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May 2015

CNWWA Commentary on Presentations at the May 12, 2015 Building Envelope Forum in Toronto

On May 12, 2015 two separate presentations were made at the 2015 Building Envelope Forum in Toronto that related to Window Wall Systems. With due respect to the authors and presenters, the CNWWA submits that there are other facts and interpretations which are relevant to the issues that should have been raised.

'Glass-Walled Condos: Short Term Durability and Long Term Costs'

by **Ted Kesik, Professor of Building Science, University of Toronto**

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The presentation compared thermal and acoustic insulation qualities between high ratio visible glass window wall systems and low ratio visible glass punch windows and brick/cement block walls. It is an architectural/design decision influenced by the developer's budget and the perceived preferences of potential purchasers that drives the decision about what the ratio of visible glass will be for a particular building. If the design that is selected calls for large sections of floor to ceiling glass, then the thermal and acoustic insulation will be less effective than solid concrete or brick walls regardless of whether the fenestration is a 'curtain wall system' or a 'window wall system'

The presentation did not distinguish between window wall systems designed and imported in the early 1990's from offshore vendors compared to more recent fabrication and design technologies by Canadian based suppliers to address Canadian climate issues. The presenter made misleading general statements that are "window wall systems are crappy", "window wall enclosures are prone to water leaks" and "often result in the propagation of mold".

Interestingly one of the slides shows a photo of sections of curtain wall under construction yet Mr. Kesik's comments were focused on window wall systems.

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Mr. Kesik also referenced a 2014 report by the City of New York's Urban Green Council on heat loss and gains in the event of an extended electrical power outage during extreme summer or winter weather. Mr. Kesik was quick to point out that 'typical' high ratio glass condominiums would heat up much more quickly than other types of homes during a summer power outage. The actual study[1] that was referenced provides a more balanced perspective and computer model simulations of different home styles ranging from detached brick bungalows to high rise apartments and identifies needed energy efficiency improvements in most types of structures.

Mr. Kesik made some unsupported allegations regarding retrofit requirements for window wall systems, suggesting that by year 20 to 25, major refit or replacements are required. Mr. Kesik also suggested that on a typical condo project, window wall systems involve several kilometers of sealed joints and connections and that the odds of a perfect seal in all of the windows are not favorable. Such comments completely ignore the advanced design, manufacturing and installation processes used by CNWWA members. Modern window wall sealing technologies have evolved a long way from the hand applied caulking that may have been used in the 1970's and early 1980's.

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Mr. Kesik also referenced another Urban Green Council report[2], entitled 'Seduced by View' which sampled about 60 highrise structures in New York City, both residential and commercial buildings, and found that on average 59% of the vision glass surfaces were shaded by curtains or blinds irrespective of the direction of view or time of day. While the CNWWA does not dispute the fact that a high percentage of vision glass is shaded by curtains or blinds, the report simply suggested that buildings could have smaller areas of vision glass, e.g. starting 2 or 3 feet above the floor instead of full floor to ceiling glass designs.

Mr. Kesik concluded his presentation with several remarks related to ventilation systems and energy recovery, the benefits of using thermal breaks at balcony slab projections and the benefits of eliminating the use of shear walls as demising walls in highrise condominium designs. Mr. Kesik suggested that the incremental costs for an 800 square foot condo unit to include thermal breaks at the balconies, higher performance walls and windows and a dedicated energy

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[1] Accessible via the internet at http://urbangreencouncil.org/babyitscoldinside
[2] Accessible via the internet at http://urbangreencouncil.org/sites/default/files/seduced_by_the_view.pdf

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recovery ventilation system for each condo unit ("ERV") would be approximately $10,000, or about 2% of the purchase price.

The CNWWA recognizes that there are many design elements in mid and high rise condominiums that would enhance energy efficiency, occupant comfort and reliability including, but not restricted to the installation of dedicated ERV's and thermal breaks at balconies.

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'Potential Options for Retrofitting Glass Condos – A Feasibility Study'

by Duncan Rowe, Principal, Diamond Schmitt Architects

The presentation was about a recent independent study on evaluating and implementing improvements to existing post-war multi-unit residential buildings which are characterized by sound physical supporting structures but have poor insulation and performance enclosures.

The presentation cited as background fact that 116 of the 130 towers under construction in the GTA during May 2015 were residential and that the majority of the residential structures use window wall systems with a high visible glass ratio. Mr. Rowe also stated that window wall systems have lower initial costs but life expectancy is only 20 years and are expensive to replace. No foundation was provided for the alleged low life expectancy or the alleged high replacement costs.

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Mr. Rowe did reflect that an ideal structure in terms of durability and energy efficiency would likely be ugly with minimal if any visible glass.

Three alternative methods were considered for existing occupied units:

1) Interior spray applied polyurethane foam (125 mm) with a conventional drywall interior finish, to provide a thermal, air and vapour control layer;
2) interior rigid polystyrene (50 mm XPS) and drywall interior finish; and
3) vacuum insulated panels (25mm) infill with no interior drywall finish.

Thermal modeling was based on an exterior temperature of -18C, 3 IGU bay, aluminum frame construction unit with a thickness of 25 mm, width of 3 feet and a visible glass ratio of 50%. In the base case, that is with an IGU being replaced with an identical unit the interior temperature at the slab was 7C, 6C at the head/sill frame and 10C at the frame surface at mid level.

The results for case 1 (interior spray foam with conventional interior dry wall interior finish insulation), were interior temperature at the slab was 10C, 18C at the new interior dry wall.

The results for case 2 (interior rigid polystyrene and drywall) were also interior temperature at the slab of 10C, 18C at the new interior dry wall, but a high condensation potential at the head/sill of frame surface.

The results for case 3 (vacuum insulated panels) were 10C at the slab and 7C at the head/sill frame with some condensation potential.

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The study concluded that option 1, spray foam with additional drywall appears to be the best option based on thermal performance, condensation potential and material availability/cost. The cost of spray foam and drywall was estimated to be $450 per bay (floor to ceiling, 3 feet wide section), No life expectancy estimates were provided for the suggested retrofits, however Mr. Rowe did state that further study is required to more accurately understand the performance and constructability.

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