Energy Efficient University Building
Lawrence, KS, United States

**Project Description**

The Center for Design Research building, located on the historic Chamney Dairy Farm in Lawrence, Kansas, is a response to the emerging culture and support of sustainability at the University of Kansas. In congruence with the center’s mission, which is to provide a location for interdisciplinary work between multiple schools, the building provides a facility that aids in the education of the university and community on sustainable strategies, material innovation and building efficiency.

The design for the building implements sustainable strategies to maximize the potential of existing resources, minimize environmental degradation, create an environment that is safe, comfortable and efficient and provides an iconic representation of sustainability for the University of Kansas. The building provides a location for professional collaboration and community education while displaying a wide range of sustainable strategies. In doing so, it showcases the advances of green building technologies and products, serving as a standard for the future development of the University and Center for Design Research.

Noteworthy features of the 2,000 sf building include: an underground cistern which helps to reduce portable water demands and storm water runoff while also supplying the toilets, a 34-foot-long living wall of ferns on the interior which is watered with rainwater collected from the roof; an interactive display in the entrance that reveals the energy performance of the building in real-time, a wind turbine coupled with a broad array of rooftop solar collectors tied into a “smart meter” system; the first regional car charging station and a façade of local Kansas limestone. Limestone was used to insulate and clad the building envelope as well as provide a heat sink in the form of a trombe wall located behind the glazed south façade.

The Chamney Farm complex dates back to 1912, and the main house and barn still stand today. To complement the existing stone language of the Chamney Farm complex, more than 100 tons of stone tailings were reclaimed from Kansas quarry sites. By using stone tailings rather than cutting new stone, natural resources are conserved thereby reducing the load on landfills. Small and odd shaped tailings were reclaimed and hand cut into stackable pieces used for cladding both interior and exterior walls. To further diminish site waste, all scrap stone pieces from the cladding process were recycled to be used in the cavities that exist between the frame materials.

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KU Research - There is fascinating research going on in basement laboratories and garages all around campus. A goal of the building is to share with the public some of the outstanding ideas the KU faculty are exploring.

Public Outreach - The easily accessible location and high visibility allows for the project to publicly demonstrate the latest technologies throughout the design of the building.

Intelligent Building Orientation - A narrow footprint positioned within the site maximizes passive strategies and takes advantage of a south-facing slope.

North Side - In keeping with the Passive Institute’s design strategies, there are zero openings on the north side of this building.

Heavy Frame Construction - The skeletal frame is over three times thicker than conventional wall systems. This enables more insulation to be used in the cavities that exist between the frame materials.

Glass and Steel - The widespread use of glass and steel, as in the floor surface and handrails, is because both of these materials are highly recyclable.

Material Responsibility - Accurate records are kept of all the materials and environmentally friendly substances are implemented when possible.

For example, the concrete contains an average of 20% fly ash, a waste product of coal burning, without compromising structural qualities.

Thermal Mass - Not unlike the heat build-up that occurs in a vehicle left in the sun with its windows up, the trombe wall - the interior stone wall - uses this passive strategy to take in and then heat the interior when the glass is not shadowed and radiate the stored energy night as well.

Water Reclamation - Rainwater collected from the roof is diverted to an underground cistern and used to irrigate the living wall, helping to reduce potable water demands and storm water runoff. It also supplies the toilets.

Cross Ventilation - Airflows can be manipulated to exhaust warm air out of the building through operable skylights along the north wall of the building, diminishing site waste, all scrap stone pieces from the cladding process were recycled to be used in the cavities that exist between the frame materials.

Reclaimed/Locally-Made Materials - Reclaimed wood/concrete and local granite were used as materials in order to preserve the historic nature of the building.

Blown Cellulose Insulation - Engineered lumen frame allows for more insulation, resulting in a higher R-value. Cellulose is 75-85% recycled paper fibers produced from newspaper waste. The building is super insulated with values over four times the conventional levels.

Super Insulated Basement - This building uses ten inches of solid rigid insulation board; all of the junctions between the boards were taped and sealed. This was followed with a ten mil barrier that wrapped the entire building.

Green Roof - The roof membrane and all of the roof components were selected and approved by the Center for Design Research to comply with the LEED criteria for roofs.

Low Flow Fixtures - All of the fixtures in this building use controlled water quantities and the toilets use water harvested from the roof. The mirror is located away from the lavatory to avoid prolonged water usage at the sink.

Energy Recovery System - The large hoods on the north side are for the ERV’s (Energy Recovery Ventilation) and are the building’s a very sophisticated heating and air conditioning system that provides a constant supply of fresh air to the building.

High Tech Shading - The broad southern façade is made up of electrochromic glass, a smart glass that adjusts to maintain thermal comfort by managing solar heat gain through automated testing technologies. It lets the sun light in during the summer and blocks it out in the winter.

Project Images: