360 State Street | New Haven, CT 06510
P 203.865.3600 | F 203.865.3601
360StateStreet.com

SUSTAINABILITY
LEED ND Platinum

GREEN BUILDING

360 State Street is one of the greenest communities in the Nation. The project is a certified LEED® Platinum Project, the first of its kind to be recognized by the U.S. Green Building Council in the Pilot Neighborhood Development Program for exemplifying the principles of smart growth, urbanism, and green design prior to, during and post-construction. The project includes a spectrum of energy efficiency measures to achieve an energy savings of 60% compared to a conventional code compliant apartment building in Connecticut (ASHRAE 90.1-2004 Baseline), and confirmed by energy tracking over the first two years.

Fuel Cell

360 State Street installed the first fuel cell in a multifamily facility in the world. The fuel cell, a renewable power source, provides for a majority of the project's electric needs, and nearly all of the project's heating and hot water needs through combined heat and power ("CHP") or cogeneration. The fuel cell and CHP facility at 360 State allow power to be produced and delivered to its end users at an efficiency level triple that of grid power and heat (90% vs. 30%). Furthermore, the fuel cell and CHP facility produce power though a combustion-free electrochemical process, therefore it's only byproducts are water and heat, reducing pollution by 99.8% compared to traditional generation. Added off-site benefits include reducing the need for investment in new regional transmission and generation infrastructure and easing pressure on the grid while it's peaking.

Thermal Storage Tanks - Fuel Cell Heating

Thermal energy storage tanks are used to store the excess heat generated by the fuel cell that could not be used immediately by the domestic hot water system. The fuel cell produces electricity twenty-four hours a day, thus generating a constant supply of heat; however typical heat demands for domestic hot water spike in the morning and with subsequent use throughout the day. These tanks allow for the collection and storage of heat during off-peak hours that is then used for domestic hot water and space heating. Additionally, these tanks store heat used for the swimming pool.

High Efficiency Heat Pumps - Fuel Shifting Technology

Typical code compliant apartment buildings utilize PTAC (packaged terminal air conditioning) units with auxiliary electric resistance heat and cooling. 360 State Street uses high efficiency water source heat pump units fed from the fuel cell's waste heat and use approximately 30% less electric energy for cooling.

Variable Speed Drive Pumps

The heat pump system is fitted with a variable volume pumping system to conserve on electrical pumping energy. In order to achieve effective variable volume pumping for the heat pump loop, a number of components are necessary that are fitted with a digital controls system.

High Efficiency Cooling Towers

The heat pump water loop is cooled with high efficiency cooling towers connected through a high efficiency plate and frame heat exchanger. The towers are oversized by 30% to effectively increase cooling system efficiency. This system is fitted with digital controls to maximize efficiency of the system operations.

Energy Recovery System

The ventilation air from the residential corridors and bathroom exhaust of each apartment is outfit with an energy recovery unit. The unit captures heat energy from exhaust air and pre-conditions supply air, reducing the need for new conditioning.

Demand Control Ventilation

The building loading dock utilizes carbon monoxide and sulfur dioxide sensors to operate the exhaust fans. The placement of these sensors ensures ventilation system operation in the presence of an operating delivery vehicle. Carbon dioxide sensors are also installed in spaces served by heat pumps fitted with ventilation air connections including Elm City Market's kitchen exhaust.

High Efficiency Refrigeration

The refrigeration system within Elm City Market is of the highest efficiency possible, and was selected for their ongoing green operation. The refrigeration equipment is 30% more efficient than standard, a huge energy saver considering a grocery market typically expends 60% of its total energy on refrigeration. The refrigeration equipment ties directly into an energy recovery system, allowing all waste heat to be re-used within the building, not exhausted to the atmosphere. Additionally the refrigerant from the system is re-used to preheat the domestic hot water for the Market.

Regenerative Drive Elevators

360 State Street's regenerative drive elevators capture the electricity from braking to provide additional power to them, increasing their efficiency.

High-Efficiency Occupancy Controlled Lighting

360 State Street utilizes high-efficiency lighting fixtures throughout the building including LED lighting in Elm City Market reducing the need for cooling energy. Occupancy and ambient light sensors allow for the elimination of electricity demand for lighting spaces that are not frequently in use. A portion of these sensors are tied into the building's ZigBee wireless mesh and controllable through a remote web portal.

Real-time Energy Feedback

The real-time display and programming functionality of the apartments' heat pump thermostats will allow tenants to see their electric use, heat pump thermal demand, cold and hot water use, and rates charged for each commodity via an energy web portal. Tenants are be able to understand how they are using energy and determine how they can effectively cutback use without inhibiting their comfort level.

Real-time Water Feedback

At 360 State Street, electric energy is directly consumed in the form of electricity used to pump water to its end use. Indirectly, energy is expelled to treat and transport the water and wastewater to and from the site. The water usage of tenants at 360 State Street is monitored via water submeters directly tied into the ZigBee wireless mesh system. Water usage is transmitted in real-time to the individual apartment web portals. Tenants are able to track their real time and historic water usage and costs with ease and identify areas to realize savings.

Water Use Occupancy Sensing

With ZigBee wireless web-access embedded within each thermostat and water meter at 360 State Street, a signal is sent to the thermostats when no water-use has been recorded in the apartment for 24 hours, setting the thermostat back to base heating or cooling levels. A message is sent to tenants via email, text message, or phone notifying them of the temperature setback that has been implemented and triggering them to respond with when they plan to return so that the thermostat will restore to occupied conditions before the tenant returns.

Water Saving Fixtures and Storm Water Reclamation

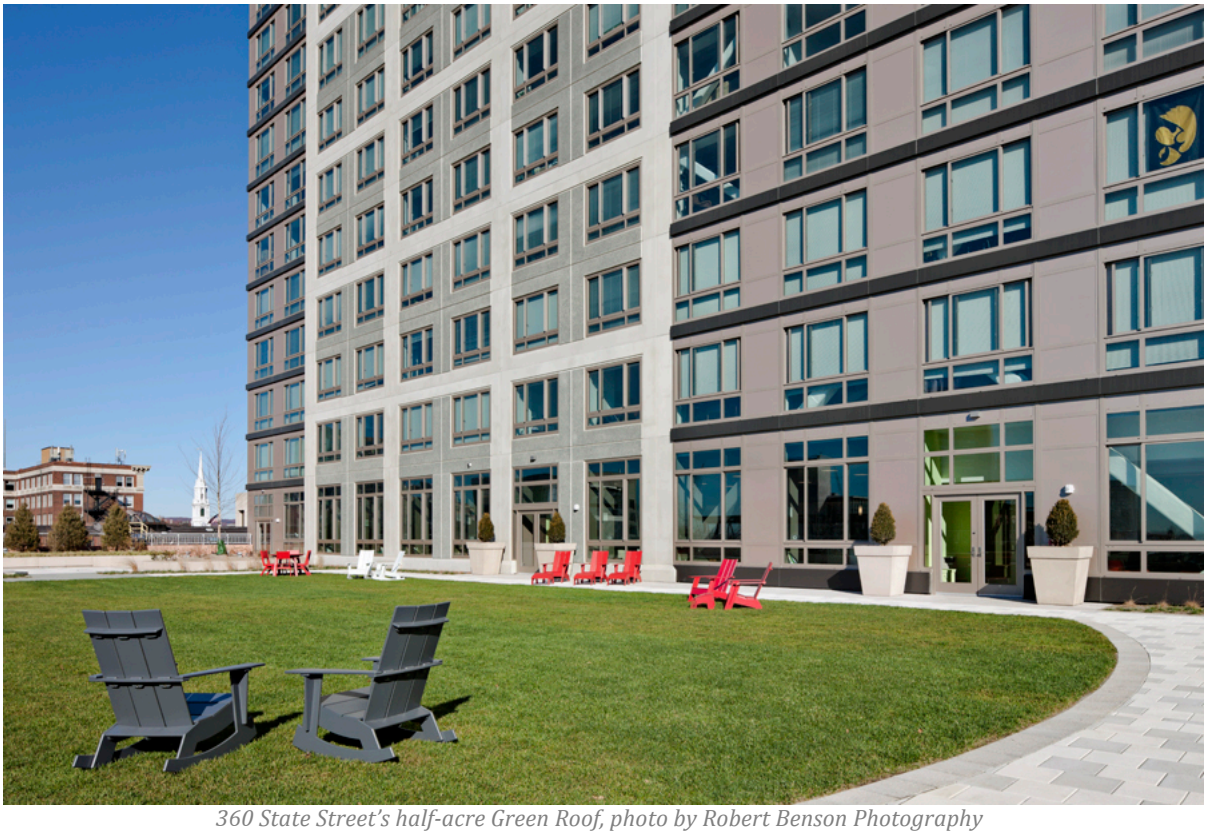
360 State Street achieves 30% water savings through the use of low flow fixtures, residential unit water meters, and storm water re-use for irrigation. The building includes a ½ acre native-species green roof which retains storm water, minimizes the project's impact on the local water and sewer system, and minimizes heat-island affect. When the green roof retention system is at capacity, storm water is stored in a water retention tank for irrigation.

High-Performance Glazing

High performance windows substantially decrease the peak electric load of 360 State Street by minimizing solar heat gain during peak summer cooling seasons while still allowing the interiors to be day-lit, reducing the need for electric lighting.

Enhanced Insulation

Increasing slab, wall and roof insulation reduce energy needs particularly peak demand loads. Insulated corners and edges of floors, roofs, and windows minimizes thermal bridging and prevents outside air from seeping into the building, causing it to expend less energy for heating and cooling. At 360 State Street, wall insulation has been increased to R-20, roof insulation to R-40, building slabs to R-8, and exterior floors exposed to outside air are insulated to R-16.



360 State Street's half-acre Green Roof, photo by Robert Benson Photography

360 State Street | New Haven, CT 06510
P 203.292.4900 | F 203.292.4901
360StateStreet.com

LEED® ND FACTS

LEED for Neighborhood Development

The U.S. Green Building Council (USGBC) Leadership in Energy and Environmental Design (LEED) for Neighborhood Development (ND), developed in collaboration with Congress for the New Urbanism and the Natural Resources Defense Council, emphasizes elements that bring buildings and infrastructure together and relates the neighborhood to its local and regional landscape.

LEED for Neighborhood Development integrates the principles of smart growth, urbanism and green building into the first national system for neighborhood design. The LEED ND rating system awards projects not only for their green building features but also for creating compact, walkable, vibrant mixed-use neighborhoods within dense urban areas with connections to mass transit.

The USGBC awards four levels of achievement through the LEED ND rating system: Certified (40-49 points), Silver (50-59 points), Gold (60-79 points), and Platinum (80+ points). 360 State Street achieved LEED Platinum certification with 83 points.

Below are few impressive facts about 360 State Street's LEED certification:

360 State Street is the only LEED ND Platinum project in Connecticut and also the only LEED LD Platinum project in the eastern United States.

Connecticut has 493 LEED certified projects; 5 of which are LEED Platinum Projects.

360 State Street is the largest LEED Platinum project in Connecticut and the 2nd largest in New England.

Connecticut has 7 registered LEED ND projects; 360 State was the first and is the only LEED ND Platinum project in the state.

360 State is the first apartment building in the world to be heated and powered by a fuel cell.

LEED® for Neighborhood Development Pilot

360 State Street
Project #10092407
Certification Level: PLATINUM
Stage 3
25 June 2012

83 Points Achieved — Possible Points: 106

Certified 40 to 49 points **Silver** 50 to 59 points **Gold** 60 to 69 points **Platinum** 80 or more points

27 Smart Location & Linkage — Possible Points: 30

Y	Prereq 1	Smart Location, Option 1	
Y	Prereq 2	Proximity to Water & Wastewater Infrastructure, Option 1	
Y	Prereq 3	Imperiled Species & Ecological Communities, No species found	
Y	Prereq 4	Wetland & Water Body Conservation, Option 1	
Y	Prereq 5	Agricultural Land Conservation, Option 2	
Y	Prereq 6	Floodplain Avoidance, Option 1	
2	Credit 1	Brownfields Redevelopment	2
1	Credit 2	High Priority Brownfields Redevelopment	1
9	Credit 3	Preferred Locations	10
8	Credit 4	Reduced Automobile Dependence, Options 1 & 3	8
1	Credit 5	Bicycle Network	1
3	Credit 6	Housing & Jobs Proximity, Option 3	3
1	Credit 7	School Proximity	1
1	Credit 8	Steep Slope Protection, Option 1	1
1	Credit 9	Site Design for Habitat or Wetland Conservation, Option 2	1
	Credit 10	Restoration of Habitat or Wetlands	1
	Credit 11	Conservation Management of Habitat or Wetlands	1

32 Neighborhood Pattern & Design — Possible Points: 39

Y	Prereq 1	Open Community	
Y	Prereq 2	Compact Development	
7	Credit 1	Compact Development	7
4	Credit 2	Diversity of Uses	4
3	Credit 3	Diversity of Housing Types	3
	Credit 4	Affordable Rental Housing	2
	Credit 5	Affordable For-Sale Housing	2
2	Credit 6	Reduced Parking Footprint	2
7	Credit 7	Walkable Streets	8
2	Credit 8	Street Network, Option 1	2
1	Credit 9	Transit Facilities	1
1	Credit 10	Transportation Demand Management, Option 2	2
	Credit 11	Access to Surrounding Vicinity	1
1	Credit 12	Access to Public Spaces	1
1	Credit 13	Access to Active Spaces, Option 1	1
1	Credit 14	Universal Accessibility	1
1	Credit 15	Community Outreach & Involvement	1
1	Credit 16	Local Food Production, Option 3	1

18 Green Construction & Technology — Possible Points: 31

Y	Prereq 1	Construction Activity Pollution Prevention	
	Credit 1	LEED Certified Green Buildings	3
3	Credit 2	Energy Efficiency in Buildings	3
3	Credit 3	Reduced Water Use, Options 1 & 2	3
	Credit 4	Building Reuse & Adaptive Reuse	2
	Credit 5	Reuse of Historic Buildings	1
1	Credit 6	Minimize Site Disturbance through Site Design, Option 1	1
1	Credit 7	Minimize Site Disturbance during Construction, Option 1	1
	Credit 8	Contaminant Reduction in Brownfields Remediation	1
5	Credit 9	Stormwater Management, February 2007 Version, Option 1	5
1	Credit 10	Heat Island Reduction, Option 1	1
	Credit 11	Solar Orientation	1
1	Credit 12	On-Site Energy Generation, Option 2	1
	Credit 13	On-Site Renewable Energy Sources	1
	Credit 14	District Heating & Cooling	1
	Credit 15	Infrastructure Energy Efficiency	1
	Credit 16	Wastewater Management	1
1	Credit 17	Recycled Content in Infrastructure	1
1	Credit 18	Construction Waste Management	1
1	Credit 19	Comprehensive Waste Management	1
	Credit 20	Light Pollution Reduction	1

6 Innovation & Design Process — Possible Points: 6

1	Credit 1.1	Innovation in Design: Exemplary Performance in SLLc4	1
1	Credit 1.2	Innovation in Design: Exemplary Performance in SLLc6	1
2	Credit 1.3	Innovation in Design: Exemplary Performance in GCTc12	1
1	Credit 1.4	Innovation in Design: Green Building Education	1
	Credit 1.5		1
1	Credit 2	LEED Accredited Professional	1