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The College of Built Environment (BE), Integrated Design Lab's (idl) research team wins $1.2 million to radically reduce how new hospital designs use energy.

Sen. Maria Cantwell (D-Wash.) announced on June 18th, 2010 that University of Washington researchers from the College of Built Environments (BE), Department of Architecture's Integrated Design Lab will lead a team of Lab researchers and building industry professionals including; SOLARC Engineering, the architectural firm NBBJ and TBD Cost Consultants, in receiving a $1.2 million grant from the U.S. Department of Energy (US. DOE.) to extend a model that reduces hospital energy use by 60 percent. The work of the UW team reflects National leadership in design integration and energy efficiency, and reflects a sea change in the integrated design of hospital and healthcare facilities for radically higher performance.

Common current practice in the building industry is to create a building that is energy efficient, a bit better than the minimum performance required by energy code. Now an advanced, leading-edge, goal is to approach net-zero: the point at which the structure greatly reduces its energy demand and then creates as much energy as this radically-efficient building uses.

"Hospitals and healthcare facilities are second only to fast-food restaurants in energy consumption. They consume approximately 4 percent of all energy used in the U.S., so lowering the amount is very important," said Joel Loveland, a Professor of Architecture who directs the Integrated Design Lab at the university. He and Heather Burpee, a UW Research Associate in Architecture, lead Target 100, which is named for an energy use index (EUI), much like the miles per gallon (MPG) rating of an automobile, and reflects the goal of significantly increasing energy efficiency. Together with experts who aided the initial research, Loveland and Burpee will model energy strategies for hospitals in seven cities of the U.S. representing the seven major US. DOE. national climate zones.

The UW team's initial strategies were included by NBBJ in the new Montlake Tower under construction at the UW Medical Center with the energy efficiency incentive support of Seattle City Light and Puget Sound Energy. Also, ZGF Architects is considering more extensive use of these strategies for the patient tower addition to Seattle Children's Hospital. Mahlum Architects is considering them for its Living Building hospital for Peace Island Medical Center in Friday Harbor.

The work addresses the Architecture 2030, 2030 Challenge, an environmental advocacy group. Architects, engineers and building owners are adopting the goal, which targets a greater reduction in energy use every five years. Buildings constructed by 2030 are to be net-zero energy consumers. For buildings that will begin operating between 2010 and 2015, the goal is a 60 percent reduction from standard operational use.

The UW team's research to date and available at the UW, CBE Integrated Design Lab website at http://www.integrateddesignlab.com/Seattle/Resources/HD_Research.html demonstrates that there is little additional cost -- about 2 percent – for the Target 100 design strategies.

Part of the group's work is based on the IDL's research on contemporary Scandinavian hospital design, supported by the Scan Design Foundation, UW Valle Endowment and the Northwest Energy Efficiency Alliance. These Scandinavian facilities consistently use 20-25% of the energy of their American counterparts. Along with energy efficiency, the Lab's studies include research into the rich use of common Scandinavian quality health design strategies such as the abundant use of daylight from windows that also commonly support natural ventilation in most all healthcare and support spaces.

The UW researchers found heating to be the biggest target for energy reduction. In the U.S., more than 50 percent of hospital energy is used to heat space or water. It's ironic, says the researchers' report, because their study of a 225-bed hospital in the Puget Sound region found that "hospitals generate enough heat from internal mechanical or electrical sources to need no additional heat until the outside temperature drops below 20 degrees." And in the Seattle region, that kind of cold rarely happens. This new kind of hospital integrates goal setting, energy modeling, and the means to verify performance from initial conception through post-occupancy building operations. The background research to the US.DOE. grant targets three key building systems with a number of strategies:

Architectural Systems:

- Increase use of daylighting and active sunlight control for reduced glare and cooling.
- Use solar heating when possible and appropriate.
- Balance of heat loss and radiant surface comfort with the design of high-performance building façades.
- Maximize the form and orientation of the building in relationship to the outside environment.

Building Mechanical Systems:

- Separate primary heating and cooling of building spaces from the ventilation air of those spaces.
- Optimize heat recovery from interior spaces and large internal equipment.
- Turn off equipment when not in use.

Building Central Plant systems:

- Advanced heat recovery at the central plant with heat pumping using ground-sourced heat exchange.
- (or) with lesser performance, enhanced heat recovery chillers and highly efficient boilers.

Researchers emphasize that their strategies work in concert: to get that 60 percent increase in energy efficiency, the means must be bundled.

The UW award builds on health design research at the College of Built Environments' Integrated Design Lab for Puget Sound. Northwest Energy Efficiency Alliance, through its BetterBricks initiative, has supported the lab's research work in healthcare energy efficiency for the last four years.

The energy department grant is one of 58 totaling more than $76 million funneled from the American Recovery and Reinvestment Act. The goal is more energy-efficient buildings and training for technicians who maintain commercial buildings.

Along with Loveland and Burpee with the University of Washington's IDL, Solarc Architecture and Engineering Inc., NBBJ, and TBD Consultants Inc.; the research team includes Cameron MacAllister Group, Mahlum Architects, and Mortenson Construction.

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