Genzyme Center

Headquarters for Genzyme Corporation

Shedding New Light on Sustainable Building Strategies

Photo Courtesy of Genzyme Corporation

A Case Study of Sustainable Building Strategies

Written by Dara Olmstead and Dona Neely

Tufts Climate Initiative & Tufts University Department of Urban and Environmental Policy and Planning

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Executive Summary

The Genzyme Center has the prestige of being one of the only thirteen buildings in the United States that have earned LEED (Leadership in Energy and Environmental Design) Platinum certification and is the largest corporate office building to earn the highest LEED designation. The high performance green building is expected to have a 42 percent lower energy cost and use 34 percent less water, compared to a conventional building. Construction processes lowered the total weight of the building by 25 percent and its design allows for 90 percent of the workspaces to have sufficient natural light. While minimizing environmental impact was a priority for Genzyme, their primary objectives centered on creating a building that provided a healthy and comfortable setting that was aesthetically appealing and something employees could be proud of.

The twelve-story, 350,000 square foot building is located in Cambridge, Massachusetts. While designing the headquarters facility, Genzyme considered site development, water use, energy efficiency, material use, and indoor environmental quality,[1] the five core features of the LEED standard's framework. The main highlight of the building is the abundance of daylight that is disbursed throughout as a result of a collection of daylighting technologies and an intricate management system. Other sustainable features include urban infill redevelopment, filigree slab construction, use of internally- and externally-generated renewable energy, energy efficiency systems, water conservation technologies, stormwater mitigation, and promotion of public transportation. The Genzyme Center, which was completed in 2003, proves that green buildings can be creative, beautiful, and functional.

1. Introduction

> *"Creating a green building-one that sets new standards-is consistent with what we do every day as a corporation," said Henri A. Termeer, Genzyme's chairman and chief executive officer. "Genzyme Center is consistent with our purpose, and our purpose is to innovate to create new standards of care for patients who have untreatable diseases."*[2]

Genzyme Center is the headquarters for Genzyme Corporation, an international biotechnology company that is "dedicated to making a major positive impact on the lives of people with serious diseases" (Annual Report 2004). Genzyme focuses on products and services related to rare inherited disorders, kidney disease, orthopedics, cancer, transplant and immune diseases, and diagnostic testing. They have approximately 7,000 employees based in 30 different countries, and revenues of $2.26 billion in 2004. The company prides itself on its innovation, collaboration, and transparency; these three concepts are reflected in the design of their corporate headquarters.

Genzyme Center is located at 500 Kendall Street in Cambridge, Massachusetts. This area is fast becoming a bio-tech hub; it borders the MIT campus, is two blocks from the Kendall Square MBTA subway stop, and is near the Charles River. Comfort for the 900 employees that work at this location was a priority and many of the environmental features, such as the day-lighting strategies and the ability to "interact" with nature reflect that goal.

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[1] What Makes Genzyme Center a Green Building? (n.d.)

[2] Genzyme Center Earns Highest Environmental Rating From U.S. Green Building Council. September 8, 2005.

1.1. Site at a Glance

Table 1: Sustainable Building Features of the Genzyme Center

Category	Description
Site Selection	Remediated brownfield
Process	Integrated building design, LEED Green Building
Material Selection	Filigree wideslab construction, FSC wood, recycled products, low VOCs, construction waste recycling
Energy Conservation	Extensive daylighting systems, sophisticated building management system, green roof
Renewable Energy	Photovoltaic panels, 100% of purchased electricity from renewable sources
Water Efficiency	Rainwater harvested, water sensors, low flow fixtures
Stormwater Management	Green roof, stormwater filtering
Indoor Environment	Low VOCs, operable windows, thermostats in offices
Transportation	Located near subway, subsidized public transportation, bicycle accommodations, car pool assistance
Contractors	Behnisch, Behnisch & Partner, Inc., architects, general planners Next Phase Studios, executive architects House & Robertson, executive architects Buro Happold, engineers Turner Construction, construction managers

2. Site

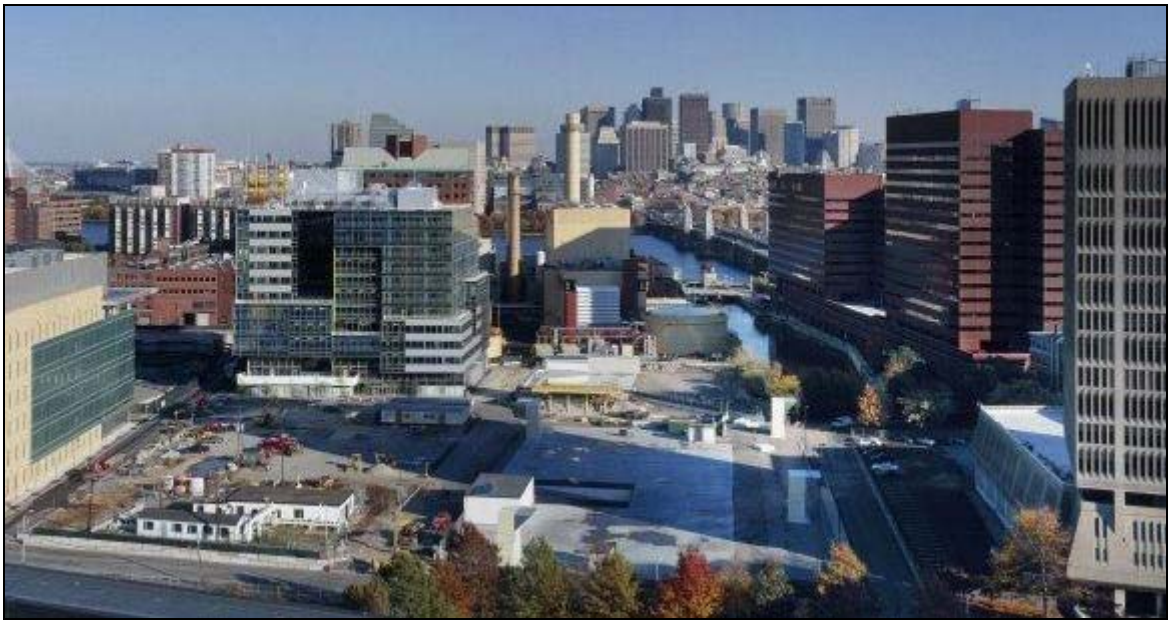
Developer Lyme Properties LLC, in conjunction with Ken Greenberg of Urban Strategies, created a master plan for this ten-acre site in the heart of Kendall Square, which intends to create a mixed-use community with commercial, residential, and recreational activities that take place 24 hours a day, 7 days a week, creating a safe, dynamic community. Kendall Square is a dense, urban area in Cambridge that is bounded by the Massachusetts Institute of Technology (MIT), the Charles River, residential areas, and other biotech and technology companies.

2.1. Brownfield

Genzyme Center is located on a remediated brownfield that was formerly a coal gasification plant. Lyme Properties invested $10 million in the cleanup; most of the contaminated soil was treated on site and capped. The building and site are part of an ambitious urban infill redevelopment which is intended to create a mixed community and help reclaim polluted sites.

2.2. Zoning

The master plan helped guide the selection and design process for the Genzyme building. The company's desire to build in the city is a departure from the common office park model that surrounds the Boston suburbs. The infill site uses urban land that is fit for development, as opposed to contributing to sprawl which uses pristine open space for development. Conserving open space on the site itself was also a priority; Genzyme preserved approximately 23 percent of open space, which is 50 percent more than required by the City of Cambridge.



The Genzyme Center is key feature in a 10-acre urban infill redevelopment plan, near the Charles River.
Source: **http://www.aiatopten.org/hpb/images.cfm?ProjectID=274**

3. The Building

Construction of the twelve-story, 350,000 square foot building began in June 2001 and the building was occupied in November 2003. Both the building and the land were owned by Lyme Properties, LLC, who subsequently sold the building in April, 2005. Genzyme Corporation occupies eleven of the twelve floors and part of the ground floor; planned retail space also leases the ground floor.

3.1. Pre-design

In April 2000, Genzyme held a competition for the design of their new headquarters. The entry submitted by Behnisch, Behnisch, & Partner, Inc. of Germany and California was selected because it presented an impressive concept rather than a model. Behnisch proposed that the building be designed from the inside out in a way that would reflect Genzyme's work style. They studied how Genzyme and their employees interact and used this insight to inform the building design. There are three key concepts that reflect Genzyme's ethos and are the cornerstones for the design: innovation, collaboration, and transparency:

Glass walls allowing views of the city create inviting meeting places throughout the building.
Source: www.behnisch.com

Innovative use of daylighting technologies brings sufficient natural lighting to 90 percent of the workspaces;

- The high proportion of open space naturally facilitates collaboration among employees; and
- Glass walls, on the outside and inside, make the building literally transparent.

Combined, these features create a bright and interactive atmosphere in the building.

Behnisch also proposed that the building follow a sustainable design; support by Genzyme's CEO Henri Termeer allowed for the green building concept to flourish and expand. Behnisch's experience with designing sustainable buildings gave them credibility that helped them build support for their ideas. Throughout the design and construction process the theme of how to minimize the environmental impact was discussed and developed by the project team.

3.2. Design Process

Three different architectural firms were involved in the design of the building. The owners, Lyme Properties, hired House & Robertson Architects to fit out the base building; Genzyme hired Next Phase Studios of Jamaica Plain, MA, to fit out their portion of the building; and Behnisch, Behnisch, and Partners was contracted to design the building shell.

The design group, which included representatives from Lyme Properties, Genzyme, and the architectural firms, followed an integrated building design process to reach sustainability goals. The U.S. Department of Energy defines integrated building design as "a process of design in which multiple disciplines and seemingly unrelated aspects of design are integrated in a manner that permits synergistic benefits to be realized."[3] With this process, green design strategies are integrated with conventional design strategies to achieve high performance at the lowest cost.

The integrated design team was supplemented with a Blue Ribbon Panel comprised of a selected group of Genzyme employees. This panel was convened to define the concept of green building and make decisions about how sustainable design would be incorporated into the building. Bill Reed, AIA, a green building expert, co-founder of the group that developed the LEED Green Building Rating System®, and vice-president of Integrative Design for Natural Logic, acted as a consultant and helped the group define "green" for Genzyme.

Early in the process, Doug King from the engineering firm of Buro Happold, who was contracted for structural, mechanical, electrical and plumbing engineering, suggested that LEED be used as

[3] Integrated Building Design for Energy Efficiency. 2004 U.S. Department of Energy – Energy Efficiency and Renewable Energy, Building Technologies Program.
www.eere.energy.gov/buildings/info/design/integratedbuilding/index.html

a guideline for the building's design. LEED (Leadership in Energy and Environmental Design) is the industry standard green building rating system that is managed by the U.S. Green Building Council (www.usgbc.org). The design process was dynamic and continually evolved as the members learned about green building practices. The LEED checklist was used as a guideline for much of the decision making process in order to guide the team in making green choices and to maximize the number of points earned by the project; this would contribute to the goal of achieving Platinum rating, the highest that can be earned. The design team focused on LEED's five-part framework to organize their environmental strategy:

- Site development;
- Water savings
- Energy and efficiency;
- Materials selection; and
- Indoor environmental quality.[4]

4. Construction

Construction began in June 2001 and was managed by Turner Construction of Boston, MA. Genzyme had worked with Turner in the past and was satisfied with their work. Turner was able to draw on their resources and green building knowledge from various divisions of their global company.

The building was constructed on a fast track schedule, where the base building construction and tenant improvement work were conducted at the same time, which is uncommon. Genzyme, Lyme, Turner, and Behnisch met weekly to discuss project management, changes, finances, and other issues to ensure that things kept running smoothly.

4.1. Sustainable Materials

Natural Logic, an environmental consulting firm with an office in Arlington, MA, was hired to define green specs for construction materials. The specs called for products that were low or free of volatile organic compounds (VOCs), organic, made from recycled content, from local sources, etc. Turner Construction was responsible for researching and locating the materials that met the criteria set forth in the design phase. Samples and manufacturers' contact information were given to subcontractors to help them obtain products that fit the specifications. Proposals for alternative products were encouraged, as long as they met the green specifications; this allowed Genzyme to choose products based on cost, performance and greenness.

With the increasing interest in sustainable building practices, green construction materials are becoming more available. Twenty-three percent of the materials used in the construction of the Genzyme Center had recycled content, including steel, aluminum, tile, drywall, ceilings, and carpets. The steel rebar was 100 percent post consumer waste recycled content, steel railings were steel fabrications with approximately 70 percent recycled content, and the Gypsum drywall

[4] What Makes Genzyme Center a Green Building? (n.d.)

had approximately 70-80 percent recycled content. In addition to using materials that were environmentally friendly, 75 percent of the materials used were from local sources. Choosing locally made products reduces the amount of fuel consumed and greenhouse gases released in the delivery process.

Almost all of the wood used inside and out was Forest Stewardship Council (FSC) certified, meaning that the wood was harvested from a forest that was being sustainably managed according to FSC's international set of standards (www.fscus.org).

4.1.1. Filigree Wideslab Construction

A unique type of concrete construction, filigree wideslab construction, was incorporated because of its many environmental benefits. Filigree wideslab construction uses two inch slabs of pre-stressed, pre-cast concrete that are laid on pillars. Next, a concrete reinforcing bar is put in, and finally polystyrene is put in the voids where less strength is needed, which reduces the amount of concrete needed and lessens the weight of the structure. The voiders were 24" wide and 8" to 12" deep; this eliminated 2,552 cubic yards of concrete and reduced the weight of the slab by 33 percent. The filigree slabs were precast to have 12" upturned edges, which eliminated the need for 250,000 square feet of (or 2,604 sheets of 4' x 8') plywood formwork. This technique also eliminated the need for 386 tons of reinforcing steel. Overall, use of the filigree wideslab lowered the weight of the building by 25 percent. With less weight, fewer concrete piles are needed and foundation elements can be reduced. The filigree slabs have thermal mass, which helps to retain the steady state temperature of the building. Exposed concrete was kept wherever possible to increase the amount of thermal mass or storage in the building.

4.2. Parking Garage

Parking was located below ground to reduce the square footage of dark surfaces and the heat island effect they create with the absorption of the sun's heat. Heat islands are magnified by a lack of vegetation that would cool the air and shade the land. This intense heat leads to an increase in air pollution, particularly smog. Additionally, the uncomfortably warm air in the summer triggers an increase in air conditioner and electricity use, which increases greenhouse gas emissions.

Putting the parking below ground also reduces the amount of stormwater runoff from impermeable surfaces. Stormwater runoff can carry pollutants, such as oil and fertilizers, into nearby waterbodies, which in this case would be the Charles River, a river that is listed on the EPA's list of officially polluted waterbodies.

4.3. Demolition and Construction Waste

Turner Construction created a construction waste management plan that defined the roles and responsibilities of how they and the subcontractors would recycle construction waste. George Trucking, a waste hauler from New Hampshire, was hired to facilitate this recycling. The fact that they separate construction waste at their site simplified and streamlined the process of ensuring that most of the waste would be recycled. The haulers kept track and provided proof of the amount of materials that were recycled; over 93% (calculated by weight) was recycled. Concrete spill leftover from delivery was recycled back to the batch plant to be reused; this accounted for a large percentage of the recycled waste calculation, with its heavy weight.

5. Energy

It is estimated that the energy saving strategies implemented throughout the building in will reduce energy usage to be 36 percent lower than the average for comparable buildings and 25 percent less than a new building that meets the Massachusetts state energy code requirements.

International engineering firm Buro Happold of New York used DOE-2 to model the energy efficiency of the building. The DOE-2 software program considers a building's layout, construction, usage, heating and cooling systems, weather data, and utility rates to predict the facility's energy use and cost. This tool predicted that energy costs for the base building (shell with heating and cooling) would be 42 percent less than a conventional building's. The DOE model is not used to evaluate actual post-occupancy performance of the Genzyme Center because it does not take into account the build-out of the office space and did not consider the use of a steam absorption chiller.

5.1. Building Envelope

The building envelope is composed largely of glass; 46 percent of the envelope is single-glazed glass and 22 percent is solid cladding. Eight hundred windows line the building and provide ample daylight. Forty percent of the building's exterior is a double façade that is separated by an accessible four-foot loggia space. This design helps the building maintain its thermal conditions by trapping heat that is radiated from the building and blocking solar heat that would otherwise enter the building.

Nearly half of the Genzyme Center's envelope is glass.
Photo Courtesy of Genzyme Corporation

5.1.1. Green Roof

The Genzyme Center has reduced their environmental impact by planting an insulated roof membrane assembly (IRMA) green roof. Placing membrane under the insulation provides additionally waterproofing protection for the roof. The green roof spreads plantings across approximately 50 percent of the roof; Energy Star rated reflective surfaces are used on the remainder to reduce heat absorption and cool the air.

5.2. Daylighting

As a result of the building design and lighting technologies installed, 75 percent of the employees have an outside view and 90 percent of the workplaces have sufficient natural light. Lighting engineers from Bartenbach LichtLabor from Austria were employed to fulfill Genzyme's goal of maximizing the amount of natural light available to the employees. The technologies used include "U" shaped blinds, heliostats, reflective ceiling tiles and wall surfaces, metal light distributors, and prismatic chandeliers. The reflective pool on the ground floor also functions as a light distributing mechanism.

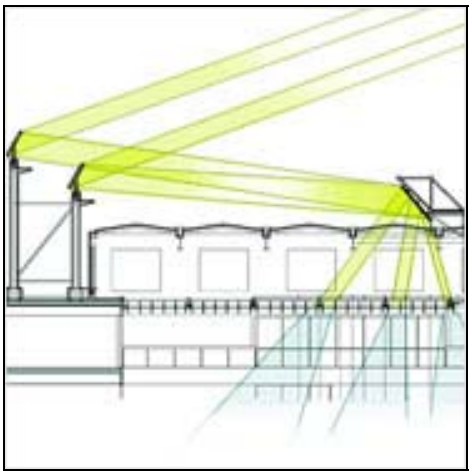
5.2.1. Perimeter Blinds

"U" shaped perimeter blinds collect light and reflect it onto metallic ceiling panels to reduce glare and increase the depth of light penetration. These computer-controlled blinds track the sun and catch and diffuse light throughout the day. The upper section of the blind redirects light onto the ceiling panels while the lower section is made of perforated vanes that minimize glare. The blinds automatically tilt according to the sun's position and are programmed to close at night to reduce light pollution and help maintain the building's temperature. The management system uses a weather station on the roof to compile data that is used with an annual shading diagram that takes into account many factors, including nearby buildings and the sun's position, to control the blinds on each floor and section of the building. Occupants can override the system for thirty minute increments if they desire a different level of light. The blinds can maximize heat gain in the winter and minimize it in the summer by directing the sun's heat in or out of the building.

5.2.2. Heliostats

The amount of daylight is further increased by seven movable heliostats (mirrors) on the roof that track the sun and direct it into the building via through prismatic, computer controlled louvers on the atrium skylight made from milled acrylic that mechanically adjust to diffuse light and reduce glare. This light is reflected off of various surfaces throughout the atrium. The skylight louvers can also be used to block light and heat when the sun is too strong. Weather sensors adjust the heliostats according to low light levels, the sun's position, and high winds. The mirrors on the roof automatically move in order to avoid being damaged by high winds.

Roof mounted mirrors, heliostats, direct light into the building through a skylight.
Photo Courtesy of Genzyme Corporation



Source: www.metropolismag.com/html/content_0104/gen/index.html

5.2.3. Light Wall

High gloss, reflection coated interior vertical blinds were installed on one side of the atrium to form a "light wall" that maximizes daylight distribution. The light wall is computer controlled to distribute light according to weather conditions. The wall is composed of twenty-two polished aluminum panels and each panel is composed of vertical blades. The panels are perforated to allow light to pass through, in addition to distributing light that is reflected off their surface. The light wall has six preset time controlled configurations that are engaged throughout the day. Additional reflective panels on the inner surface of the atrium walls further enhance light

reflection. These panels were partially funded by a grant from the Massachusetts Technology Collaborative (MTC).

5.2.4. Prisms

The distribution of daylight is further enhanced by 768 prismatic plates arranged as mobiles that reflect light into the building, while also functioning as art. The milled acrylic prisms cause light and rainbows to bounce around the building, mimicking the movement of nature inside the building and allowing for the surroundings to feel more dynamic. During the daytime the prisms reflect sunlight, which prevents heat from being absorbed; they also diffuse light and eliminate glare from the halogen lights that are turned on at night.

Light directed through the skylight is reflected off a prism chandelier and a light wall.
Source: www.behnisch.com

5.3. Lighting Efficiency

Photo sensors and occupancy sensors were installed in offices to make sure lights are off when employees leave the room. The sensors also automatically switch lights to a "soft-off" mode when daylighting should be sufficient; this status can be overridden by occupants to ensure worker comfort. Energy efficient halogen metal vapor ceiling lamps are used at night; light from these spotlights is reflected off the prism chandelier, which results in sufficient light in the atrium.

5.4. Heating and Cooling

Low-grade waste steam obtained from a neighboring cogeneration plant is used for heating and cooling instead of electricity; this approach reduces energy costs and greenhouse gas emissions. The steam is exchanged into heat or used to drive a steam absorption chiller for cooling; fan coil units are used to meet local heating and cooling needs.

The building is also cooled naturally by the stack effect of the heat rising up through the atrium and out of the building; this process is greatly enhanced by the large atrium. Use of the operable windows further benefits this flow and minimizes demands on the HVAC system.

5.5. Building Management System

A complex building management system designed by Andover Controls maintains thermal conditions and manages energy usage based on data collected from sensors on the roof that monitor the weather and availability of daylight. The system manages the building's windows, blinds, lights, thermal conditions, etc., based on information collected from 5,000 points of control or operation points. The system can override individual thermostats and shut off the HVAC system if windows are open; it also decreases the amount of air circulation when the office is not occupied. The building management system is an integral part of the energy conservation strategy.

Genzyme has developed an internal reporting system to measure and track key environmental performance indicator data, such as energy use, water consumption, air conditions, and CO_2 emissions. The company collects this data at most of their facilities to identify potential improvement projects and measure the value of projects implemented. The data is also combined into a global report that is used internally to review building performances.

5.6. Renewable Electricity

One hundred percent of the Genzyme Center's purchased electricity is from renewable sources, currently a mix of 10% wind, 12% landfill gas, 40% small hydro, and 38% biomass. Genzyme purchases their electricity from electricity generator Constellation Energy, distribution is through NStar. When the contract was initially established, the renewable energy did have a premium cost, approximately four percent higher than the total cost of electricity (generation, transmission and distribution costs). However, the agreed fixed cost may now be more comparable, given the subsequent increase in the cost of electricity from non-renewable sources.[5]

PowerLight designed and installed a 1,650 square-foot array of roof-mounted photovoltaic panels in the summer of 2003. The photovoltaic system has a peak output of 20kW and produces about 24,000-26,400 kWh per year. Genzyme considered potential solar gains, the risk of wind shears, and cost when they decided to lay the arrays flat instead of tilting them. The facility personnel visually inspect the system monthly to look for trash and other items that could be covering the panels. The electricity generated is used to light the fire escape stairwells, where there is no natural daylight. The photovoltaic panels were sponsored in part by a $321,750 grant from the MTC, which also was applied to additional reflective panels.

6. Water

The facility is expected to use 34 percent less water than is used in a similar sized building. Exact numbers are unavailable, but it is estimated that the building's conservation measures are saving more than 500,000 gallons annually in internal water use.

6.1. Consumption and Conservation

Water is used for restrooms, showers, the cafeteria, water fountains, irrigation of outside landscaping and indoor gardens, a reflection pool in the lobby, and cooling towers. Water conservation measures include: the installation of low flow fixtures, waterless urinals, dual flush toilets, and sinks and water fountains with motion sensors.

When the contractors were looking for dual flush toilets there were no commercial models available in the United States; therefore, an Australian brand, Caroma was ordered. The dual flush toilets use 0.8 gallons of water for the smaller flush, and 1.6 gallons for the larger flush. At the time, the buttons on the dual flush toilets were not ADA (American Disabilities Association) approved so they could not be used in handicap stalls. Instead, Genzyme installed toilets that are more efficient than conventional toilets, but less efficient than the dual flush model.

[5] Matilla, Rick. Personal communication, September 12, 2005.

6.2. Harvesting

Stormwater is retained by the part of the roof that is a living roof. Rainwater from the parts of that do not have a roof garden, such as the area around the PV panels and the mechanical penthouse, is harvested and used for the cooling tower of the HVAC system or for watering plants. Stormwater that is not used is filtered before it is released to the stormdrain system; these filters require minimal maintenance and periodic cleaning. These features collectively reduce stormwater runoff by 25 percent.

6.3. Landscaping

The property was landscaped with native or adaptive plants to reduce water, fertilizer, and pesticide use. Reduced fertilizer use is important because fertilizers contribute to eutrophication of water bodies. Drip irrigation is employed instead of spray irrigation for outdoor landscaping. Moisture sensors were installed in the soil (both inside and outside) to eliminate unnecessary watering. These sensors, which are used throughout the entire site property owned by Lyme, are predicted to save 216,000 gallons of water annually.

7. Build-out Materials

A water-based polyurethane finish was applied to the wood athletic floor instead of a wax finish, which requires a high VOC solvent for its application. However, there is now concern that this type of finish may not wear well in high-traffic areas. Milliken carpets tiles were installed in carpeted areas, to allow for the replacement of sections that have reached the end of their useful life, instead of the entire carpet.

Genzyme also chose urea formaldehyde-free wood composites. Urea formaldehyde, which is used as an adhesive in pressed wood products, causes many health problems in humans and is a suspected carcinogen. Wood with wheat board core, which is a renewable, agricultural byproduct, was also used.

Eco-friendly furnishings were obtained from Steelcase, a company that applies a life cycle approach to its manufacturing processes. Steelcase built the first LEED certified manufacturing facility and has eliminated nearly all hazardous waste from its manufacturing process and almost all VOCs from one of its metal furniture lines. Steelcase was also the first to test its furniture for indoor air quality impact. All wood used in the furniture purchased for the Genzyme Center was FSC certified and made with recycled content, most pieces were finished with a water-based finishers. Steelcase reduced related packaging by either wrapping products in blankets or shipping them in flat boxes and assembling them onsite.

8. Operations and Maintenance

An independent commissioning agent, EH&E of Newton, MA, was hired to review building systems, provide a commissioning plan, monitor the installation of equipment, conduct a final operational survey, and verify the proper working of many of the systems. In addition to

completing and submitting the reviews, the agent provided a manual for re-commissioning, which was to be conducted during the first year of occupancy.

Adjustments to the building's systems began after move-in (November 2003) and continues today (May 2005) as Genzyme's operations staff continues to learn how the building functions. A particular area of focus has been how the air circulates around the significant open space area and causes the temperature to feel cooler than it actually is. Minimal maintenance issues have been reported at this time.

8.1. Operations Manual

Turner Construction and a subteam of Genzyme's design team that included facilities and maintenance employees compiled the operations and maintenance manuals for all products and systems in the building. Because of the scope and amount of information to be organized, Genzyme requested that the information be assembled in an electronic operation and maintenance user manual. Turner created an eighteen chapter manual that includes embedded links for the manufacturers, equipment, and products; this makes the information easy to find in a user friendly format. Additionally, the electronic document can be easily updated and does not require paper. The manual covers the topics of structural components (e.g., concrete, roofing, flooring), energy efficiency systems (e.g., photovoltaic system, curtainwall, automated blinds), operational systems (e.g., elevators, HVAC systems, emergency power), and more.

9. Occupant Comfort

Many building features, including daylighting, natural ventilation, maximum circulation of air, and individual control over temperature and lighting, were incorporated to ensure a healthy and pleasant environment. A survey found that 58 percent of the employees based in the Genzyme Center believed that they were more productive in the new headquarters. Additionally, the sick time recorded for employees based here was five percent lower than the collective average in other Massachusetts facilities.[6]

Daylight is maximized throughout.
Photo Courtesy of Genzyme Corporation

As discussed in the Energy section, daylighting is one of the most important features of the building. Seventy-five percent of workers receive at least two percent daylight. Daylight is enhanced through a combination of innovative features that allow the light to penetrate into all parts of the building. These features include the glass shell, heliostats, skylight, reflective panels and surfaces, prism chandeliers, and a light wall. Computer controlled shades and louvers optimize the amount of daylight brought in and prevent glare so occupants can work comfortably.

[6] Genzyme Center Earns Highest Environmental Rating From U.S. Green Building Council. September 8, 2005.

Superior indoor air quality was of high importance to the design team, as it is one of the main ways of ensuring that the building is a healthy work environment for employees. The strategy called for low-VOC or VOC-free materials such as in paints, adhesives, wood preservatives, carpets, and plastics, to minimize related off-gassing. Carbon dioxide (CO_2) monitors that adjust airflow levels as needed were installed throughout the building. Operable windows on all twelve floors give employees control over their work environment and allow fresh air to be easily brought into the building.

Temperature and humidity monitors that are connected to the building management system keep the building at optimal thermal comfort levels. Thermostats allow occupants to adjust the temperatures in their own offices to suit their needs. The indoor reflective pool and plants also help to naturally regulate humidity levels.

Eighteen interior gardens and seven accessible outdoor garden terraces increase the workers' connection to nature and contribute to better indoor air quality. Plants and moving art structures -- prisms that cast rainbows and a large reflective pool on the first floor -- make the indoor environment seem more natural and dynamic.

Large stairways, a cafeteria, multiple lounge areas with bright colored furniture, and common printing/copy and coffee centers are dispersed throughout the building. The abundance of open space allows for air and light circulation; this design is also meant to facilitate creativity, interaction, and collaboration among the employees, as well as provide for a comfortable work environment.

Interior gardens allow employees to connect with nature while working.
Photo Courtesy of Genzyme Corportation

10. Transportation

Genzyme pays 60 percent of its employees' MBTA passes, including subway, bus, commuter rail, and boat passes. The building is located less than two blocks from a major subway station, Kendall Square on the Red Line, which links commuters to Boston, Cambridge, Somerville, and the suburbs. In addition, commuter bus lines run through the area. A "guaranteed ride home" program is offered to employees who take advantage of public transportation services.

The company also promotes carpooling to minimize single occupant automobile trips taken by their employees. The parking building is detached from the building and provides only 600 spaces, which minimizes the "convenience" of driving to work. The building offers 40 parking lanes for car pool vehicles; eleven recharging stations are also available for electric vehicles, though it is believed that they do not get much use.

Genzyme has contracted with ZipCar, a membership-based program that offers cars for rent by the hour in major cities across the U.S. (www.zipcar.com), to make shared Toyota Prius hybrid vehicles easily available to the staff. The company also provides employees with access to the Charles River Transportation Management Association's database which is used to match workers with carpools and vanpools (www.masscommute.com/tmas/crtma/rideshare.htm); the City of Cambridge requires this as a condition of development approval. Shuttle service is provided between Genzyme's Cambridge facility and their office in Framingham, a suburb of Boston. Additionally, bicycle racks, showers and a locker room are available for bicycle commuters.

These initiatives earned Genzyme the designation of being named one of the "Best Workplaces for Commuters" by the Environmental Protection Agency and the Department of Transportation in 2005.

11. Financial

The Genzyme Center cost $140 million (including fit out), with $107 million for construction; the square foot cost is estimated to be $400. Approximately $23 million, or 16 percent of the total cost, was invested in sustainable features. Savings of 42 percent off energy costs and 32 percent off water costs are expected.[7]

In 2002, the Massachusetts Technology Collaborative awarded Genzyme a $321,750 grant for the photo-voltaic system and reflective metal wall panels. The organization also provided Genzyme with a second grant of $30,000 to create two interactive educational kiosks where visitors could learn about the environmental aspects of the building.

12. LEED Certification

The LEED (Leadership in Energy and Environmental Design) Green Building Rating System® provides a national standard for high-performance, sustainable buildings. The LEED framework focuses on sustainable site use, environmentally-friendly building materials, energy efficiency, water conservation, and indoor air quality (www.usgbc.org/DisplayPage.aspx?CategoryID=19). Genzyme applied this framework as a design guideline for their building. By doing so, they successfully achieved their goal of earning a LEED Platinum rating, the highest level, with a total of 52 out of a possible 69 points. The application process was completed by the Genzyme Center's team and managed by Genzyme's Director of Environmental Affairs, Rick Mattila. The Genzyme Center is now distinguished as one of the only 13 buildings that have earned this designation (as of September 2005). Over the past five years, only 260 of the more than 2,100 building projects that applied have earned LEED certification.[8]

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[7] Genzyme, Environmental Construction, http://www.genzyme.com/genzctr/genzctr_enviro.asp
[8] Genzyme Center Earns Highest Environmental Rating From U.S. Green Building Council. September 8, 2005.

13. Education and Outreach

Genzyme estimates that over 2,500 tours were given in the first year of occupancy and that in 2004 there was an average of 480 visitors per week. To date over 5,000 building professionals, government officials, students, and members of the public have visited. Due to the building's popularity, Genzyme has trained 40 employees to be able to conduct tours; they also offer monthly public tour dates.

Two interactive kiosks, partially funded by a MTC grant of $30,000, have been set up; one is located in the company's cafeteria, the other is in the building lobby where it is easily accessible to the public. The media presentation offers information on how the building's features benefit the employees, environment, and community. This exhibit is also accessible on the company's website, along with links to press releases and articles that review the features of the green building (www.genzyme.com/genzctr/genzctr_home.asp). Additionally, Genzyme has produced a "Genzyme Center" pamphlet that highlights the design and the eco-friendly aspects of the building. The architects at Behnisch, Behnisch & Partner compiled a 96 page book about the facility and sustainable building practices called *Genzyme Center,* which is available from FMO Publishers (www.fmo-publishers.com).

13.1. Awards

The Genzyme Center has earned a number of special recognitions for its architectural and sustainable features. Below is a list awards received and the sponsoring organization.

- Worldwide award for high architectural standards and substantial contribution to the environment, Royal Institute of British Architects, 2005.
- Best Workplace for Commuters, Environmental Protection Agency & Department of Transportation, 2005.
- Environmental Merit Award, Environmental Protection Agency, 2004.
- Top Ten Green Projects, American Institute of Architects, 2004.
- Build America Award, Association of General Contractors, 2004.
- Green Building Awards, Northeast Sustainable Energy Association, 2004.
- Future Projects Award, Architectural Review, 2004.
- Excellence in Sustainable Design & Development, New Hampshire Chapter of the American Institute of Architects, 2004.
- GoGreen Business Award, City of Cambridge, 2004.
- WasteWise Program Champion, Environmental Protection Agency, 2003.
- John A.S. McGlennon Environmental Business Council of New England Environmental Award for Corporate Leadership, 2003.

13.2. Press

In addition to the awards earned, the Genzyme Center has been featured in several publications:

- "Genzyme Builds New Corporate Headquarters in Cambridge." *High-Profile*, November 2002. www.high-profile.com/2002/nov/genzyme.html
- "Bright Idea." *Boston Globe*, October 25, 2003. www.genzyme.com/genzctr/pdf_genzctr_news_globe.pdf

- "Productivity." *Metropolis*, January 2004. www.metropolismag.com/html/content_0104/gen/index.html
- "Luminous Paradigm." *The Architectural Review*, April 2004. http://www.arplus.com/broch/articles/arapr04/arapr04behnisch.pdf
- "The Earth Day Ten." *Interiors and Sources*, July 2004. www.isdesignet.com/Magazine/2004/jul/earthday.html
- Project Portfolio. *Architectural Record*, July 2004. http://archrecord.construction.com/projects/portfolio/archives/0407KendallGenzyme.asp
- "Building Green." *Boston Globe*, September 6, 2004.

14. Contacts

The primary vendors involved in the design and construction of the Genzyme Center include:

Primary Contact
Rick Mattila, Director of Environmental Affairs, Genzyme, http://www.genzyme.com/

Architect (Lead designer), General Planner
Behnisch, Behnisch & Partner, http://www.behnisch.com

Construction Managers
Turner Construction, http://www.turnerconstruction.com/

Engineers
Buro Happold, http://www.burohappold.com

Green Construction Specifications
Natural Logic, http://www.natlogic.com/

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