

## Loyola University's Institute of Environmental Sustainability

This 216,000 sq.ft. new construction and renovation project on Loyola University's Lake Shore Campus incorporates a new student dormitory, conversion of an existing high-rise convent building to faculty offices and the addition of a new laboratory/classroom wing to the existing convent along with a new research greenhouse. The resulting building complex houses the University's Institute of Environmental Sustainability (IES) which allows students to live, study and learn within the same sustainable environment. Additionally the new dormitory building features a dining cafe, student dorm rooms, student lounges, shower/restroom and laundry facilities. The new dormitory building and the existing high-rise convent building are adjoined by a new research laboratory wing that includes a state-of-the-art clean energy lab, as well as a transparent greenhouse known as the "eco-dome". The clean energy lab utilizes food waste from various campus dining locations to produce biodiesel as part of a student-run enterprise. Further, the new greenhouse space is designed to be a year-round facility and includes an aquaponics system intended to provide organic produce and fish to be served in University dining halls.



The design for the new IES complex includes highly efficient mechanical systems, natural ventilation, daylight harvesting with a state of the art fully dimmable lighting control system, rainwater harvesting for irrigation and flushing, and green roofs. The existing tower was converted from a steam boiler plant heating system and air-cooled chiller cooling system to a geothermal heat pump system.

The mechanical design consists of a vertical closed-loop geothermal system installed underneath the new construction with supplemental heat available from a biodiesel fuel burning boiler (supplied by student produced biodiesel in the clean energy lab). With the geothermal system being installed underneath the new building, a geothermal vault was created underneath the floor of the hallway with transparent glass that allows occupants to view portions of the geothermal system with real-time temperature readings and other graphics displayed throughout the complex. The geothermal field is the source for two modular water-to-water heat pump systems which supply dual temperature water for conditioning the buildings and hot water for domestic water heating via heat exchangers. All dormitory and living spaces are naturally ventilated and conditioned via a two-pipe vertical fan coil system. The café, dining, multipurpose and common areas on the first floor of the dormitory are conditioned with ceiling mounted chilled beam units and naturally ventilated. The workshop, office and classroom spaces in the new laboratory wing are also conditioned with ceiling mounted chilled beam units. These spaces are naturally ventilated via manually operated windows in the occupied spaces, with fan assisted ventilation through the adjacent atrium skylight.



The IES complex embodies sustainability, from its site selection/positioning to its operating systems, all the way to the end user through a variety of spaces and activities all housed within the same environment. Within the dormitory building, student rooms are divided among neighborhoods that participate in energy competitions through the real-time monitoring of each neighborhood. In all aspects building occupants are encouraged to interact with their sustainable surroundings and driven to further apply these concepts in their daily lives and the global community leaving a legacy of energy conservation.

Construction for the Institute of Environmental Sustainability was completed in the summer of 2013 utilizing Building Information Modeling throughout design and construction. A rating of LEED Gold has been achieved largely in part to the LEED energy model for this project predicting an energy cost reduction of over 60% when compared to an ASHRAE 90.1 baseline building.