Existing Buildings and Retrofits Meeting #3

NJ Energy Code Collaborative

March 27, 2026

Agenda

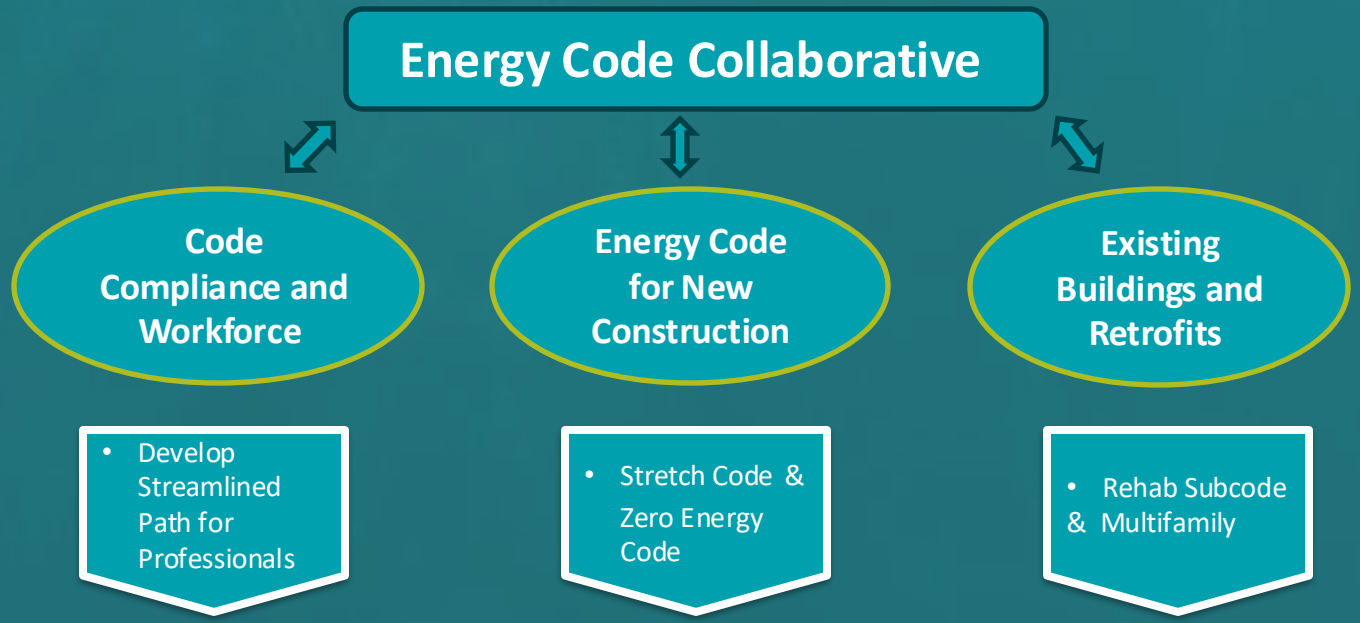
- Welcome and introduction
- Impact of change of occupancy
- Discussion on mapping incentives for existing buildings and identifying gaps, particularly in the multifamily market
- New Jersey Green Building Manual case studies template review
- Next steps

Meeting Guidelines – Antitrust Statement

- Throughout our meetings, participants shall comply with competition law requirements and shall not enter into any discussion, activity or conduct that may violate any applicable competition law. Should the meeting discuss matters that contravene competition law requirements, it is the responsibility of participants to notify the Moderator who will discontinue the discussion or close the meeting.

NJ ECC Purpose

Establish a timely and robust, stakeholder-guided process to research and develop a New Jersey Zero Energy Building Roadmap that provides options to build government and market capacities to effectively advance an increasingly more energy-efficient building energy code and improve administration, enforcement and compliance, aligned with relevant clean energy policies of the State, including the Energy Master Plan goals and recommendations.



Zero Energy Building Roadmap

The Roadmap, as a living document, presents three concurrent pathways with explicit actions and timing for implementing zero energy building strategies, primarily through the adoption/amendment of building codes. These pathways, adopted together, are designed to lead New Jersey to implement zero-energy building codes for both new construction and existing buildings by 2030 or sooner.

- New Building Base Code Path
- Stretch Code/Zero Energy Code Path
- Existing Building Path

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IECC 2024 C505

Energy Modeling Update – March 27, 2026

Rutgers Center for Urban Policy Research (CUPR)

Questions to investigate

With the change of occupancy:

- Is there an increase in individual system Energy Use Intensities (EUIs)?
- Can the existing system (capacity) meet the demand of the new occupancy?
- Impact of reliance on supplemental HVAC? (Band Aid approach)

Religious Worship to Retail

The Fort Lauderdale, Florida, building that opened in 1922 as St. Anthony's Catholic Church and later became First Evangelical Lutheran Church now houses Jay's steakhouse. Photo courtesy of Jay's

Source: International Council of Shopping Centers.

- The adaptive reuse of religious buildings as retail spaces is becoming increasingly common.
- Retailers utilize original church architectural elements to create unique, upscale, or experiential retail environments.
- Former churches are converted into small vendor markets, bookstores, cafes, breweries, and retail showrooms

https://www.inc.com/bruce-crumley/old-churches-become-heavenly-sources-of-new-business-space.html
https://www.nytimes.com/2024/08/04/business/church-development-reuse.html

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Religious Worship to Retail

Jersey City Approves Adaptive Reuse Plan for Historic St. Mark's Hall

By **Chris Fry** - March 18, 2025

The former St. Mark's property at 443 Jersey Avenue will be converted into residences under a recently approved plan. Image courtesy Weckenmann Architecture.

Source: JERSEY DIGS

Current site. Image by MVMK via the application.

Adaptive reuse of a 140-year-old church

Includes: Residential tower and mixed-use commercial space (retail)

Preserves façade, bell tower, and historic features

Super Hill Chapel -NJ Example

Sugar Hill Chapel Converted to a bakery & boutique

(Galloway Township)

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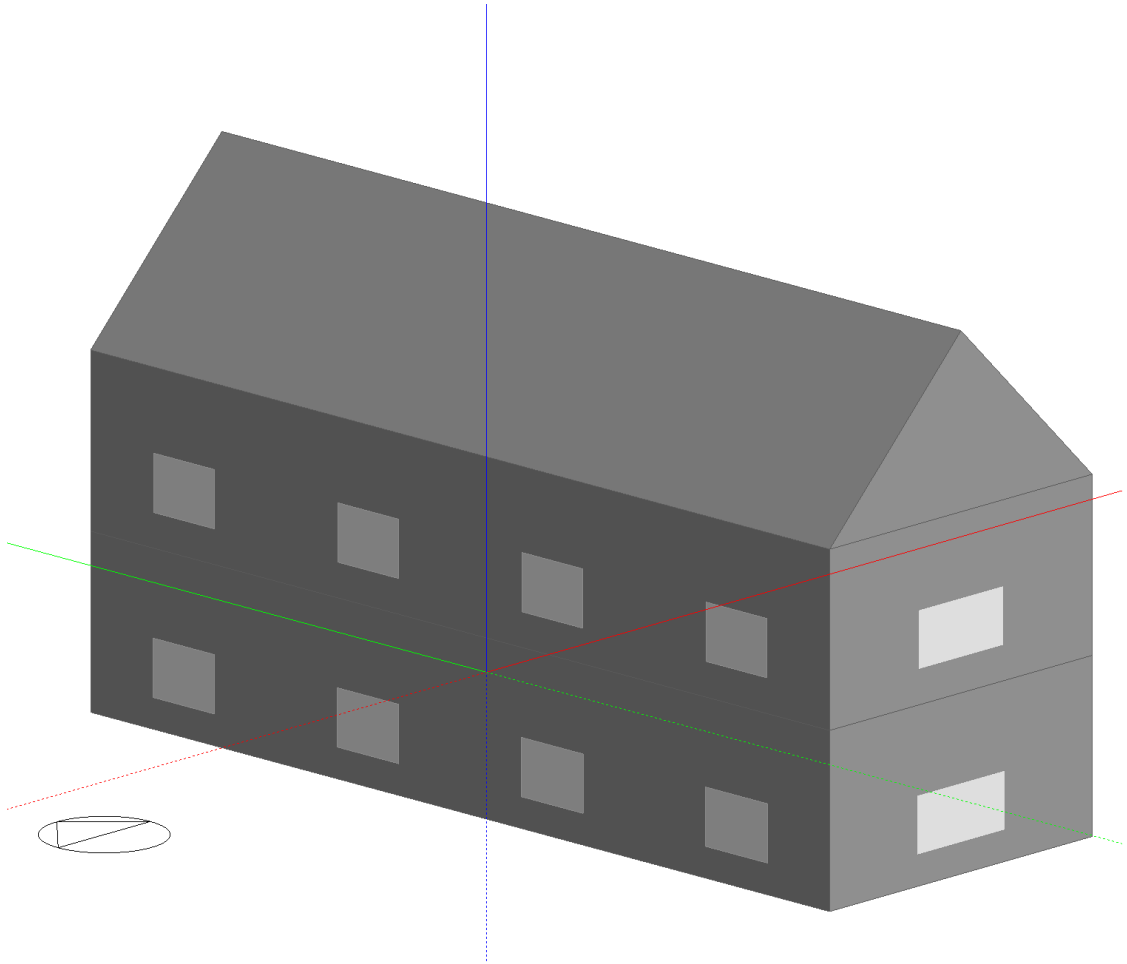
Scenario

TABLE C505.2.2BUILDING MECHANICAL SYSTEMS

ENERGY USE INTENSITY RANK	INTERNATIONAL BUILDING CODE OCCUPANCY CLASSIFICATION AND USE
High	A-2, B (laboratories), I-2
Medium	A-1, A-3,[a] A-4, A-5, B,[b] E, I-1, I-3, I-4, M, R-4
Low	A-3 (places of religious worship), R-1, R-2, R-3,[c] S-1, S-2

- 4869 SQFT Religious Worship: Tuned to NJ.
- Activity template and occupancy schedules switched from a place of religious worship to a retail store
- Annual energy consumption and EUIs compared across each end uses.
- Upgrade scenario for new change of occupancy modeled for code-compliant in-kind HVAC system.



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Assumptions

1) Baseline efficiency: Assumed **20–30% below rated (80–90%)**

2) The gap between rated and actual efficiency is typically larger in older, non-condensing boilers (especially flue losses 10-30%)

3) Supported by LGEA audit reports:

- Multiple church sites were reported as requiring heating equipment upgrade due to poor conditions
- Grace Episcopal → Reported as **“reached the end of its useful life service"**
- St. Stephen's Malankara Orthodox Church reported as "**Both units are 20 years old**, and we recommend that they be replaced with more efficient units“
- St. Elizabeth Episcopal Church → "All boilers are **over 20 years old**“

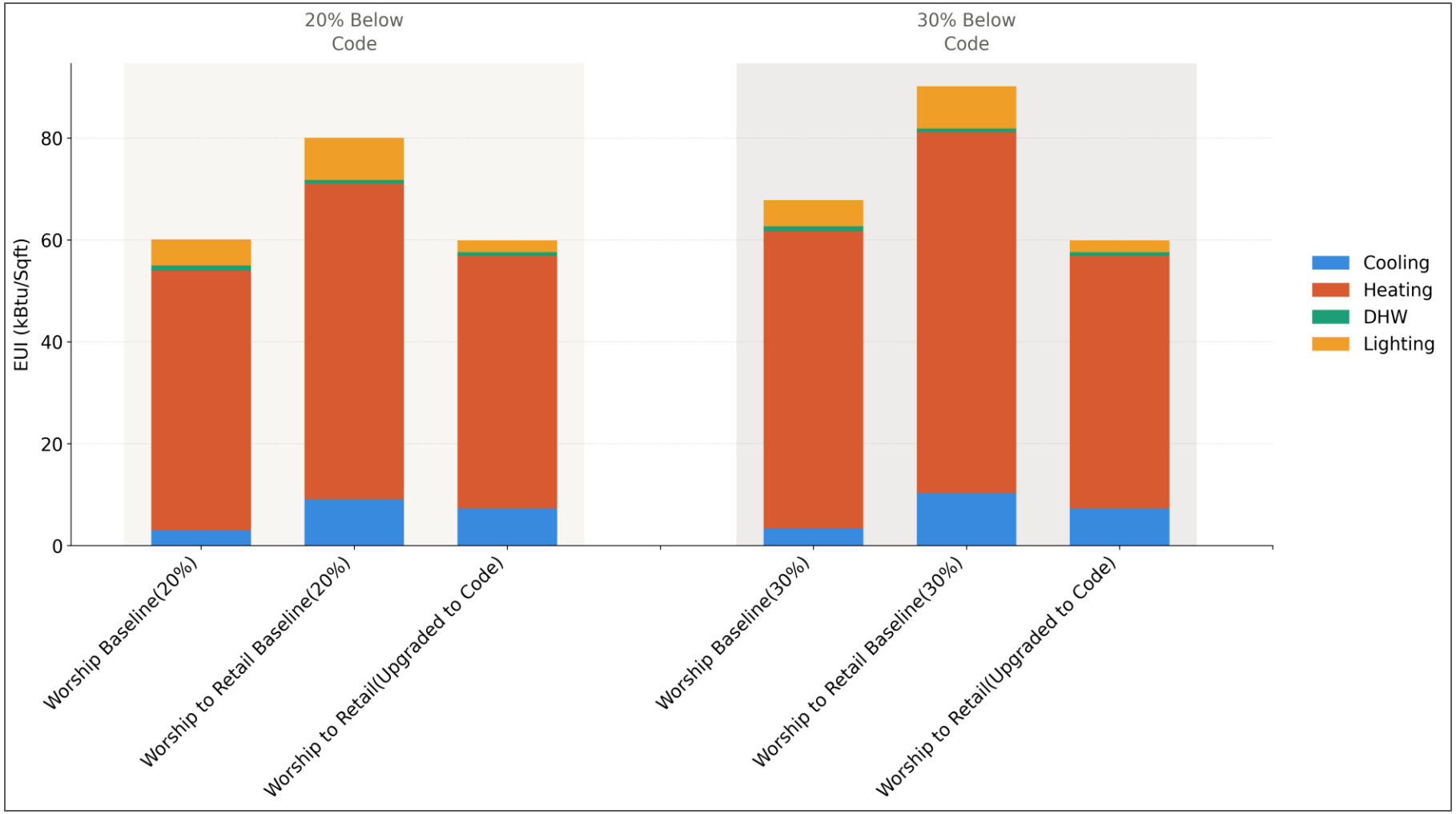
Scenario

- Worship Baseline (20% / 30%): Existing worship building operating at 20% or 30% below code efficiency, representing baseline system performance
- Worship → Retail Baseline (20% / 30%): Building converted to retail use while maintaining the same below-code baseline HVAC performance
- Worship → Retail (Upgraded to Code): Building converted to retail with HVAC system upgraded to meet code-compliant efficiency

Raftery, P., et al. (2023). *Measured Space Heating Hot Water Distribution Losses in Large Commercial Buildings*. ASHRAE Transactions.
TRC Energy Services. (2017–2023). *Local Government Energy Audit Reports, NJ BPU*.
Barma, M. C., Saidur, R., Rahim, N. A., & Allouhi, A. (2017). A review on boilers energy use, energy savings, and emissions reductions. *Renewable and Sustainable Energy Reviews, 79*, 970–983. https://doi.org/10.1016/j.rser.2017.05.187

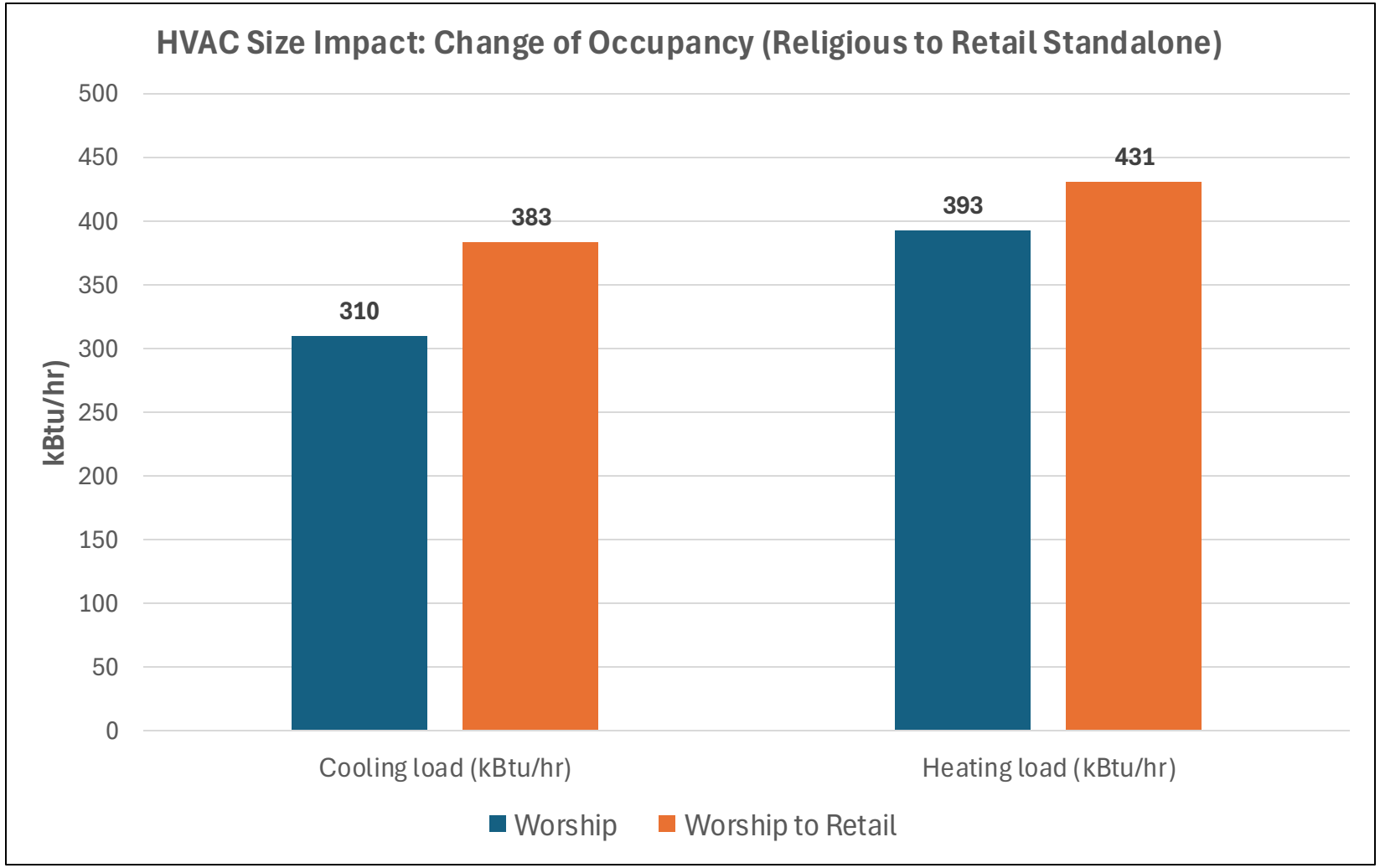
Result-EUI Impact

- EUI increases across each end use
- EUI increase above code-compliant retail model



HVAC System Capacity (peak design load)

- Determine HVAC equipment size needed for peak Summer and winter conditions
- System sized to hold the indoor temperature at the setpoint
- Cooling load Increase **24%**
- Heating load Increase **10%**



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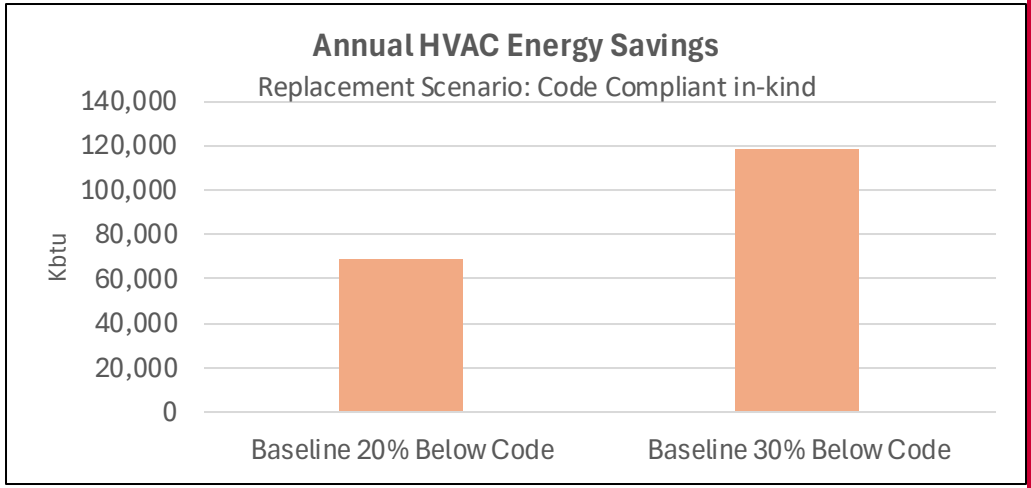
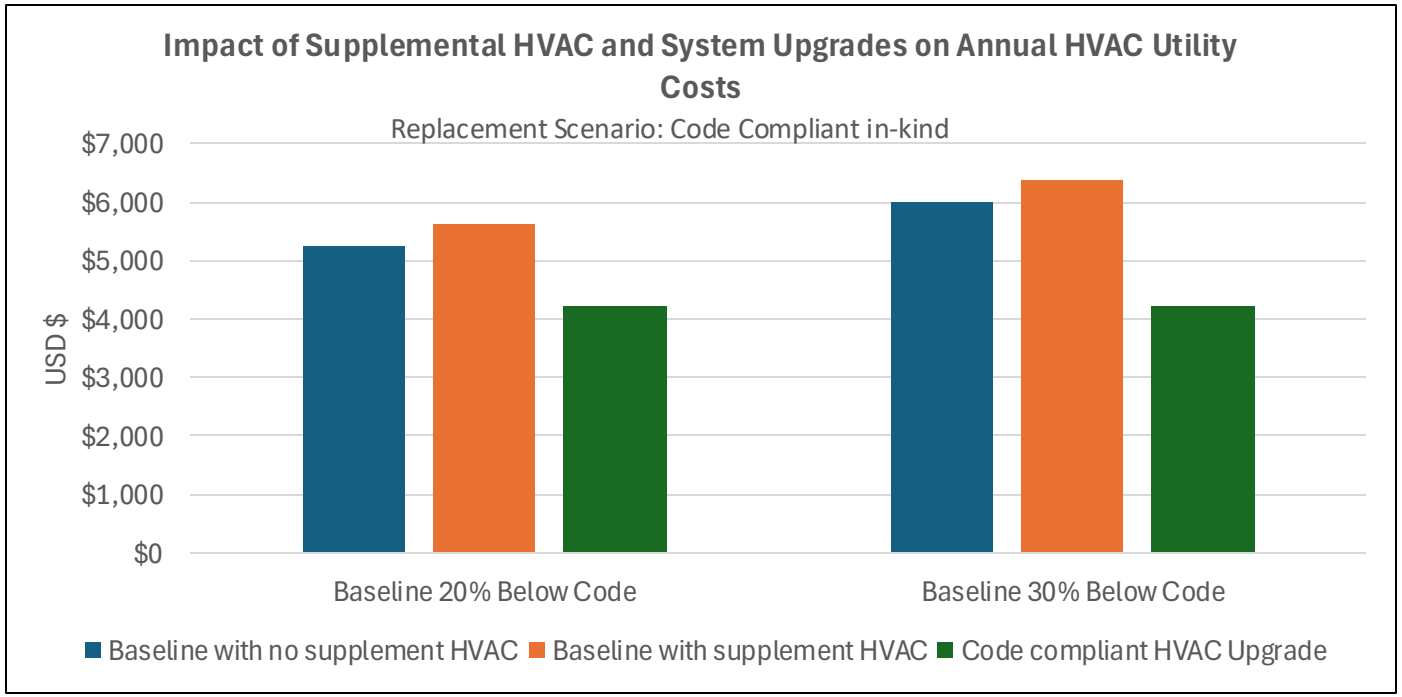
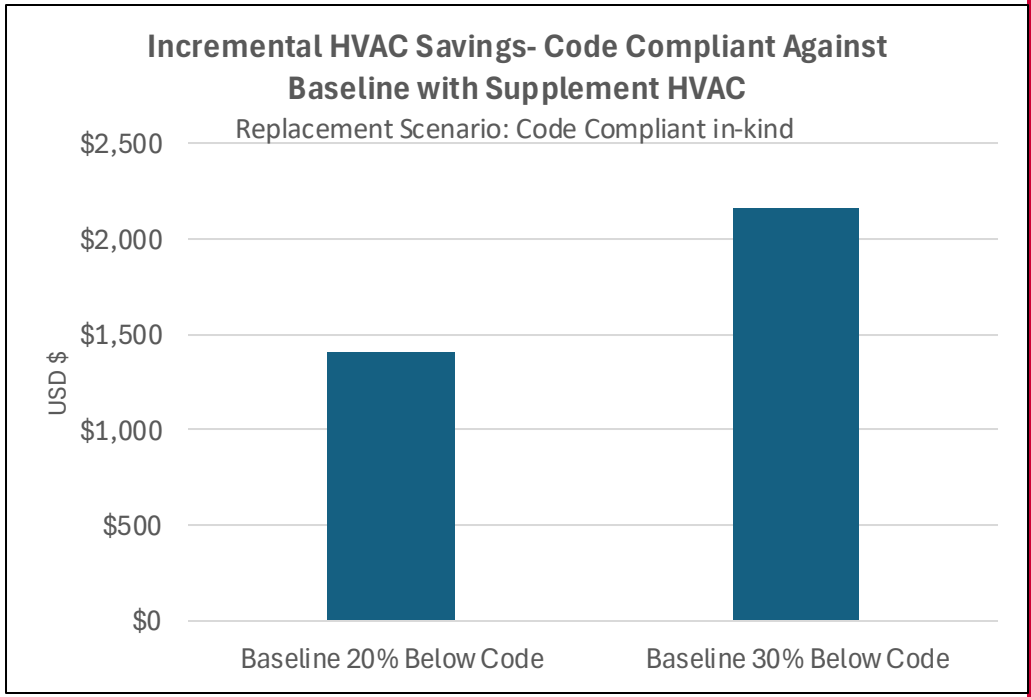
Impact of Supplement HVAC

- Supplemental HVAC increases energy use and costs
- System upgrades (code-compliant) deliver significant cost savings compared to supplement-dependent scenarios







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Next Steps

- Gather more data on installed equipment performance to refine baseline
- Estimate equipment upgrade cost and available incentives
- Calculate ROI metrics through Simple Payback or Cost-Benefit Analysis (CBA)

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Thank You

Mapping Incentives & Identifying Gaps
Discussion

Mapping Incentives for Existing Buildings

Incentive programs are different among Utilities (same multifamily search, different results at NJDEP One-Stop)

- JCP&L: "Building Tune Up", "Direct Install", "HVAC Tune-Up", "Engineered Solutions" (with clearest definition or program at NJDEP One-stop)
- PSEG: "Engineered Solutions"
- Atlantic City Electric: "Packaged Terminal Heat Pump – CEE Tier 2 Multifamily, "Engineered Solutions"

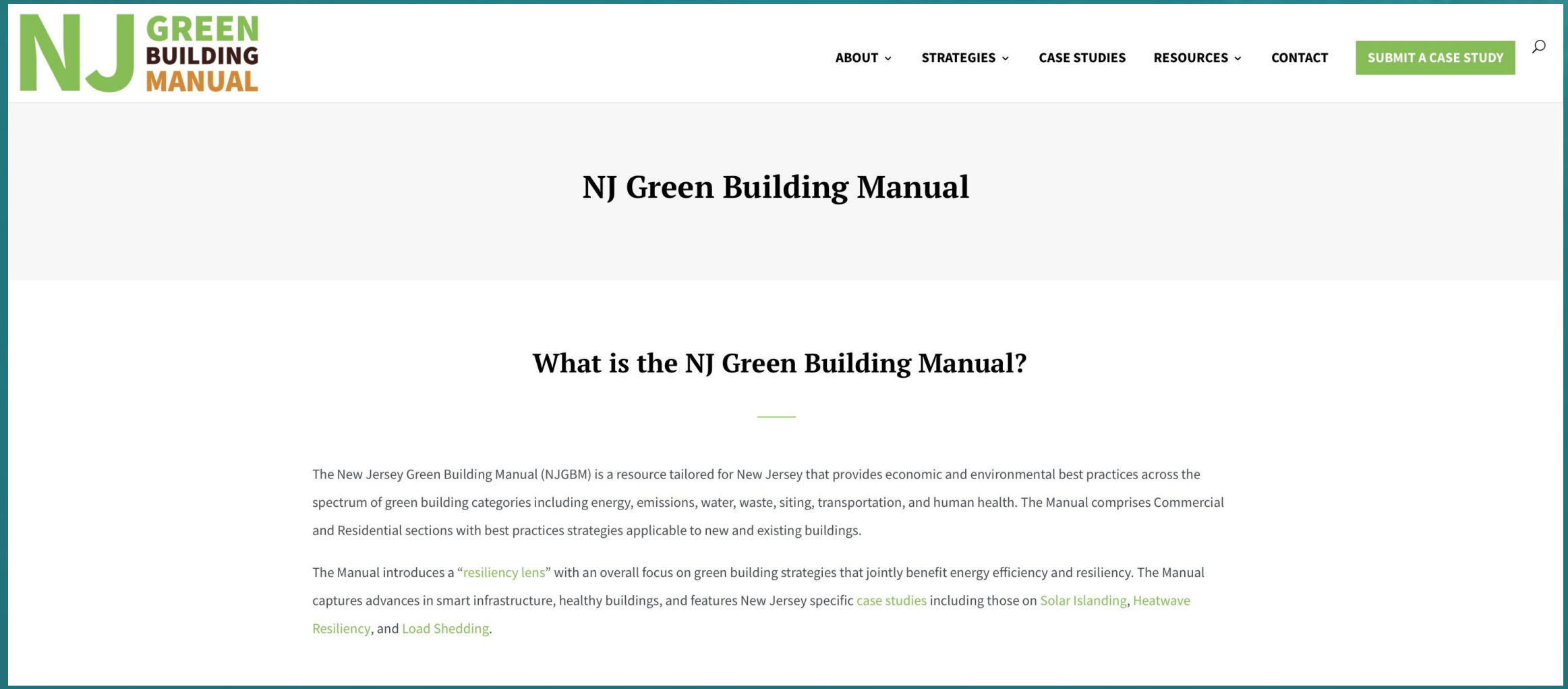
Commercial

- JCP&L: CPACE, Commercial Custom Equipment, Building Tune-Up, Direct Install, HVAC Tune-Up, Strategic Energy Management, Engineered Solutions, Virtual-Strategic Energy Management
- PSE&: Direct Install, Equipment, CPACE, Energy Management, Custom Program, Engineered Solutions, FlexPower
- Atlantic: CPACE, Direct Install, Prescriptive & Custom Program, Engineered Solutions

Multi-Family Gaps

- **Prevailing Wage Restrictions** – impacts affordability and ROI with 30% labor increase
- **Adequacy Electrification Incentives** – significant expense without enough incentiviza**tion**
- **Monetizing energy savings for building Owner(s)** - impacts ROI lack of realized savings
- **Consistency among programs & complexity of obtaining incentives** – cost and time to apply is prohibitive (P4P easier to navigate than 'Engineered Solutions')

NJ Green Building Manual Case Studies



NJ Green Building Manual Case Studies

The Musconetcong Water Association (MWA) transformed a small abandoned masonry warehouse into a thriving River Resource Center. Major renovations are considered New Construction projects, as an equal degree of planning, sourcing, and site disturbance occurs. This project stands out for its careful consideration of its environmental impact, especially with the river very nearby. The River Resource Center takes full advantage of its perch above the Musconetcong River with thoughtful views from offices, an exterior viewing platform, and community meeting spaces.

River Resource Center of Musconetcong Watershed Association

"This building renovation would not even have been possible without employing green strategies due to the severe land use restrictions of the site. This project is an excellent example of how a marginal building and environmentally sensitive site could be transformed to an attractive, functional use that would not have been possible using only traditional building technologies." - Kim Hood, Musconetcong Watershed Association

Location of Project: Asbury, NJ
Owner: Musconetcong Watershed Association
Submitted by: Mike Cronomiz

Overview

The River Resource Center in Asbury, NJ transformed a small abandoned masonry warehouse into the thriving home of the Musconetcong Watershed Association (MWA). The River Resource Center takes full advantage of its perch above the Musconetcong River with thoughtful views from offices, an exterior viewing platform, and community meeting spaces. Ground level kayak storage is also provided.

Special considerations are frequent when renovating existing buildings and this project is no exception. An existing brick kiln built into the building foundation could not be removed without compromising the structure. Steel beams at the second floor ceiling level, previously used to support a flat roof, could not be removed in a cost effective manner. The design team retained and featured these exposed elements to preserve the integrity of the building's industrial past. An owner-imposed special consideration, central to the WMA's mission, was protecting the adjacent river from pollution and debris caused by the construction process. The design team worked closely with the contractor to limit the site disturbance to within 40 feet of the building. Erosion & sediment were carefully monitored and controlled.

Process

Design

Prior to assembling a design team, the Musconetcong Watershed Association sought to preserve and reuse the existing structure. The first phase was remediating the site along the river. MWA members worked diligently to restore native plantings and natural habitat along the banks of the Musconetcong River adjacent to the project site. A vegetative buffer was installed with help from a Cook College professional arborist. To prevent further damage to the existing structure, a new Galvalume roof (highly reflective) was installed. This also acts as a passive strategy to keep the building cool in the summer.

The Musconetcong Watershed Association hired an integrated project design team that worked in collaboration to arrive at the best possible solutions for the given requirements and conditions.

Project Team

Architect: Mike Cronomiz and Scott Kelly | *Re:Vision Architecture*
MEP Engineer: William Amann | *M&E Engineering*
Civil Engineer: Jim Chmielak | *Engineering & Land Planning Associates*
Structural Engineer: Ann Rothman | *Ann Rothman Structural Engineer*
Construction Manager: Cliff Tanzler | *CCCP*
Commissioning Agent: Ed Iczkowski | *EFI Comissioning Services, LLC*

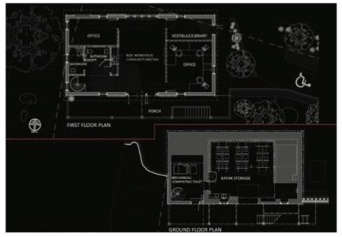
To test the decisions being made and help guide the team toward the best solutions, energy and daylight analysis were conducted at regular intervals. Additionally, the project was designed and benchmarked to meet or exceed LEED certification requirements.

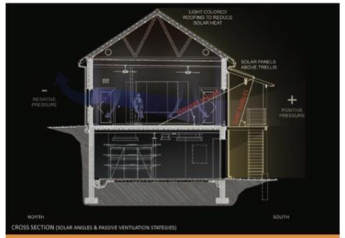
Build

In order to deliver the project in a way that was environmentally responsible, the Construction Manager followed strict guidelines set in place by the design team and continued to work closely with the team during construction. This includes an Erosion & Sediment (E&S) Control Plan—to protect the site and adjacent river from construction-generated pollution, a Construction Waste Management Plan—to divert waste from landfills (this project diverted 98% of the waste generated on site), and an Indoor Air Quality Management Plan—to protect the subcontractors onsite during construction as well as to prevent the buildup of contaminants that could be released into the space after occupancy.

Operate

The building is located within 90 feet of a C-1 (trout production) stream and is in the Highlands Preservation zone. The regulations created under these two sets of environmental rules impose severe limitations on effluent generation in the building. Because the building employs both a composting toilet and a grey water waste disposal system, only cleaning products which have been certified as safe for such applications are used. Virtually no water is used in the composting toilet; therefore, the building uses 67% less water than buildings of comparable size and use. Water used in the HVAC system is returned to a ground well after heat





Ratings and Awards

Society of American registered Architects, PA Chapter Award:
Excellence in Design (top honor)

2010 June LEED NC v2.1 certification
Platinum

2009 Green Building America:
Award Winning Project

is extracted (winter) or exchanged in cooling. A geothermal heat pump is used for heating and cooling. One well water source provides water for both domestic consumption and HVAC. The masonry structure acts as a 'heat sink' to minimize temperature fluctuations. The building employs a high degree of thermal insulation in the form of urethane foam on the basement ceiling and on the metal roof. Exterior sheet insulation is covered with stucco. Heating and cooling requirements are minimized. With a high percentage of natural light flooding the work areas and efficient halogen and LED lighting systems, the building achieves a 48% energy use reduction over buildings of comparable size and use.

Evaluate/Commissioning

A Commissioning Agent was hired to work with the project team early in the project design phase. The Commissioning Agent works as a third party (separate from the design and construction teams). S/he can review the project design to ensure it is meeting the owner's needs and observe and report during construction to ensure proper component installation. A commissioning report was provided to the owner at the end of the project which allows the owner to have the system re-commissioned at any point in the future back to the optimized settings. Commissioned systems included water, HVAC, lighting controls, and PV Array. Post construction, the Commissioning Agent also worked with the building owner to create an operations and maintenance manual, participated in a training session with the building occupants and completed a one year follow up meeting.

Finance

MWA challenged the team to select design strategies that would minimize the costs of occupancy while meeting a tight project budget of $430,000 or $190/sq ft, including site work. On the front end of the project, MWA received a substantial grant award from the Warren County Freeholders. However, operations and maintenance costs would still need to be raised through programs and donations. Both the initial project cost and long-term operating costs were carefully considered in making decisions regarding the selection of green strategies and features. The project met the lean budget parameters, demonstrating that adaptive re-use of existing structures can be cost-effective, environmentally responsible, and visually interesting. To date, MWA has found that the building is extraordinarily economical to operate while it provides a high degree of functionality. Virtually, the only utility cost is electricity, and the building uses very little of that.

Performance

Energy

To date the building has outperformed the pre-selected goals for energy usage – The project was modeled to use 21,157 kWh annually and over the past year has actually used 16,644 kWh. The energy performance is monitored through an electric meter and utility statements, and the on-site electric generation is monitored through a sub-meter installed as part of the photovoltaic array. The HVAC and lighting systems use minimal energy. All computers are new and relatively efficient. Electrical usage is minimal. On sunny days, the electrical meter actually runs backwards when the building is lightly occupied. Staff finds that abundant natural light is often sufficient for work, especially in the conference room/classroom. Multiple casement windows in each room allow for fresh air and breezes which help to cool or warm the building in the spring and fall. However, there is a small problem with summer ventilation: to achieve proper airflow, opening windows were installed in the building eaves, however; it is awkward to open and close windows located over 20 feet above ground. In the future, this could be remedied by installing a remote control.

NJ Green Building Manual Case Studies

Water

Water consumption is not currently being metered for the project, however the small amount of water released into the on-site composting toilet has not created problems, indicating that the project is not exceeding the volume of water determined as its selected goal of roughly 2,873 gallons per year. Water used for HVAC heat exchange is returned to the ground.

Lessons and Trade-offs

"Perhaps the biggest surprise was the successful reuse of what was an abandoned eye-sore, and transforming it to be a truly attractive headquarters for the MWA. Another surprise was that Forest Stewardship Council Certified lumber was not the greenest option –because local lumber was key in this project. Visitors are often surprised to see staff adjust building or room temperature by opening or closing windows rather than adjusting the thermostat. Another surprise was how easy it was to accomplish what the Board set out to do. We credit that to the extraordinary design team, the architect, construction manager and building contractors. All of the design/build team believed in what they were doing and contributed far more thought and energy than we might have expected. "

"The best advice we could offer is to employ professionals who have demonstrated green experience and who approach the project with a good attitude and an open mind. In our case, the best investment the Board made was in a dedicated and highly competent construction manager who stayed on the project as if he was the owner. Our architect was committed to the teaching process as well as design, and as a result, the board, staff and all contractors learned the importance of designing space and systems that would produce an energy-efficient and pleasing work space. We are now able to share this knowledge with others who are considering incorporating "green technologies" into their projects. It turned out to be a good idea to leave so much of the building infrastructure exposed. It is very easy for people to stand under the pergola porch roof and look up at the solar panels. Geothermal heating ducts run through our open ceiling and remind visitors that the building is heated and cooled by geothermal energy. Likewise the high efficiency foam insulation is visible on the inside of the roof. Our foam flush toilets never fail to amaze visitors and allow us to point out the importance of keeping septic material out of the ground when located so near a stream in a limestone area."

List of Green Strategies

Design

- Brownfields and Infill Sites
- Integrated Design Process
- Energy Modeling
- Native and Adapted Plants
- Tree Preservation
- High Reflectance Materials
- Water-Efficient Landscape Design
- Turf Grass
- Rain Barrels & Cisterns
- Low Flow Fixtures
- Composting Toilet
- Building Orientation
- Natural Ventilation
- Cool Roofs
- Daylighting
- Air Infiltration
- Insulation
- Glare and Heat Gain Reduction
- High-Efficiency Lighting Systems
- Downlighting
- Properly-sized HVAC Equipment
- Dedicated Mechanical Systems
- Demand Control Ventilation
- Variable Frequency Drives
- Thermal Massing
- ENERGY STAR Equipment
- Sensor Controls
- Geothermal
- Photovoltaic Systems
- Green Power
- Salvaged Materials
- Post-Consumer Recycle Content
- Rapidly Renewable Resources
- Construction & Demolition Waste
- Recycling Centers
- Green Cleaning
- Low-Emitting Materials
- Certified Wood
- Regional Materials
- Sound-Absorbing Materials
- IAQ Management Plan
- Entryway Systems
- Moisture Control
- Interior Design and Lighting Design
- Views and Operable Windows
- Sense of Place

Build

- Site Protection Plan
- Construction & Demolition
- Indoor Air Quality Management Plan
- Building Flush

Operate

- Operator and Occupant Training
- Alternative Transportation
- Post-Occupancy Evaluation Survey
- Plug Load
- Telecommuting and Teleconferencing
- Green Cleaning
- Source Reduction and Recycling
- Composting
- Flexible Work Spaces
- Wire Management Systems
- Building Commissioning Plan

Before Rennovation | After Rennovation

For more information

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