



OMEGA CENTER FOR SUSTAINABLE LIVING
Rhinebeck, New York

ENVS 664
October 20, 2010
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INTRODUCTION

Building and construction seems to be the most sectors that have potentially large contribution to achieve sustainable development. Nowadays, sustainable building and design is widely spreading not only in the United States, but also is a new paradigm in other countries. Sustainable building extends beyond the use of recycled materials, energy efficiency, and low impact construction. It goes into a green building, which explains more, it is a high-performance property that considers and reduces its impact on the environment and human health. It is designed to use less energy and resources to reduce life cycle environmental impacts of the materials used (The Green Building Revolution, 2008; Smart & Sustainable Built Environments, 2005). I therefore picked the Omega Center of Sustainable Living (OCSL), Rhinebeck, New York as a perfect example of the building that is designed under the green concept.

THE OMEGA CENTER FOR SUSTAINABLE LIVING

Omega Institute for Holistic Studies, a nonprofit organization, was founded in 1977 with the goal to foster personal growth in health and happiness, while living happily with others in the society. At present, it becomes the nation's most trusted source for wellness and personal growth, and an outstanding internationally human development company that provides exceptional services to more than 23,000 people yearly (Omega Center for Sustainable Living, 10/14/10).

Omega Center for Sustainable Living (OCSL) is an organization under Omega Institute for Holistic Studies. In 2005, the preliminary goal of OCSL was to replace the organization's wastewater septic system by using alternative methods, which were able to complete a closed hydrological loop in water use. With a greater effort, Omega has set out the use of its water system and building as a teaching tool in their educational program designed around the ecological impact of their Rhinebeck campus. Accordingly, the OCSL today serves as the heart of Omega's environmental initiatives. To achieve its highest goal, environmental sustainability, the OCSL declares itself as an environmental education center and natural water reclamation facility to meet the highest standards currently available in sustainable architecture (Omega Center for Sustainable Living, 10/14/10).

Omega decided to use an Eco MachineTM designed by John Todd, as a new wastewater treatment for the building. The Eco MachineTM as a heart of the building, is a natural wastewater treatment system that cleans water by mimicking the natural systems, in other words, Eco

Machine™ uses zero chemical to treat wastewater before dispersed back to recharge the aquifer (Omega Center for Sustainable Living, 10/14/10).

The OCSL's building designed by BNIM Architects, houses a classroom, laboratory, greenhouse, water garden, restrooms, and a constructed wetland. The building was built in a way that systems can be seen, understood, and replicated with the expectation that others will be inspired and help to protect the clean water and adopt sustainable living practices. Omega identified three criteria to be met by the natural water reclamation system:

1. Water reclamation using zero chemicals
2. Water reclamation using low energy
3. Educational opportunities for individuals and groups

OCSL BUILDING ELEMENTS

Every element of the OCSL campus development and infrastructure is designed to emphasize sustainability (Green Building Materials: A Guide to Product Selection and Specification, 1999). Site improvements must meet regulatory requirements, be in educational form, and create beautiful inspiring landscapes within the ecological and cultural context of the campus. Demonstrations of the developed water reclamation educational programming will make the most of all site elements.

OCSL - Site

OCSL is located on 195 acres in Hudson Valley, Rhinebeck, New York. The 6,250 square feet (4.5 acres) building was built on an already developed site, an old landfill, for new development. Before the construction started, the OCSL team worked very hard to ensure that the former landfill was safely cleared. Total project cost (land excluded) was \$2,800,000 (AIA: Omega Center for Sustainable Living, 10/14/10).

OCSL - Water reclamation

OCSL's reclamation system was sustainably designed to fit the campus water usage on the conservational basis. Rainwater is collected, purified, and then used for site maintenance and in the building's toilets. All water on the campus is used and purified in a closed hydrological loop; water is drawn from deep wells, is used, and finally flows to the Eco Machine™. With the Eco Machine™, all water from the campus is purified by microscopic algae, fungi, bacteria, plants, and snails in seven

steps, which are solid settlement tanks, equalization tanks, anoxic tanks, constructed wetlands, aerated lagoons, recirculating sand filter, and dispersal fields. The machine's maximum capacity of purifying water is 52,000 gallons of water per day and takes approximately 36 hours to process wastewater.

To keep the machine runs effectively, each component is specifically designed to allow the OCSL team to manage the flow of wastewater, for example, when water usage is low, wastewater is divided among various cells to efficiently feed all living organisms and plants that purify water (Omega Center for Sustainable Living, 10/14/10; AIA: Omega Center for Sustainable Living, 10/14/10).

OCSL - Energy

OCSL building was designed to be an extremely efficient building. All systems are supplied by 100% energy from the 211 photovoltaic solar panels that integrated into the building. OCSL is heated and cooled with the use of 100% geothermal energy. When heat is needed, an electrically driven compressor takes the constant heat available from the earth and concentrates it for use, and delivered to the radiant heating system. For cooling, heat is extracted from the building and transferred to the earth. Energy reduction is achieved in the greenhouse, for example, in winter months vent windows open up to let solar radiation in (Omega Center for Sustainable Living, 10/14/10; AIA: Omega Center for Sustainable Living, 10/14/10).

OCSL - Electricity

Three solar arrays (211 photovoltaic panels) generate electricity more than what the OCSL can use on an annual basis. These arrays generate 134.20 kilowatt per day and the building demand 132.77 kilowatt per day on average. These solar panels generate more electricity than the building consumes, hence OCSL is a net zero energy building. OCSL uses a concept of net metering; the excess electricity will be sold to Omega's utility company and will draw energy back from the local power grid when there is not enough captured energy (Omega Center for Sustainable Living, 10/14/10; AIA: Omega Center for Sustainable Living, 10/14/10).

OCSL - Materials

Using green building materials can provide compliance with regulatory requirements [green building material]. Omega's ultimate goal is to be the first Living Building in the region that the building design meets the United States Green Building Council's LEED Platinum standards and

achieves certification as a Living Building. Thus, all materials of OCSL's building need to conform to the designation. OCSL's building materials were selected to avoid harmful chemicals. All new wood materials came from the Forest Stewardship Council (FSC) certified sources. All concretes were sourced locally, which made up of 40% slag. Moreover, 99% of metal, cardboard, rigid foam, and wood waste were recycled materials (Omega Center for Sustainable Living, 10/14/10; AIA: Omega Center for Sustainable Living, 10/14/10).

OCSL - Indoor environmental quality

Operable windows in each space of the building are applied to provide wellbeing and enjoyment to visitors. They play a vital role in the passive heating and cooling system for the building, for instance, vent windows open automatically when the inside temperature reaches a set level. Floor plan orients in an east-west axis is for the best control of daylighting. Moreover, all building materials need to be evaluated for durability, environmental impact, and impact on indoor air quality in order to minimize the potential of toxin from construction materials (Omega Center for Sustainable Living, 10/14/10; AIA: Omega Center for Sustainable Living, 10/14/10).

OCSL GREEN HONORS

- *Living Building Challenge™ Certification, 2010*: the OCSL was one of the first buildings in the world to achieve full certification under the Living Building Challenge™ from Cascadia Region Green Building Council, the most advanced green building rating system in the world (Living Building Challenge: a proven strategy for reclaiming the built environment, 10/14/10)
- *LEED Platinum Certification, 2010*: the OCSL achieved the highest green building designation available from the U.S. Green Building Council (Omega Center for Sustainable Living, 10/14/10).
- *AIA/COTE 2010 Top Ten Projects Award*: the OCSL received the American Institute of Architects Committee on the Environment (AIA/COTE) Top Ten Green Projects award on Earth Day 2010. It is an honor of the green building industry's highest award for sustainable design excellence (AIA: Omega Center for Sustainable Living, 10/14/10).
- *High Performance Building Designation from NYSERDA, 2009*: the OCSL's performance reached more than 30% of designated code of the New York State Energy Research and Development Authority(Omega Center for Sustainable Living, 10/14/10).

WHAT TO BE IMPROVED?

The Omega Center for Sustainable Living is able to successfully attain its goal as a purposeful building and site, which designed to use clean water, return the clean water to the local systems, and educate users about the process. Although, it is environmentally sustainable enough to meet the LEED, AIA, and Cascadia criteria, there are some concerns that Omega needs to take into account. The OCSL has been operated only for a short time; it should conduct a life cycle assessment of all elements to make sure that its sustainable goal is achieved. Also, it has to focus on its monitoring and evaluation processes. As the heart of this project is the natural reclamation water system, it is very important to ensure that all elements in the Eco Machine™ are properly functioned. Otherwise, the released water might be contaminated and would lead to negative impacts on any living creature in the environment.

CONCLUSION

The Omega Center for Sustainable Living building, by all definitions, is a very green building and green interior. It integrates the most cutting edge technology, finest design of green building, environmental friendly materials, and the latest wastewater treatment technologies under one roof. It also demonstrates natural systems with bio-mimicry concepts. I believe, if all systems of the OCSL's building are able to work effectively and efficiently in long term under their green strategies. The OCSL would be considered one of the greenest buildings in the world that shows us how people can live in harmony without creating negative impacts to the environment.

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