

Genzyme Center

A Model for Green Building in the 21st Century

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An innovative and highly advanced method of sustainable development practiced throughout the world today is though “green building.” Green building is a way to minimize the ecological footprint¹ through site planning, energy and water conservation, and material recycling, while also enhancing the built and natural environments². It affects every step of development, from the groundbreaking and construction, to daily operation. It also contributes to the lives of the occupants inside the building, as well as the community outside.

While green building is more commonly found in Europe, the practice is steadily increasing in America. Since the U.S. Green Building Council’s (USGBC) development of the LEED (Leadership in Energy and Environmental Design) Green Building Rating System®, there is now a national standard of green building. As of 2005, 289 new constructions projects were LEED®-certified, and 2,069 new constructions projects have applied for certification³.

One notable Platinum-Level LEED®-certified project, the highest status of certification attainable, is the Genzyme Center in Cambridge, Massachusetts. The Genzyme Center is the corporate headquarters for the biotechnology company, Genzyme Corporation. It was designed with two main goals in mind: first, to create an exciting and interesting workplace for its 900 employees and second, to serve as an environmentally-responsible building with cutting edge technology. The result is a structure with an all-glass exterior, a twelve-story central atrium with skylights, incredible amounts of natural sunlight, and extensive views of the outdoors, which gives it an “open and airy feeling.” It uses 34 percent less water than a comparable building, has 42 percent lower energy costs than a comparable building, and 75 percent of the materials used have recycled content, which has minimized the impact on the environment⁴. Through innovative green design strategies, the Genzyme Center has created an employee-friendly and environmentally-friendly atmosphere. This essay will discuss the land-use and site selection, water conservation and use, energy conservation and efficiency, material use, and indoor environmental quality that together have created a unique and exemplary model of green building.

Land-Use and Site Selection

The Genzyme Center is built in a previously-industrial neighborhood on an abandoned coal gasification plant site. Surrounded by vacant lots, the site was situated in a depressed

neighborhood. By remediating the “brownfield” site, the land has been brought back to productive use. With the MIT campus and the Cambridge Side Galleria Mall nearby, as well as adjacent residential homes, the development of the Center fits within the local and regional planning framework of creating a mixed-use community⁵. As the area continues on its path of revitalization, the added pedestrian traffic from the Genzyme employees will attract commerce and retail attractions in the neighborhood—further enriching the area.

Because the Center is located near the Charles River waterfront area, bicycling and walking paths are easily accessible. The public transit MBTA Red Line is a five minute walk from the Center. To encourage automobile alternatives, the Center has an indoor bike storage area with lockers, showers, and changing areas. The company also provides discounted public transit passes and a carpool database service. For those who need to drive, the garage has preferred carpool spaces and has electric vehicle recharging stations, to encourage further environmentally responsible alternatives.

During construction, eco-friendly land-use tactics included maximizing open space by exceeding the city requirements by 50 percent, reducing disturbance to the site, controlling erosion and stormwater runoff, and protecting wetlands. Planted vegetation was either native or adaptive plants and trees. In order to minimize the albedo effect caused by asphalt parking lots, the parking garage is underground. The land-use and site selection plans are positive green design techniques that help the community, reduce air and water pollution, and add convenience to the employees⁶.

Water Conservation and Use

A number of water conservation techniques have been applied to the Genzyme Center. The green roof system of the Center is made from plant materials and a reflective surface to reduce heat absorption. Stormwater runoff is reduced by 25 percent due to the vegetated roof and the skylight rainwater collection system. Rainwater collected from the roof, “greywater,” supplies the evaporative cooling towers, which reduces the use of potable water. Any overflow that is not used to irrigate the vegetated roof or supply the cooling towers is filtered to remove solids before it is discharged into the stormwater sewer⁷.

The indoor and outdoor gardens are set up with efficient irrigation systems (moisture sensors) that help in conserving water. Automated and low-flow faucets, waterless urinals,

and dual flush toilets have reduced potable water usage by 32 percent below the average comparable building.

Energy Efficiency

To create a comfortable and eco-friendly atmosphere, the heating and cooling system of the Genzyme Center is powered by the steam from an adjacent power plant. For heating and cooling, a fan coil system pumps water around the building, instead of blowing air, which is more energy efficient. The fan coil units automatically turnoff when windows or doors open for ventilation. Temperature control is also found in several areas in the building, which allows people to control their specific environments.

Through an intricate system of roof-top mirrors and various reflective surfaces on top of the atrium and inside the Center, natural light is reflected throughout the building. This creative usage of light allows almost every occupant to use natural sunlight during the day, instead of overhead lights. A daylight dimming system and an automatic light detection system have reduced light usage by 45 percent⁸.

Through the construction of a double façade on one-third of the building, a four-foot ventilation void is created. In the summer, blinds are used to block the sunlight and the heat is vented out through the void. In the winter the blinds are opened and vents closed, so that the heat can create a warm buffer around the building. Solar and thermal controls are further enhanced through the construction of a double glazed façade, low emissive coatings, and internal blinds, on the remaining two-thirds of the building.

A photovoltaic system on the roof generates electricity on-site at 20kW at peak output. Energy efficient fans, motors, and equipment along with the heating/cooling management systems have reduced the projected overall energy cost for the building by 42 percent.

Material Use

The Genzyme Center has increased thermal efficiency through the use of filigree slab concrete as the main construction material. Because of the concrete's strength, the use of reinforced steel is reduced. Foam fillers lessened the overall weight of the structure, which led to further reductions in foundation materials. The total amounts of material reduction based on a comparable building were 386 fewer tons of steel reinforcements, 2,552 fewer

cubic yards of concrete, and 2,600 less sheets of plywood forms⁹. In addition, construction time was significantly shortened. The use of the concrete also reduced the amounts of VOCs released in the environment at the factory and on-site.

LEED calculates that 23 percent of the materials used in construction are recycled materials. Fifty percent of the materials used were manufactured locally and almost all of the wood products were certified by the Forest Stewardship Council. Additionally, for the building's recycling program, over 500 square feet of storage area is dedicated to recyclables. Through the development of a construction waste management plan, 93 percent of the construction waste was recycled or reused.

Indoor Environmental Quality

The indoor environmental quality is a common issue with the average office space in the States. The "Sick Building Syndrome" is apparently the cause of numerous health problems stemming from poor ventilation, poor air quality, insufficient light, and inadequate humidity and temperature controls. The Genzyme Center through its green design features has created a superior environmental air quality system. To monitor indoor air quality carbon dioxide, temperature, and humidity monitors have been placed throughout the building. All paints, coatings, sealants, and adhesives meet low VOC standards. Carpets and composite woods all meet industry health standards.

Because of the lights enhancement system, 75 percent of work spaces receive sufficient natural light and the use of overhead lights is unnecessary. Every workspace has views to the outside. There are 18 indoor gardens and outdoor patios that connect people to the natural environment.

The overall flexible design of the Center allows for interior changes in order to adapt to future needs, an important aspect of green design. This allows the building to be fluid and change with the needs of the time and environment, and not be stuck in time and place. Individuals are allowed to choose their chairs and file cabinets, adjust their desk and chair heights, and control their lighting and temperature and windows, which create a far more people-friendly atmosphere as well as an environmentally-friendly structure.

By creating a space that is better for people the engineers and designers of the Genzyme Center have constructed a workspace that is not only stimulating and exciting to the

occupants, but less polluting to the environment. By providing multiple modes of access to the Center, redeveloping a marginal neighborhood, and remediating a brownfield site, the land use and site selection has contributed to the health of the surrounding community. Through water conservation methods, potable water consumption is reduced. Through solar energy use for heating and lighting, steam collection from a nearby plant, and energy efficient systems throughout the building, the Center has reduced energy consumption. By reducing and recycling the materials used in construction the overall time and money spent in constructing the building has been significantly reduced. And by creating an indoor atmosphere that is conducive to happy and healthy employees the Center have provided a great place to work for people. Through these innovative green design strategies, the Genzyme Center is a wonderful model for developers and companies throughout the country and the world to learn from.

¹ Timothy Beatley, *Green Urbanism* (2000), 290.

² Alexis Karolides, "Green Building Approaches," *Green Building: Project Planning & Cost Estimating* (2002), 3.

³ U.S. Green Building Council, "An Introduction to the U.S. Green Building Council and the LEED Green Building Rating System®" (2005).

⁴ [Genzyme Corporation Official Website](#).

⁵ U.S. Green Building Council. *LEED Certified Project Case Study: Genzyme Corporation* (2003).

⁶ [LEED Certified Project Case Study \(2003\)](#).

⁷ [LEED Certified Project Case Study \(2003\)](#).

⁸ [LEED Certified Project Case Study \(2003\)](#).

⁹ [LEED Certified Project Case Study \(2003\)](#).

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