CASE STUDY ANALYSIS

Elizabeth Heldridge
Environmental Systems 1
10.14.2017

Omega Institute for Sustainable Living

BNIM Architects
Rhinebeck, New York, USA
May 2009

Overview:

The primary goal for this project was to overhaul the organization's current wastewater disposal system by using alternative methods of treatment.

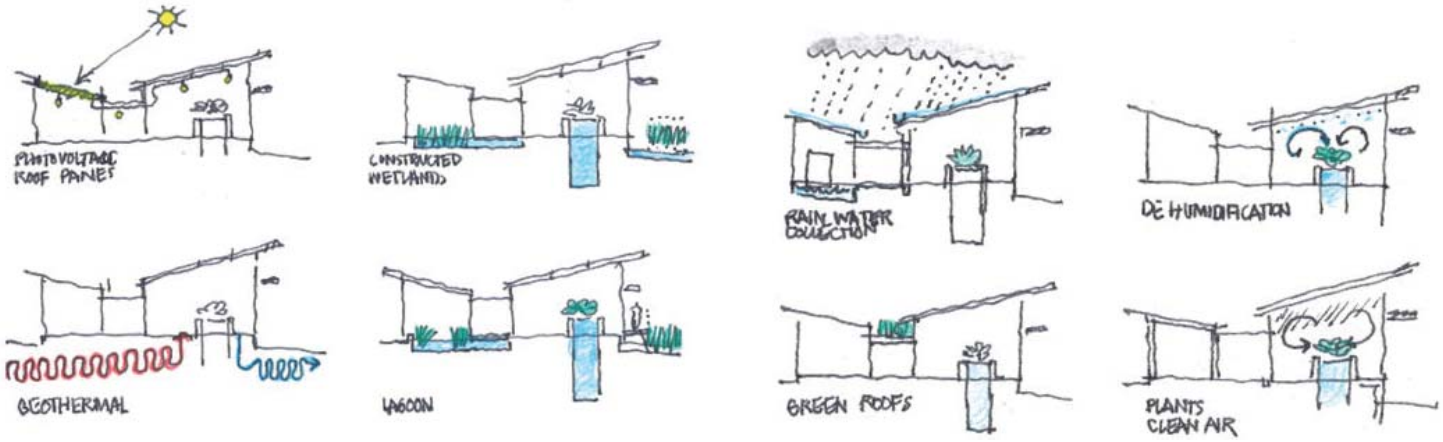
BNIM claims that the design is calculated to be net–zero. The result balances passive (daylight, passive solar heating, natural ventilation) and mechanical (geothermal, fans, electric lighting) comfort systems.

The building section is designed to allow specifically calculated solar access to the plants growing in the lagoon, and to shade for internal comfort.

Rhinebeck, New York is within climate zones 5a/5b

It is mild / warm in summer, cold in winter, often wet and humid overall. Average Min temp is 38 F, while average Max temp is 60 F.

Water conservation is a critical issue for this region. The system of reclaiming water and returning it clean to the local watershed is intended to reducethe water footprint of every individual who visits the campus, of improving local water quality, and having positive impacts on regional and global water supplies beyond.



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Design Analysis:

Solar:

Located along an east–west axis, the building is oriented for optimal control of daylighting and solar heat gain. The plants (as in a greenhouse program) would reach a light saturation point at around 30,000 lux. This would be too hot for the comfort level of the workers. T

herefore, this design flattens the amount of light falling on the plants, minimizing the surfaces exposed during the summer months to this level in order to minimize the heat taken on by the space. In the colder months, the amount of light will be maximized and warm the space. Solar tracking skylights also help this effort.

Ventilation:

Fixed, Operable, and Solar Tracking windows are designed to assist passive ventilation. Solar radiation heats the upper volume of air, and then natural buoyancy induces stack ventilation, which causes the air to push its way out of the open windows and pull in fresh, cooler air from lower windows in these spaces.

The plant systems also help with ventilation, removing carbon dioxide and adding oxygen. The operable windows in the southern facade allow the air cooled by the wetlands to push heat out of the building.

Evaporation:

The landscape produces a microclimate of clean air. During summer months the cool laboratory water has both a cooling and drying effect on the hot humid air entering the building. The lagoon and wetlands produce a microclimate of cool air during the summer months. The plants inside dehumidify the air and cool / condition.

Internal Gains:

The internal gains of this project are heavily impacted by the cool thermal mass of the water being processed in it. Only the classroom space has conditioned air, all other spaces are passively conditioned. The plant systems also reduce mechanical demands on the buidling.

Infiltration:

Not Specified

Conduction:

Not Specified

Proposed Changes:

This project appears to respond to its specific climate and program efficiently. BNIM achieved NetZero ratings as well as a visually and aesthetically pleasing design. Based on my study, it seems that there was an opportunity to choose different materials which specifically reduce infiltration optimize conduction.