Design Team
Architect: Goody Clancy
Acoustical: 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: 26.9 kBTU/sf/yr (not including PV)
• Projected Energy Generation: 125,105 kWh/year
• Net Projected Energy Use Intensity: 18.6 M BTU/sf/yr
The project is aiming to achieve LEED Platinum certification, which includes a variety of sustainable design elements and strategies. Here are some key aspects:

- **Embodied Carbon Reduction**: Through the use of sustainable materials and energy-efficient systems, the building aims to reduce its embodied carbon by 90% compared to a typical new building.
- **Natural Ventilation**: The project utilizes natural ventilation to reduce energy consumption and improve indoor air quality.
- **Double Skin Facade**: This design feature improves energy efficiency by providing a secondary path for ventilation and daylighting.
- **Operable Windows**: These allow for better control of ventilation and natural light, improving both energy performance and occupant comfort.
- **Structural System - Life Cycle Assessment**: An initial Life Cycle Assessment (LCA) was conducted using Tally software, which showed significant reductions in environmental impacts compared to traditional materials.
- **Thermal Envelope**: The building envelope is optimized with high-performance insulation and innovative design features like the double skin facade.
- **Daylighting and Lighting**: Daylight and energy-efficient lighting systems are integrated to improve energy efficiency and occupant comfort.
- **Water Efficiency**: The project includes rainwater harvesting and efficient plumbing systems to reduce water consumption.

**Floor Plan and Floor to Floor**:
- **16.6kBTU/sf/yr**: The project aims for a very tight thermal envelope, reducing heating and cooling loads.
- **88% Reduction**: Significant reduction in energy consumption compared to baseline.
- **700,000kg CO₂**: Embodied carbon reductions are integral to the design, aiming to offset emissions.

**Material Sustainability**:
- **Rockwool Insulation**: R-40 ROOF R-_VALUE: R40: Provides excellent thermal insulation properties.
- **Solar Power**: Photovoltaic panels are utilized to offset electrical consumption.
- **ROCKWOOL INSULATION**: R-40 ROOF R-VALUE: R40: Provides excellent thermal insulation properties.
- **Structural System**: The structural system is assessed for its life cycle impacts, contributing to the overall sustainability of the building.

**Operable Windows**: These windows are designed to be both energy-efficient and user-friendly, allowing for natural ventilation and better control of indoor environments.

**Conclusion**: The Arthur L. Irving Institute for Energy & Society at Dartmouth College is committed to creating a sustainable and high-performing building that excels in energy efficiency, environmental impact, and occupant comfort. The project is an example of how design and technology can come together to create a positive impact on the environment and the community.
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