Tower Renewal Project Series

BUILDING TECHNOLOGIES

The science of over-cladding

By Michael McClelland and Graeme Stewart with Dr. Ted Kesik

With much of the high-rise housing stock now passing some 40 years of service, deterioration of the building envelope is widely evident as is the buildings increasing environmental impact on the region. Leaky sieves that pre-date building science; they require far more energy than necessary. It is time building performance was upgraded to the expectations of the 21st Century.

The single most effective strategy in reducing the ecological footprint of our stock of aging concrete residential towers is the application of thermal over-cladding.

Research in the University of Toronto's architecture, landscape and design faculty examined relationships between the skin (building envelope) and armature (structural system) in the context of façade-retrofit technologies with optimized environmental performance. Essentially concrete filing cabinets, these buildings provide a surface to which new insulation, rain screens and "skins" can be applied.

The retrofit strategy holding the most promise involves comprehensive over-cladding, which incorporates a secondary framing system that enables the updating and integration of building services in a space between the exterior insulation and the existing façade, and the introduction of features such as sun shading appropriate to each building's elevation. This strategy of integrating servicing channels in envelopes enables a "green" integration to district energy loops fed by geothermal or co-generation systems.

Key to the over-cladding strategy is minimizing tenant disruption during the process of retrofit through phased upgrades applied from the outside rather than the inside. This process would also offer the opportunity to update building appearance, creating unique and attractive neighbourhood landmarks.

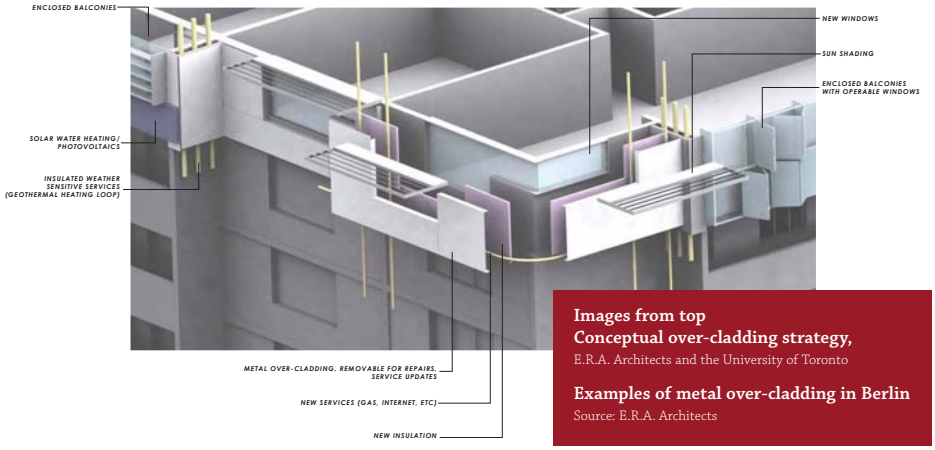
An analysis of a typical 20-storey apartment tower using this system, predicts several hundred thousand dollars of annual energy savings, the elimination of several hundred tonnes of annual greenhouse gases and the realization of relatively quick payback periods.

Internationally, over-cladding aging high-rises has been a key strategy for carbon reduction, especially in the European Union. A leader in the field has been Germany, where the tower blocks of post-wall Berlin have been significantly upgraded as part of both environmental policy and unification. In Bratislava, the entire district of hundreds of tower blocks is in the process of being over-clad as part of Slovakia's environmental agreement in joining the EU. Paid for in equal shares by the EU Commission of the Environment, the municipality and private investors (who gain development rights on adjacent properties), the project is not only making buildings more efficient, but also breathing new life into this aging district through new mixed use and improved public space.

In Canada there is an opportunity to learn from the best international examples, as well as develop innovative solutions best suited to the Canadian urban context and climate. It will make for better building stock, a greener economy and more beautiful urban landscapes.

Dr. Ted Kesik is professor at the University of Toronto's Faculty of Architecture, Landscape and Design, and is one of Canada's premier building scientists. He is currently leading a team researching best practices for the environmental upgrade of aging residential high-rise buildings. Michael McClelland is a principal and Graeme Stewart is the project architect for Tower Renewal with E.R.A. Architects. The Tower Renewal Project, spearheaded by the mayor of Toronto, is being developed in collaboration with E.R.A. Architects and an interdepartmental municipal staff working, City of Toronto agencies, the University of Toronto and CMHC and the Clinton Foundation, among others. NRU

CONCEPTUAL FRAMEWORK OF BASIC HIGH-RISE OVER-CLADDING STRATEGY



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Conceptual over-cladding strategy, E.R.A. Architects and the University of Toronto

Examples of metal over-cladding in Berlin Source: E.R.A. Architects