

## Omega Center for Sustainable Living Eco-Machine®



*Exterior view of OCSL building and treatment wetlands*

What the Eco-Machine has given us is a way to actually connect our participants and the staff that come in to water, to how they are a part of natural processes, not separate from natural processes. People travel from all over the world to see this.”

–Robert “Skip” Backus, Director of the Omega Institute

### Background & Design

The Omega Institute for Holistic Studies is a visionary educational center located in the heart of the Hudson Valley in Rhinebeck, NY. Their innovative day-long and residential programs offer visitors and students a path toward personal health and well-being. Their educational mission is to point the way toward a sustainable, just, resilient, and regenerative future where people and nature work side-by-side to build a better life for all.

In 2003, the Omega Institute recognized that their septic system was failing and high levels of excess nutrients were being released into the local watershed. It sought a solution for treating the domestic wastewater generated by their 23,000 annual visitors that would be non-toxic, showcase cutting-edge sustainable design, and serve as a public amenity. Omega wanted their investment in new infrastructure to not only enhance the aesthetics of their campus but also act as a model for the sustainable management of natural resources.

To meet these goals, John Todd Ecological Design (JTED) worked collaboratively with Conservation Design Forum and Omega’s Skip Backus to propose the construction of the Omega Center for Sustainable Living (OCSL) a cutting edge facility based around an Eco-Machine for onsite wastewater treatment. The OCSL would allow Omega to manage wastewater not as a liability but as an asset to the campus. The Eco-Machine would not only safeguard water quality in the nearby pond it would also provide the campus with tertiary treated water, suitable for

<b>Waste Stream</b>	Domestic Wastewater
<b>Treated Flow</b>	52,000 GPD
<b>HRT (hours)</b>	36
<b>Treatment Level</b>	tertiary
<b>Foot Print (covered / uncovered)</b>	5,000 SF / 24,500 SF
<b>Year Built</b>	2009

reuse in toilet flushing, outdoor water features and grounds irrigation. The outdoor wetlands would also provide habitat for native plants and animals.

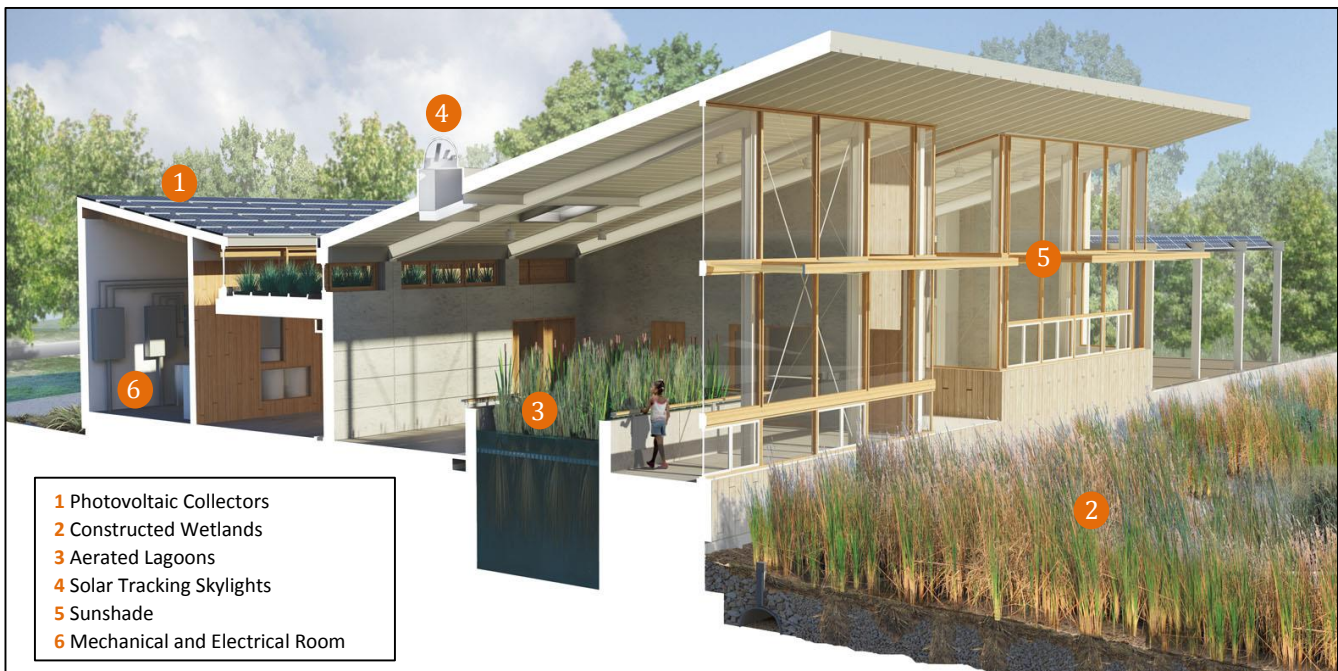
The OCSL Eco-Machine is designed for continuous treatment throughout seasonal fluctuation in climate (hot summers and freezing winters) and campus attendance. The use of an indoor aerobic treatment process and extensive outdoor wetlands reflect these design parameters.

## Treatment Process

The OCSL Eco-Machine uses a combination of outdoor constructed wetlands and aerated aquatic cells to treat up to 52,000 gallons per day of domestic sewage. Campus wastewater flows first through a series of underground septic storage tanks which provide primary treatment and removal of settle-able solids. From the septic storage tanks effluent is dosed into terraced 20,000 square foot wetlands. In the wetlands nutrient-rich wastewater is consumed by root-associated microorganisms and converted into humic matter. Effluent from the wetlands flows into the aerobic cells within the OCSL building. In these cells nutrient rich water forms the basis of a food web that includes an abundance of organisms from all five kingdoms of life. Microscopic algae, fungi, bacteria, protozoa, snails, fishes and zooplankton all thrive in the diverse aerobic environment of suspended plant roots and contribute to the consumption of remaining nutrients and the conversion of contaminants, cleaning products and pharmaceuticals into benign biomass and clean water. A recirculating sand filter provides final removal of any remaining suspended solids and pathogens.



*Tropical understory plants including canna lily, dwarf banana, and taro grow vigorously within the system*



*System layout (image copyright BNIM)*