Green Retrofit Project Moves Construction R&D to the Top Floor

by Lisa E. Boyes

Canada's pre-1950s buildings are typically uninsulated, and therefore consume more total energy (primary and secondary energy), than the transportation sector—with direct implications for buildings' emissions of greenhouse gases (GHGs). Secondary-energy alone, from end users' heating, cooling, etc. of buildings, produces about one-third of the country's GHGs. Primary energy is what it takes to convert and deliver energy for end users.

That's why Professor Christopher Timusk's building-retrofit R&D project, conducted with students in George Brown College's Construction Science and Management program, is such a hot prospect to help Ontario reach its goals in emissions reduction. The college's Office of Applied and Institutional Research put up seed funding for the project in 2009 which has kick-started a total additional $3 million over five years for development and commercialization: from the Ministry of Research and Innovation's ORF-RE (Ontario Research Fund – Research Excellence) program, and from the college itself and industry partners.

"Vintage buildings are often beautiful," says Timusk, "and notably inefficient users of energy. They are five to ten times as leaky of heat and air as they need to be or should be. Meanwhile, there is only one retrofit recladding system in common use today to insulate older buildings and reduce energy consumption. That system doesn't meet all the requirements for functionality and aesthetics that we're aiming for in our project."

Because Toronto, as one example in Canada, has a plentiful supply of uninsulated vintage residential buildings, Timusk and his team of two students and George Brown architecture Professor Steffanie Adams began their R&D in summer 2009 with a pilot project in the Annex neighbourhood. Their initial goal was to create an online, interactive building retrofit guide based on their documenting of best practices, to help homeowners or their contractors insulate vintage houses effectively. Working literally from the ground up, Timusk, Adams and students Robert Giusti and Jason Guihan began at the foundations in a series of local homes, with the consent of homeowners.

The next five years will take Timusk's team well beyond the basement on this project, from top to bottom and from every angle of a building's insulation or insulation needs. While the retrofit guide will still be developed to determine and guide best practices in the shorter term, the R&D goal now is to create a unique recladding system, materials

and methods, and to move the innovation through further development and commercialization.

The initial industry partner on the project, SMT Research Technologies Ltd., provided sensors and data loggers to the students' analyses in 2009. Now the company, along with Inline Fiberglass, Trow Associates Inc. and Evergreen Foundation, are partners in the larger MRI-funded project. Adequate lab space to test recladding materials and processes in smaller-scale trials will also be important to the project, before doing larger-scale trials on actual houses or small commercial buildings. Timusk and his team are looking for other partners to join the project, which will create an insulation system that is durable, non-cumbustible, affordable for the building owner or operator, aesthetically pleasing, and of course will deliver good thermal results.

The fact that successive senior students in the Construction Science and Management program will benefit, over the next five years, from real-world applied research and development only magnifies the benefit and importance of the insulation retrofit project.