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[Solar Energy Vision: Virginia Tech's Lumenhaus](#)



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Lumen, which means "the power of light," was fundamental in naming the structure designed and built by students from Virginia Tech for the 2010 Solar Decathlon in Madrid, Spain.

Lumenhaus, as shown in this You Tube [Lumenhaus video](#), is very much worth taking the time to look.

During the day, this house maximizes occupants' exposure to natural daylight. There is much research that shows natural light such as this can improve mood and well being, says the Virginia Tech design team. At Lumenhaus, energy collected during the day is symbolically radiated back out at night through a low-energy lighting system within the insulating panels.



LUMENHAUS is a remarkably distinct structure. Unlike the many energy-conscious houses that are closed with strategic openings to resist heat transfer. The structure has open, flowing spaces linking occupants to each other within the house and to nature outside.

The design team writes the Farnsworth House by Mies Van Der Rohe inspired their work. The north and south walls are all glass, maximizing the owner's exposure to bright, natural daylight that can be controlled by sliding walls that are referred to as .an Eclipsis System. The system is automated, featuring independent sliding layers that permit new design possibilities

in a solar-powered house, while filtering light in artistic patterns throughout the day.

As the design team writes: LUMENHAUS epitomizes a "whole building design" construction approach, in which all the home's components and systems have been designed to work together to maximize user comfort with environmental protection. LUMENHAUS is a zero-energy home that is completely powered by the sun."

Other sustainable features in this house included passive energy systems, radiant heating and building materials that are from renewable and/or recyclable sources. The materials included:

- Minimized painted surfaces using green line paint with low VOC content from Sherwin-Williams, minimizes the impact on air quality while still delivering maximum performance
- Long lasting polished HTC Superfloor concrete floor — durable, easily cleaned and doubles as a thermal mass for passive solar strategies
- Structural Insulated Panels (SIPs) provide superior insulation as well as structural strength, while reducing infiltration and optimizing the use of framing materials
- Closed-cell spray foam insulation containing no CFCs, HCFCs, or measurable levels of formaldehyde promotes tight enclosure and increases R-values
- Long lasting aluminum framed Fleetwood sliding glass doors obtained from vendors who practice waste reduction by recycling remnants and glass scrap for future use
- Lightweight Barrisol stretched fabric ceiling made from recycled, lead-free co-polymer fabric ceiling
- Environmentally preferable electrochromic glass, SageGlass, helps to reduce heating and cooling loads while automatically improving light quality by tinting the glass if the intensity of the sunlight is too strong

- Daltile bathroom tile made from recycled materials
- Aerogel filled polycarbonate panels give a high insulation value while transmitting a beautiful translucent light
- Stainless steel shutters provide sun protection, security, privacy, cross ventilation, strategic views and a dynamic diffused natural light
- Roofing system utilizes a white, lightweight, weatherproof, Acrylife PVC membrane that protects the roof from harsh weather conditions while also reflecting light, therefore decreasing the amount of heat from sunlight that is absorbed through the building envelope

All energy for this house is provided by 45 grid-tied [solar panels](#) – the Sanyo 190 HIT Double Bifacial Photovoltaic Module. The product can simultaneously absorb sunlight from the back face of the panel, producing up to 30 percent more electricity than a one-sided panel.

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