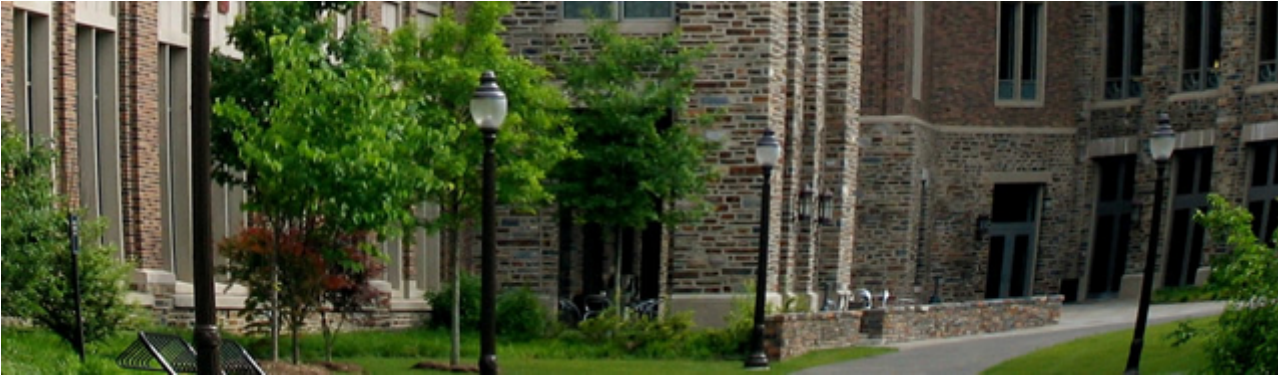


Duke Sustainability



Chilled Water Plant 2

Building Information

Tenant: Duke Facilities Management

Architect: Affiliated Engineers and FLAD Architects

Construction: [Skanska](#)

Purpose: Facilities (Cooling)

Footprint: 63,663 sq ft

Duke University opened its second chilled water plant in March of 2006. The plant provides air conditioning to the university and hospital campuses. In 2009, the chilled water plant went through a major renovation. It received LEED™ Gold certification under LEED™ version 3.0.

[View the Chilled Water Plant 2 LEED™ Scorecard](#)

Sustainable Site Features

Choosing a site for a building sets the tone of potential environmental impacts in building development and occupancy. Duke set a tone of minimizing impact by deciding to renovate the existing chilled water plant instead of building a new one. In fact, they did not expand the building's footprint onto undeveloped land, which preserved campus green space. In addition, the plant is within walking distance of several basic services such as local restaurants, convenience stores, banks, hospitals, schools, and the Chapel.

The site is easily accessible for commuting to work because it is less than half a mile from three different bus routes, has bicycle racks and showers, and has preferred parking spots for carpoolers and fuel-efficient cars.

Finally, the major renovation reduced the amount of impervious land by 48%. Impervious land is land that has been covered with a nonporous material, such as concrete. This major reduction in impervious land means that there is less stormwater runoff on the site. The EPA reports that stormwater is among the biggest contributors to water pollution, so minimizing the amount of it lessens the water pollution impact of the building.

Water Efficiency

The chiller plant reduced its water use by 41% by installing toilets that use 20% less water per flush and urinals that use 87% less water per flush than traditional units.

To minimize the water usage outside the building, Duke planted red maples, a tree that is drought tolerant and therefore requires minimal watering.

Energy Efficiency

The chilled water plant uses on average 16% less energy than the pre-renovated building, and saves over 540,000 kBtu of electricity every year. This results to an energy cost savings of 35%.

Indoor Air Quality

The EPA estimates that Americans spend as much as 90% of our time indoors. Therefore, a healthy indoor environment is vital for occupants' wellbeing. The chilled water plant minimized the amount of volatile organic compounds (VOCs) in the building materials. VOCs are harmful chemicals emitted as a gas from many traditionally made paints, sealants, and flooring materials.

In order to ensure that occupants of the chilled water plant were content in their work environment, the building's lighting is easily controlled on occupancy sensors to minimize unneeded electricity usage. While the heating and air conditioning cannot be directly controlled by the occupants, Duke invites occupants to participate in anonymous surveys to ensure the temperature is set appropriately. If there is a dissatisfaction rate of 20% or more, the temperature will be altered.

Resource Management

During the demolition and renovation of the chilled water plant, the construction crew ensured that minimal waste was sent to the landfill. Over 84% of the construction waste was diverted from the landfill and 20% of the building materials contain recycled content. Importantly, Duke supports the local economy - 43% of the construction materials used in the building were harvested and manufactured within 500 miles of the site.

Integration of Sustainability in Design & Construction Process

Designing and constructing a green building efficiently and successfully requires a completely integrated process in which all invested parties are involved throughout the entire building design and construction. This integrative approach can be more time consuming than traditional building, but the savings and benefits are endless. The chilled water plant was not only successful in meeting over half the suggested LEED™ credits, but it also went beyond the suggested credits by ensuring that all the furniture in the building is GreenGuard certified.



LEED for New Construction v2009

Registered Project Checklist

Duke University CHWP-2 Expansion
September 5, 2012 Final Scorecard

20 7 Sustainable Sites Possible Points: 26

Y	N	?	Description	Points
Y			Prereq 1 Construction Activity Pollution Prevention	
1			Credit 1 Site Selection	1
5			Credit 2 Development Density and Community Connectivity	5
1			Credit 3 Brownfield Redevelopment	1
6			Credit 4.1 Alternative Transportation—Public Transportation Access	6
1			Credit 4.2 Alternative Transportation—Bicycle Storage and Changing Rooms	1
3			Credit 4.3 Alternative Transportation—Low-Emitting and Fuel-Efficient Vehicles	3
2			Credit 4.4 Alternative Transportation—Parking Capacity	2
1			Credit 5.1 Site Development—Protect or Restore Habitat	1
1			Credit 5.2 Site Development—Maximize Open Space	1
2			Credit 6.1 Stormwater Design—Quantity Control	2
1			Credit 6.2 Stormwater Design—Quality Control	1
1			Credit 7.1 Heat Island Effect—Non-roof	1
1			Credit 7.2 Heat Island Effect—Roof	1
1			Credit 8 Light Pollution Reduction	1

7 2 Water Efficiency Possible Points: 10

Y	N	?	Description	Points
4			Prereq 1 Water Use Reduction—20% Reduction	4
2			Credit 1 Water Efficient Landscaping	2
3			Credit 2 Innovative Wastewater Technologies	3
			Credit 3 Water Use Reduction	2

13 22 Energy and Atmosphere Possible Points: 35

Y	N	?	Description	Points
11			Prereq 1 Fundamental Commissioning of Building Energy Systems	11
8			Prereq 2 Minimum Energy Performance	8
7			Prereq 3 Fundamental Refrigerant Management	7
2			Credit 1 Optimize Energy Performance	2
2			Credit 2 On-Site Renewable Energy	2
3			Credit 3 Enhanced Commissioning	3
2			Credit 4 Enhanced Refrigerant Management	2
3			Credit 5 Measurement and Verification	3
2			Credit 6 Green Power	2

9 5 Materials and Resources Possible Points: 14

Y	N	?	Description	Points
3			Prereq 1 Storage and Collection of Recyclables	3
1			Credit 1.1 Building Reuse—Maintain Existing Walls, Floors, and Roof	1
2			Credit 1.2 Building Reuse—Maintain 50% of Interior Non-Structural Elements	2
2			Credit 2 Construction Waste Management	2
2			Credit 3 Materials Reuse	2

Materials and Resources, Continued

Y	N	?	Description	Points
2			Credit 4 Recycled Content	2
2			Credit 5 Regional Materials	2
1			Credit 6 Rapidly Renewable Materials	1
1			Credit 7 Certified Wood	1

8 7 Indoor Environmental Quality Possible Points: 15

Y	N	?	Description	Points
1			Prereq 1 Minimum Indoor Air Quality Performance	1
1			Prereq 2 Environmental Tobacco Smoke (ETS) Control	1
1			Credit 1 Outdoor Air Delivery Monitoring	1
1			Credit 2 Increased Ventilation	1
1			Credit 3.1 Construction IAQ Management Plan—During Construction	1
1			Credit 3.2 Construction IAQ Management Plan—Before Occupancy	1
1			Credit 4.1 Low-Emitting Materials—Adhesives and Sealants	1
1			Credit 4.2 Low-Emitting Materials—Paints and Coatings	1
1			Credit 4.3 Low-Emitting Materials—Flooring Systems	1
1			Credit 4.4 Low-Emitting Materials—Composite Wood and Agrifiber Products	1
1			Credit 5 Indoor Chemical and Pollutant Source Control	1
1			Credit 6.1 Controllability of Systems—Lighting	1
1			Credit 6.2 Controllability of Systems—Thermal Comfort	1
1			Credit 7.1 Thermal Comfort—Design	1
1			Credit 7.2 Thermal Comfort—Verification	1
1			Credit 8.1 Daylight and Views—Daylight	1
1			Credit 8.2 Daylight and Views—Views	1

2 4 Innovation and Design Process Possible Points: 6

Y	N	?	Description	Points
1			Credit 1.1 Furniture Green Guard Certified	1
1			Credit 1.2 NA	1
1			Credit 1.3 NA	1
1			Credit 1.4 NA	1
1			Credit 1.5 NA	1
1			Credit 2 LEED Accredited Professional	1

2 2 Regional Priority Credits Possible Points: 4

Y	N	?	Description	Points
1			Credit 1.1 Regional Priority: SSC4 (25%) Alternative Public Transportation	1
1			Credit 1.2 Regional Priority: WEC2 (40%) Water Use Reduction	1
1			Credit 1.3 Regional Priority: SSC-6, or Eac-1 (%TBD), or MRC-2	1
1			Credit 1.4 Regional Priority: IEQc7.1 Thermal Comfort-Design	1

61 49 Total Possible Points: 110

Certified 40 to 49 points Silver 50 to 59 points Gold 60 to 79 points Platinum 80 to 110