TECHNOLOGY
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SUSTAINABLE
DESIGN
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BUILDING A BETTER FUTURE

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Sustainable design, the art and science of creating optimal relationships between people and their environments, is more than just the latest fashion. Relentlessly high energy costs, a waning supply of natural resources, and a growing awareness of environmental concerns are making a strong social and economic case for sustainable design—and inspiring new, healthier approaches to urban living among visionaries like architect Michael McDonough and landscaper Diana Balmori.

"Eastern thought holds that nature and technology are one; this is how I design."

— ARCHITECT MICHAEL MCDONOUGH

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McDonough and Balmori, both deeply committed to seeing sustainable design practices become more mainstream, recently collaborated on a project for WIRED NextFest's Green Pavilion—an eco-friendly, pre-fabricated home complete with rooftop garden that both see as the future of urban dwelling.

Designed using computer-aided design software to model materials, predict energy requirements, and analyze structural performance, the modular ArcHouse doesn't sacrifice style or comfort to minimize environmental impact.

An elegantly curved, south-facing exterior wall—constructed from energy-efficient bamboo plywood developed by the Structural Insulated Panel Association—follows the arc of the sun to creating a living space that requires less artificial lighting, and puts its inhabitants more in touch with nature. Stepped access to a lush, ultra-lightweight rooftop lawn serves to double the home's living space while reducing

heat inside the home and filtering pollutants from the air. vA Calder-esque wind turbine on the roof generates electricity for the home.

"Energy efficiency isn't just about saving money, it's about improving our overall health and well being," says McDonough, who believes a new philosophy behind building utility is emerging. Consistent use of eco-friendly building materials such as insulating foam made from orange juice production waste and carbon dioxide; soundproofing made from cork and recycled newspaper; and walls constructed from glueless

softwood fibers harvested from sustainably managed forests can actually have a restorative effect on the environment. "In essence, your house could 'eat' atmospheric greenhouse gases" if it were constructed with bio-absorbent materials, McDonough says.
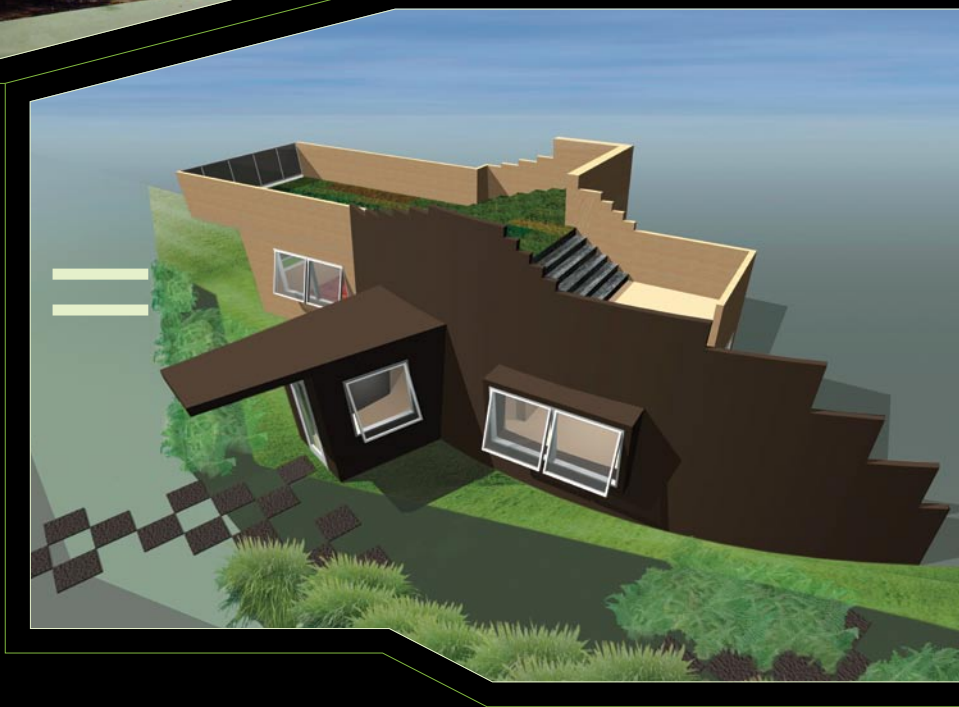
Landscape designer and ArcHouse collaborator Diana Balmori agrees that looking at buildings and their natural surroundings as two separate elements is an idea that is changing.

"The sealed-off building is now opening up to sun, to air, and

adopting the qualities of living things," says Balmori. "We're realizing that certain building elements – like plants – are in fact processors manufacturing clean air, clean soil, and clean water."

The challenge, according to both McDonough and Balmori, lies in driving mainstream acceptance and market demand for sustainably designed homes. The building world is ruled by economics—the cheapest materials and the fastest, easiest construction methods being the foremost construction considerations. But McDonough argues that sustainable materials and practices are often the more inexpensive options—both initially and over the life of the building. Bamboo, for example, is less costly than oak; using SIPs rather than traditional framing methods can save valuable construction time.

And that's where technology enters the picture. Using CAD software to model architectural design considerations, predict structural requirements, and

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compare costs and materials, architects can become more intimately involved in the construction and building management process. In fact, this tighter integration between the design and construction phases is part of a larger trend toward using software to create Building Information Models (BIMs), says Phil Bernstein, a seasoned architect in his own right and vice president of Autodesk's Building Solutions Division.

"There has been a tremendous

amount of innovation in terms of green design strategies in the past few years," says Bernstein. "Because there are so many options, designing with sustainability in mind can be very complex. If we can give designers an environment where they can simulate and model design options right from their desktops, and at the same time make it extremely easy to use, then we'll have done our part to make sustainable design a mainstream reality."

SUSTAINABLE DESIGN
Starts with Autodesk

Autodesk technology is helping architects, designers, and engineers across industries realize their own visions for building a sustainable future. Autodesk's design software solutions gives designers the tools to experiment with alternative materials and design techniques, model energy requirements and building performance, and execute a variety of environmentally friendly projects:

MANUFACTURING:
FUEL CELLS AND MARINE CURRENT TURBINES

Marine Current Turbines Ltd., based in the United Kingdom, used Autodesk Inventor Series software to pioneer a system that harnesses the energy of ocean currents and converts it to power. To design the radically new underwater windmill, engineers used the software's 3D modeling environment to explore "what-if" scenarios and assess the project's economically feasibility. The project received financial support from both the U.K. government through the DTI and the European Commission.

COMMERCIAL CONSTRUCTION:
HEALTHY OFFICE BUILDINGS

BNIM Architects, nationally renowned for its sustainable design practices and participation with the U.S. Green Building Council to develop the LEED rating system for green buildings, routinely uses Autodesk Revit Building for its design projects. The Kansas City firm is currently using the software to design a $1.1 million square foot processing center for the Internal Revenue Service, leveraging the technology to compare and estimate building materials costs, analyze lighting options and predict energy consumption with the goal of achieving a LEED Silver Rating for the building.

HIGH-DENSITY HOUSING:
HURRICANE-READY RESIDENTIAL

Anderson Anderson Architecture, nationally recognized for its progressive prefabrication systems and affordable building methods, used Autodesk Revit Building, Autodesk 3ds Max, and Autodesk Combustion to design a climate-sensitive urban housing project in New Orleans. The award-winning 160-unit structure known as Camel Back Shotgun Sponge Garden uses moisture-resistant, steel-framed SIPs to route rainwater to planted roof decks and "green walls" that absorb runoff and slowly filter rainwater back into the region's natural eco-system.

For 24 years, Autodesk has invested in people, software, and technology to help customers realize their ideas—to compete and win. For more information on Autodesk products, visit autodesk.com.

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