Ideas on the Edge

DR. MICHAEL BARTLETT

He'll Huff and He'll Puff

WIND STORMS CAN CAUSE A LOT OF DAMAGE AND SUFFERING. RESEARCHER MIKE BARTLETT AT THE UNIVERSITY OF WESTERN ONTARIO IS OUT TO REDUCE THE IMPACTS.

Neatly dressed, with a carefully trimmed moustache, Dr. Mike Bartlett doesn't resemble any kind of big bad wolf. But he does have dark designs on a certain brick house near London.

Succinctly put, Dr. Bartlett wants to blow it down. Piece by piece, again and again. "We're confident," he says without a trace of malice, "that the first major damage will be tearing the roof off the second-storey wall. It's an obvious weak spot."

The house in question is part of the "Three Little Pigs" project, a University of Western Ontario research initiative to test the effects of extreme wind conditions on light frame housing.

At the core of the project facility—

RESEARCH THAT MATTERS

REAL-WORLD BENEFITS FOR ONTARIANS:

- Safer, stronger homes.
- Engineering leadership in the economically important construction sector.

A SET OF 100 AIR CELLS CAN EXERT VARYING PRESSURES ON THE WALLS AND ROOF OF THE HOUSE.

Construction for destruction: the test house gets its reaction frame. Blue air pressure cells will soon be attached to the steel.

Project: The "Three Little Pigs" Project: Testing Full-Scale Houses and Light-frame Buildings to Destruction using Realistic, Extreme Environmental Loads
Institution: University of Western Ontario
Research Sector: Engineering
Principal Investigator: Michael Bartlett
Trust Investment: $1,891,303
CFI Investment: $2,744,599
ORF Investment: $853,296
Total research investment from all sources: $6,861,496

funded in part by the Ontario Innovation Trust—is a conventional two-storey home. The house is surrounded on all sides by a cage of heavy steel girders, anchored in a metre-thick slab of reinforced concrete. Mounted on this steel "reaction frame" is the project's most singular feature: a set of 100 air cells that press against the walls and roof. The cells are connected to actuators that operate like powerful vacuum cleaners to vary pressures over relatively small surfaces areas and up to seven times a second, simulating uneven patterns of turbulence than can tear off a roof.

The test house and reaction frame are all enclosed in a large steel building that can be rolled back on rails, exposing the house to precipitation. Sensors in the walls will allow other members of the research team to conduct research on how moisture penetrates building envelopes and forms mould.

Despite its whimsical name, the facility will address some very pressing real-world issues. The U.S. government estimates, for example, that 1.2 million homes were damaged by wind during the 2005 hurricane season that included Katrina—and that 90,000 of those homes sustained major damage or were destroyed. The cost of this kind of devastation, both in human suffering and dollars, is enormous. Researchers at the Three Little Pigs facility hope to help reduce those impacts not only by destructive testing, but also by developing new approaches to design and construction—insights they'll make available to industry across North America and around the world.

"We're trying to figure out how to share our work more broadly," says Dr. Bartlett. "We think things like web sites and video would help. Imagine a building inspector pulling out a laptop on site and showing a contractor what's going to happen if something isn't built right."

It certainly beats a visit from the big bad wolf.

Ontario Innovation Trust

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Infrastructure for Innovation
About the Ontario Innovation Trust

The Ontario Innovation Trust was created in 1999 by the Government of Ontario to invest in research equipment and facilities at Ontario's universities, colleges, hospitals and other non-profit research institutions. The Trust is governed by a volunteer Board of Directors, according to the terms of a Trust agreement established by the Ontario government. A small permanent staff looks after day-to-day operations.

Since its inception, the Trust has committed almost $843 million to strengthen Ontario's position in the global marketplace of ideas. This represents more than a third of the $2.44 billion in total funding that has been invested in Trust-supported projects.