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(left) The Public Safety Answering Center II in the Bronx, designed by Skidmore, Owings & Merrill, will incorporate CASE's Active Modular Phytoremediation System (AMPS), an interior green wall that filters circulating air.

(below) Rendering of an AMPS application in a building lobby.

(opposite page, left) An AMPS testing chamber.

(opposite page, top right) Detail of AMPS unit.

(opposite page, below right) As air passes over the plants installed in the AMPS unit, the root structures absorb volatile organic compounds and other pollutants. The filtered air passes through the AMP unit and circulates back to the indoor environment.

Mars in the Bronx

CASE gets new environmental technologies out of labs and into buildings at (relative) warp speed

BY JONATHAN LERNER

Of necessity, the Public Safety Answering Center II, New York City's back-up emergency call facility now under construction at the intersection of Pelham and Hutchinson River Parkways, is a bit like a spacecraft. To maintain functionality during crises one is loath to imagine – say, toxic gas clouds – it must be able to shut down fresh air intake from the outside, yet remain habitable within. To achieve this, the building's architects Skidmore, Owings & Merrill (SOM) have specified an Active Modular Phytoremediation System (AMPS). AMPS is an interior green wall tied right into the HVAC. Air is cleaned as it is drawn through the plants' roots, and then recirculated through the building. The technology was developed by the Center for Architecture Science and Ecology (CASE), a collaboration between SOM and Rensselaer Polytechnic Institute (RPI). "Our microbiologist cut her chops by looking at the relationship between microbes in space capsules and astronauts' health and well-being.," says CASE Director Anna Dyson. Adapting knowledge from extraterrestrial living to buildings here on Earth? SOM's Ken Lewis, AIA, a CASE principal, quips, "We're going to Mars in the Bronx."

CASE, launched in 2008, brings architects from SOM together with RPI architecture faculty and researchers in biochemistry, computer and cognitive sciences; economics; and structural, environmental, and aerospace engineering. The purpose, says Dyson, is to leverage insights derived from long-term research in fields like nanotechnology and biotechnology "into transformative new technologies for buildings, and accelerate the times of deployment to actual test beds." That acceleration is pivotal. Typically, she says, a concept may spend 30 years under development in the lab before being translated into an applicable product; meanwhile, the environmental challenges architec-

Courtesy of Skidmore, Owings & Merrill ©CASE

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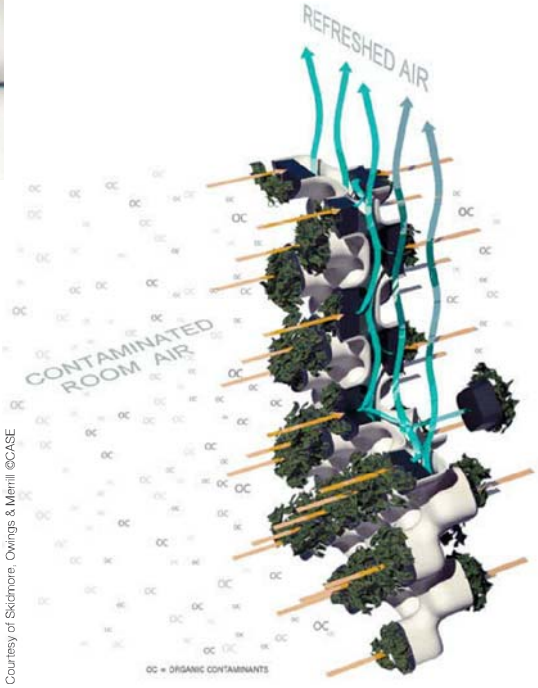

Courtesy of Skidmore, Owings & Merrill ©CASE

ture should address proliferate and intensify. AMPS, by contrast, has resulted from only 10 years' work. (It incorporates research begun before CASE was formed, at NASA.)

AMPS emerged from one of a dozen areas of research CASE is conducting. Another application already being tested in buildings is a modular façade system that harvests photovoltaic energy, reduces solar gain, enhances interior daylighting, and still provides outside views. Also being explored are buildings shaped to optimize and channel wind flows toward multiple small turbines, called Building Integrated Hybrid Flow Control Systems, or BIFCS *(see cover)*. A number of other impressive projects are being investigated: solar-harvesting building envelopes that simultaneously power water recycling and maintain interior thermal comfort; new ceramic structural systems; and the manufacture of construction materials from agricultural byproducts like coconut husks. Some lines of inquiry focus not on buildings but on built environments – the role of street layouts and dimensions in buildings' energy consumption and generating the urban heat island effect; and a technology to replace lost mangrove shorelines in tropical coastal cities.

The architect-led collaborations, says SOM's technical director Nick Holt, AIA, are about understanding the relationships between "the various forces that are acting on a building to look for technologies that aren't single-facet," but harness several such forces simultaneously. Dyson, herself an architect, says, "We don't take on things that offer just incremental improvement." AMPS, she explains, could have a "transformative impact on the way we will design buildings in the future relative to delivering air. And that affects every system, and the organization and shape of the building." She adds, "It's going to dramatically change how we process air in cities."

What makes the cross-discipline interaction work? "Architects who feel confident with multiple engineers at the table," says Dyson, "knowing what they know, but also being able to discuss things that they don't know."

"We're in an amazing moment where there's a huge amount of venture capital in the world," says Lewis. "And there is a deep hunger for systems like these." CASE is demonstrating that architecture's need for solutions can lead to – and speed up – those solutions' development. ■

Jonathan Lerner's articles have appeared in *Landscape Architecture*, *Metropolis*, *Pacific Standard*, *Modern*, and many other design and mainstream magazines. He also heads the consultancy UrbanistCommunications.com.