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Buildings Project
Kroon Hall, Yale University
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Sustainable green buildings are finally starting to make an appearance in our cities. It is important that we strive to incorporate green design into every aspect of planning a new building from where the building materials come from to where the waste ends up when the project is complete. Every step of the way needs to be carefully planned and designed by many different areas of engineering. It is important that the building is an ongoing example of sustainability in its community and also a place that brings people together. In this paper I will explain why I have chosen Kroon Hall at Yale University as a model representative of what can be achieved through green design.

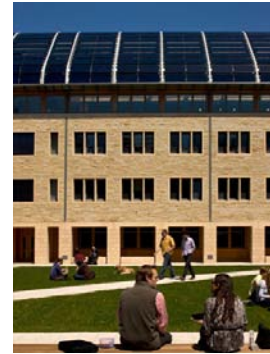
Kroon Hall has become a centerpiece of Yale's efforts to reduce greenhouse gas emissions by 43% from 2005 levels within fifteen years (Hopkins Architects Ltd.). The building, named after the family of benefactor and Yale College alumnus Richard Kroon and his wife Mary Jane, is a leading example of nearly every aspect of green design. It is



located on the campus of Yale University in an area known as "Science Hill". It was built to house the School of Forestry & Environmental Studies (F&ES). This means that faculty, staff and students all interact and have offices under its roof. In addition to office space, the building includes a library, an auditorium, a student learning center, and classrooms. This building is a physical representation of what the people that use the building work and strive for everyday. Kroon was built with the goal of achieving a platinum LEED certification. To achieve a platinum status the building must earn 80+ points out of a possible 100 with the possibility of 10 bonus points (U.S. Green Building Council).

The physical appearance and feel of this building is eye catching and different, but it does not look out of place. The architects were able to give it a Yale feel while

giving it its own unique identity by using the same Ohio sandstone that is used in many other buildings on campus, while at the same time having it stand out from the other nearby science buildings(Gonshar). The building is long and narrow, measuring 218 feet by 57 feet with a vaulted roof that allows for plenty of natural light to penetrate down into the building. Most of the wood used to build Kroon was taken from the University's own forest in northern Connecticut and the stone was quarried from within 500 miles (Gonshar). The designers were also careful to incorporate the outside elements into their plan. Two courtyards were built to serve as a gathering place, but their purpose is more than just a place for people to exchange ideas and have lunch.



The addition of the courtyards are an important key to Kroon's estimated savings of about 500,000 gallons of water a year (Gonshar). Each courtyard plays a different role in water-conservation and storm water drainage. At the southern end of the building there is an underground service dock that services all deliveries and waste removal for Kroon and the other two nearby science buildings. Building this dock underground keeps the traffic and noise out of sight and also provides the building with the opportunity of a green roof above it. This green roof helps to ease the burden on New Haven's combined sewer system by storing runoff in an underground tank and then slowly releasing it back into the earth (Gonshar). At the northern end there is another courtyard that also collects runoff from its surface as well as from the roof. This water is collected in a pond that, with the help of native plants, filters the water before it can be used in either irrigation or toilet flushing (Conniff).

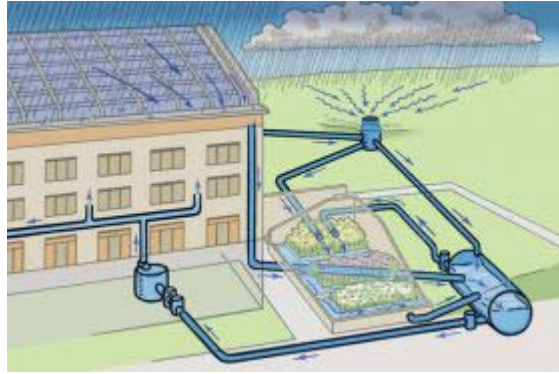


Illustration by Gregory Nemece of rainwater conservation system.

Another important contributor in its pursuit of a platinum rating is Kroon's roof. Since the building runs length wise, east to west, this provides the optimal amount of sunlight to come through it's vaulted roof. The abundance of natural light is used to further reduce the need for energy because light and occupancy sensors dim artificial lighting when it is not needed (Yale Office of Pubic Affairs). The roof is also affixed with a 100-kilowatt array of photovoltaic panels that will provide about 25 percent of the electricity for the building (Yale Office of Public Affairs). In addition to the PV panels, the team added four solar panels to the south facing side of the building that provide Kroon with hot water for sinks and showers (Conniff).

The building is equipped with operable windows to the help reduce heating and cooling during spring and fall. The buildings occupants are alerted by indicator lights when outside conditions are suitable for opening and closing. In the winter months, the climate control is aided by the use of "super efficient air-handling units that recover heat from exhaust air (Gonshar). Central floor openings induce warm air to rise naturally for better ventilation with less energy (Centerbrook) and low-velocity fans in the basement keep the air circulating (Conniff). In the summer, water is sprayed into the exhaust air stream in the air handling units and this removes heat from incoming fresh air. They mechanism can reduce the supply air temperature up to 18° F without mechanical



Illustration by Gregory Nemece of geothermal pump system.

cooling (Centerbrook Architects). On the hottest days additional cooling is provided by a geothermal heat pump system (Gonshar).

The commitment to lowering energy waste and pollutants is also seen in the choice of carpeting with low-VOC and made of natural, recycled, and recyclable materials. Paints, coatings, adhesives, and sealants are also all low-VOC (Centerbrook Architects). The use of Energy Star rated user equipment such as computers, printers, copiers, and appliances as well as energy efficient fluorescent lights aid in lowering energy consumption. The building also has a counter-weighted hydraulic elevator that uses 30% less energy (Centerbrook Architects). Kroon also has dedicated recycling areas for paper, bottles, cans, etc. and its service dock handles the recycling for Science Hill.

Although Kroon Hall is a shining example of green design and innovation, it is not 100% sustainable. The designers did not have the space to have Kroon operate solely on



solar energy so they opted to purchase renewable energy certificates for the remainder of the buildings energy needs (Gonshar). Alexandra Lange from The Architect's Newspaper commented that all the red oak paneling was monotonous and that the buildings users are not following the indicator lights for opening and closing the windows which counteracts the energy conservation.

Kroon Hall has only been opened since April of 2009 and has already provided people with a happy and healthier environment in which to further their own environmental research. The designers in addition to seeking a platinum LEED certification were also careful to make sure the building was flexible for future use. This kind of adaptability is very important for the buildings continued use of over its lifetime and commitment to future sustainability.

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Photos by Morley Von Sternberg