

***productive architecture***

Project Portfolio 2010



**Kiss +  
Cathcart,  
Architects**

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[www.kisscathcart.com](http://www.kisscathcart.com)

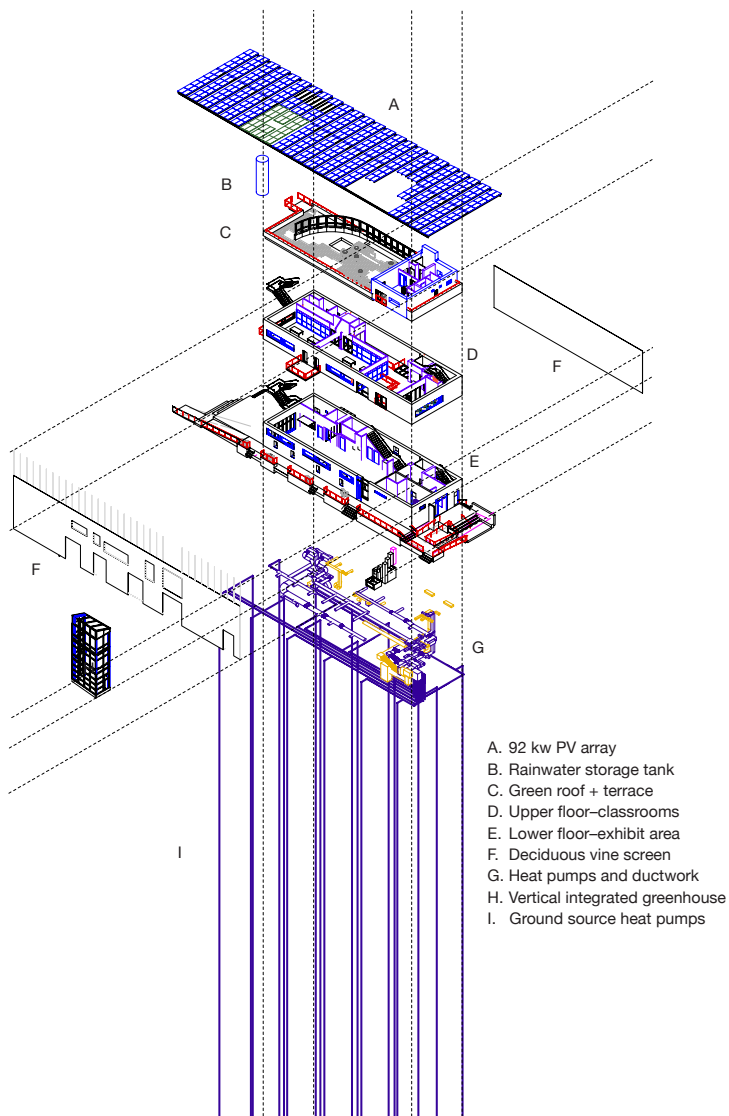




## solar 2, green energy arts and education center

Solar 2 – Green Energy, Arts and Education Center will be New York City's first carbon-neutral, net-zero energy building. The building is itself a teaching tool, demonstrating the complex relationships between natural forces and urban systems, reminding visitors of the many environmental choices we all must make every day.

Solar 2 will be an all-electric building connected to the grid, generating more electricity than it uses. Its envelope and systems allow it to achieve 40% energy savings compared to the latest ASHRAE 90.1 baseline. A green screen provides seasonal shading on the long East River elevation. A biological waste treatment system will allow reuse of gray water and black water, and a building integrated vertical hydroponic greenhouse will grow fresh produce on site.



**The Client:**  
Solar 1

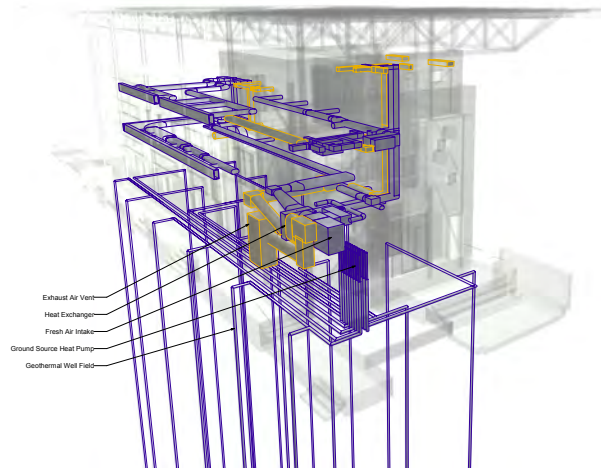
**The Team:**  
Kiss + Cathcart, Architects  
Arup, Engineers  
Wallace Robertson Todd Landscape Architects

**Project Details and Awards:**  
\$12,000,000  
8,000 sf  
Construction 2010

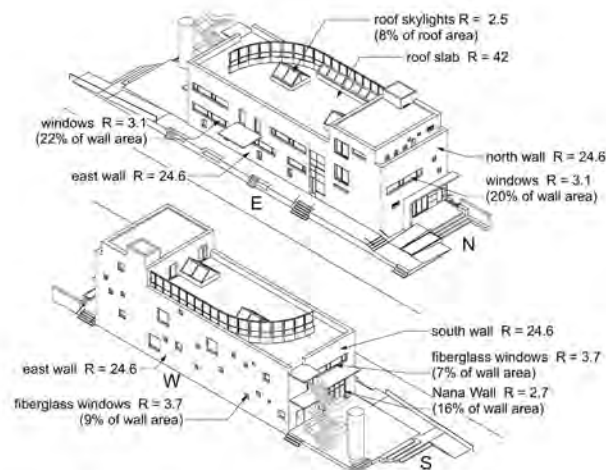
**LEED Platinum expected**  
**Holcim Gold Award 2008**



## solar 2, green energy arts and education center

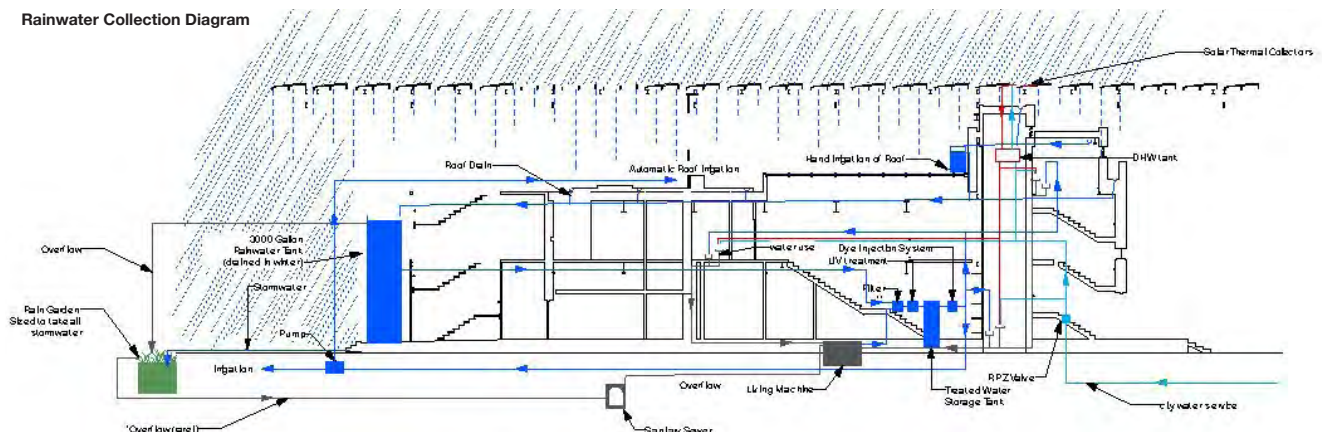


Mechanical system with Ground Source Heat Pump



Facade Insulation Level

Rainwater Collection Diagram



### Site

Solar 2 is located on a contaminated landfill site between the FDR and the East River bulkhead at 23rd Street in New York. It is at the end of a waterside neighborhood park that connects .

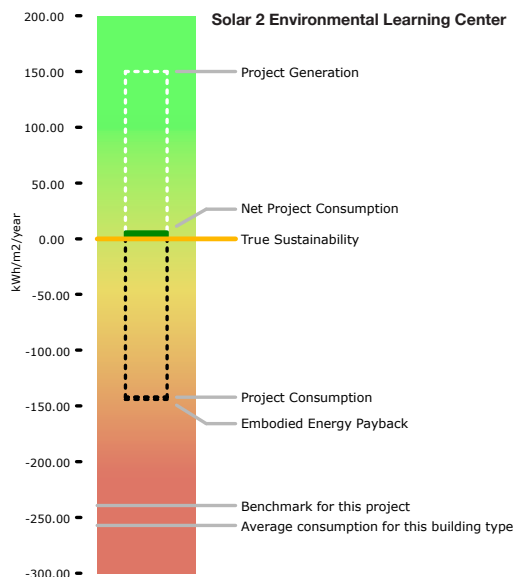
### Energy

Solar 2 will be a carbon-neutral, net-zero energy building. The building will generate at least as much electricity as it uses on a yearly basis. Its high performance building envelope has highly insulated walls and roof, and glazing specific to each orientation. Seasonal shading of the east and west windows is provided by deciduous vines and the photovoltaic canopy. Balconies shade south windows from summer sun. This decreases cooling needs and almost eliminates any heating requirement in the building and allow it to achieve 40% energy savings compared to ASHRAE 90.1-2007 baseline. Its energy needs beyond that are met by the electricity generated by its 92 kW photovoltaic (solar electric panel) canopy. Calculations show 100,200 kWh per year can be generated by the PV system.

Heating and AC will be provided to the building by unitary ground source heat pump units. The heat pump units will reject/absorb heat to/from a central condenser water loop below ground on the site. To allow good zoning control, seven separate re-circulation units will be provided in the building.

Daylight is delivered through horizontal skylights and vertical window glazing. Openings are optimized for desired interior light levels, and to supply sufficient daylight 75% of daylight hours.

Artificial lighting is exclusively through fluorescent and LED lights with load densities below 1.1 W/sf. Daylight



and occupancy sensors regulate lighting.

A Building Management System (BMS) monitors outdoor conditions, space conditions, whether windows are open, PV generation, irrigation system and, mechanical systems. Direct digital controls are provided for all aspects of the HVAC systems and for artificial lighting. Real time energy use and production are displayed on an energy dashboard in the lobby.

## Water

All waste water is treated with an onsite ecological black-water treatment system on display (eco machine) which will process all wastewater and recycle treated water for toilet flushing and irrigation using plants, microbes on their roots, and invertebrate organisms.

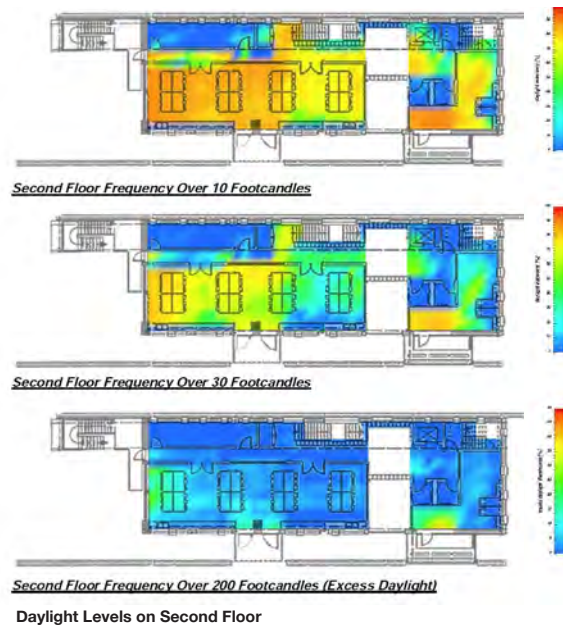
Rainwater is collected off the roof into a 3000 gallon storage tank for irrigation and a rain garden allows for excess water to be recharged to the ground on site. Overflows do go to the sewer. Site stormwater runs through a slot drain to an on-site rain garden which recharges the water into the ground.

Potable water use is minimized through use of treated water for toilet flushing and irrigation, and through low flow faucets.

A solar hot water system, with a 110 sf array of flat solar water panels, will reduce energy consumption for hot water by approximately 58%

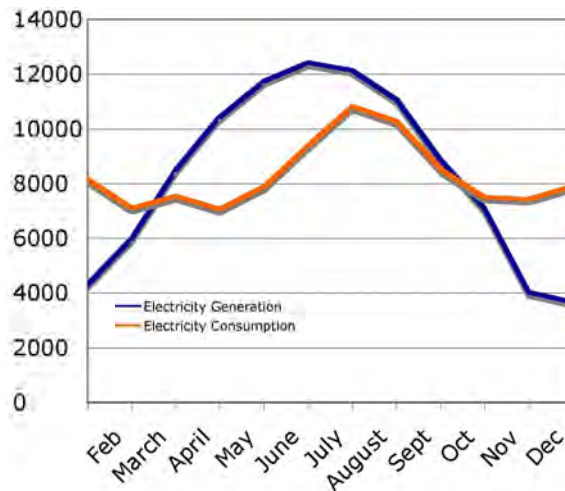
## Awards

2008 Holcim Gold Award



Daylight Levels on Second Floor

Electricity Generation vs Consumption (kWh)



Solar Energy Consumption as Percentage of Total Consumption

