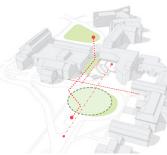
Developing the design for the thermal envelope facade the design encompassed multiple elements of our energy goals for the building, namely the thermal performance, natural ventilation, and natural daylighting for the comfort of the users.







- surrounding context - Tuck Green - Irving Plaza
- West Connector



 Landscaped corridor connects Tuck Mall to the new West End development, encouraging pedestrian activity

 Entire roof, including the skylight, has a PV potential of ~ 8.3kBTU/ sf/year, offsetting approximately 36% of total annual energy consumption

Creates spatial daylight

atrium-facing spaces

· Houses solar panels that

produce ~3.4 kBTU/sf/year

 Existing building encloses the new construction to the north and west, reducing embodied

carbon and thermal losses

the atrium

autonomy in the majority of

• Provides natural, banded light to

South Bar Recessed windows provide

- shading to minimize summer
- solar heat gains
- Fresh air provided to project labs through operable windows

• "Public Living Room" of the West

and formal gatherings

through radiant floor · Provides exhaust path for natural

Heated and cooled exclusively

and mechanical ventilation

energy use

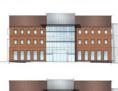
Campus for active social interaction

• Wide temperature range minimizes

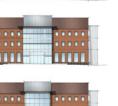
East Bar · Contemporary interpretation of traditional Dartmouth aesthetic provides optimized window to

- wall ratio External operable blinds control solar gains at large ground floor
- Operable windows provide natural ventilation and enhance occupant experience



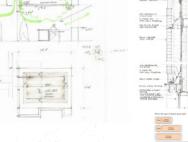


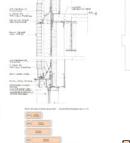


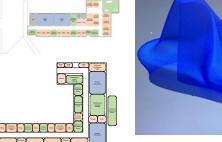


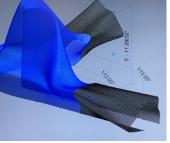


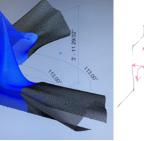


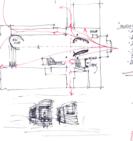


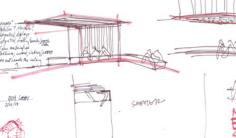




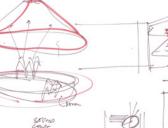


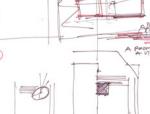


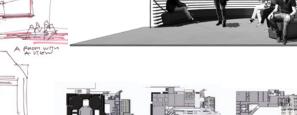












Native plantings create an

ecologically sustainable

buildings and resources

Landscape architecture provides

better connectivity to campus

landscape

