

# 2012 Research & Education Projects: A Summary *Spring 2012*



Homeowner  
Protection Office  
Branch of BC Housing

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## INDUSTRY RESEARCH PROJECTS

### Attic Ventilation and Moisture Study

#### Description

- Undertake a monitoring study of moisture in attics.
- The study will aim to determine the impact of attic ventilation on the roof assembly.
- Explore the role of the soffit venting in attic moisture in exposed locations and recommend possible alternative venting strategies.

**Status:** Project in progress. Report to be released mid 2012.

**Audience:** Builders, developers, contractors, design professionals and the industry in general.

### Field Measurement of Movement in Wood-Frame Construction

#### Description

- Conduct research to assemble data of typical wood-frame residential buildings from construction to occupation, for four, five and six-storey buildings in particular.
- Investigate the effectiveness of common design and construction measures in dealing with differential movement.
- Investigate common material handling and construction sequencing and study their impact on the consequent movement amounts.

**Status:** Field tests in progress. Additional sample buildings to be identified. Project completion by 2013.

**Partners:** FPIinnovations.

**Audience:** Builders, developers, contractors, architects and the industry in general.

### Guidelines for In-Slab Ventilation Ducts in High-Rise Residential Buildings

#### Description

- Develop guidance material and recommend code changes that will help to avoid potential problems with incorporating mechanical ventilation ducts directly into concrete floor slabs. This is done to exhaust air from bathroom fans, kitchen hood fans and clothes dryers to the exterior of buildings but the technology has raised some performance concern.
- The guidance materials will be based on researching current practices in design, construction operations and maintenance of in-slab ventilation ducts in residential high-rise buildings.

**Status:** Project in progress. Guideline document to be released in 2012.

**Audience:** Builders, contractors, architects, building officials, engineers, products manufacturers and homeowners.

## ***Improving Energy Performance in Houses – A Guide to Acceptable Assemblies***

<b>Description</b> <ul style="list-style-type: none"> <li>• Research includes the analysis of anticipated energy performance, hygrothermal performance and basic construction detailing for various roof, wall and basement assemblies suitable for supporting improved energy efficiency.</li> <li>• The final guideline document will include detailed graphic assembly illustrations, design and construction considerations and performance expectations.</li> </ul>	<b>Status:</b> Progress report to be available in early 2013.  <b>Audience:</b> Builders, contractors, architects, house designers, building officials, engineers, product manufacturers and homeowners.
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## **Online Building Envelope Research Database**

<b>Description</b> <ul style="list-style-type: none"> <li>• Bibliography includes over 1000 references on topics ranging from construction materials and green building technologies to environmental loads and maintenance.</li> <li>• Database is linked to the BCIT's Building Science Centre of Excellence website.</li> </ul>	<b>Status:</b> Online database is updated on an ongoing basis.  <b>Partners:</b> BCIT.  <b>Audience:</b> Builders, contractors, developers, researchers, consumers and the industry in general.
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## **Sustainable Building Research Laboratory and Research Program**

<b>Description</b> <ul style="list-style-type: none"> <li>• The Building Science Centre of Excellence at BCIT is developing a comprehensive Sustainable Building Research Laboratory at the Burnaby campus.</li> <li>• Using an environmental chamber facility donated by Concordia University, the multi-purpose testing facility will be used for evaluating full-scale building envelope systems performances for their durability, energy efficiency, indoor air quality and thermal comfort.</li> <li>• This laboratory and additional equipment will enable students enrolled in the Masters Program to conduct research on new technology and building systems.</li> </ul>	<b>Status:</b> Project to be completed in 2013.  <b>Partners:</b> BCIT, Western Economic Diversification Canada.  <b>Audience:</b> Researchers, design professionals, builders, developers and the industry in general.
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## **2011 Survey of Licensed Residential Builders**

<b>Description</b> <ul style="list-style-type: none"> <li>• A mail-out and online survey of all licensed residential builders in British Columbia.</li> <li>• Survey tracks builder satisfaction levels with licensing and warranty insurance systems.</li> <li>• Survey captures builders' input on research and education needs of the industry.</li> <li>• Comparison of results to the previous builder surveys to identify changes and trends.</li> </ul>	<b>Status:</b> Project to be completed early 2012.  <b>Partners:</b> CHBA BC, PBI.  <b>Audience:</b> Builders, developers, warranty providers and the industry in general.
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## Building Envelope GHG Reduction Guidelines

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### Description

- To develop a guideline document to assist industry stakeholders with identifying tested and viable opportunities to reduce GHG emissions in existing multi-unit residential buildings.
- The guide will be used for fine-tuning the design and construction of building systems and components and for making them more energy efficient, cost effective and durable.

**Status:** Project to be completed mid 2012.

**Partners:** Canada Mortgage and Housing Corporation (CMHC).

**Audience:** Researchers, design professionals, builders, developers and the industry in general.

## Review of the Window Energy Rating System

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### Description

- It is unclear if the assumptions used to calculate ER are inaccurate or incomplete. Some believe that the solar gain may be overestimated in some cases leading to a false impression of energy savings or underestimated in other cases leading to overheating, discomfort and increased cooling loads.
- Conduct an industry research project to determine if the Energy Rating (ER) system in its current form can still be used to rank the overall energy performance of windows and door appropriately for low-rise Part 9 buildings, both single family and low-rise multi-unit residential.
- The end result will include either recommending change to the ER or abandoning it altogether.

**Status:** Project to be completed mid 2012.

**Partners:** NRCan, AIPVFQ, Hydro Quebec, Fenestration Canada, BC Hydro, Manitoba Hydro, WDMA BC, CGA, GCABC.

**Audience:** Researchers, design professionals, builders, developers and the industry in general.

## Space Conditioning Energy Conservation in Non-Combustible Multi-unit Residential Buildings

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### Description

- The objectives of the study are to review and assess the effects of building enclosure on space conditioning energy use in typical high-rise residential buildings in the lower mainland of British Columbia.
- The study includes an analysis of energy consumption (gas and electricity) for both rehabilitated and non-rehabilitated high-rise buildings.
- Analysis addresses the following factors: added insulation or increased effective R value, air leakage reduction, improvements in window glazing and frames, compartmentalization and occupant behavior.
- The results will allow developing strategies that take into account enclosure repairs, energy conservation and greenhouse gas emissions.

**Status:** Research completed. Report to be released early 2012.

**Partners:** CMHC, City of Vancouver, BC Hydro, FortisBC, RDH Building Engineering.

**Audience:** Builders, developers, contractors, design professionals, gas and electricity companies, municipalities and the industry in general.

## Develop Wood-Frame Supported Fire Walls for Mid-Rise Wood-Frame Construction

<b>Description</b> <ul style="list-style-type: none"> <li>Identify concerns and investigate fire safety performance of wood-frame supported fire walls for application in mid-rise wood-frame construction.</li> <li>Provide design and construction solutions to ensure as-built wood-frame supported fire walls meet the functional requirements of the NRC for firewalls.</li> <li>Confirm the use of wood-frame supported fire walls as an alternative solution and support it as an acceptable solution in the NBC for the use in mid-rise wood-frame construction.</li> </ul>	<b>Status:</b> Project to be completed by 2013.  <b>Partners:</b> FPInnovations.  <b>Audience:</b> Researchers, design professionals, builders, developers, and the industry in general.
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## Effective Thermal Performance of Building Assemblies

<b>Description</b> <ul style="list-style-type: none"> <li>Evaluate the effective R-values of building envelope details common to assemblies that are widely used throughout B.C.</li> <li>The end result will be used to improve new envelope design and construction practices and reduce building space heating and cooling energy requirements.</li> <li>Set up criteria for buildings which would qualify for energy efficiency incentive programs.</li> </ul>	<b>Status:</b> Project to be completed by mid 2013.  <b>Partners:</b> BC Hydro, National Research Council, Canada Wood Council.  <b>Audience:</b> Researchers, design professionals, builders, developers and the industry in general.
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## Insulated Concrete Forms (ICF) Wall and Window Interface Performance

<b>Description</b> <ul style="list-style-type: none"> <li>To develop standard construction installation and interface procedures that will provide known air and water penetration resistance levels for ICF systems that are comparable or better than other conventional building systems.</li> <li>Conduct a research program to support the development of standard construction installation and interface procedures that will provide known air and water penetration resistance levels for ICF systems comparable or better than other conventional building systems.</li> <li>This information will be included in the ICF chapter of the <i>HPO Building Envelope Guide for Part 9 Houses</i>.</li> </ul>	<b>Status:</b> Project to be completed by mid 2012.  <b>Partners:</b> BC Reading Mix Concrete Association and others to be determined.  <b>Audience:</b> Researchers, design professionals, builders, developers and the industry in general.
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## Developing Durable Wood-frame Building Envelope Systems for Net-Zero Energy Ready Buildings

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### Description

- To develop and advance knowledge and best practices in constructing durable and energy efficient residential buildings.
- Increase knowledge of the hygrothermal performance of energy-efficient wood-frame envelope systems. The construction industry will be assisted in meeting the increasing requirements for building energy efficiency mandated by building codes across Canada.
- Help improve the design and construction quality of the building envelope assemblies and prevent premature building failures.

**Status:** Project to be completed by 2014.

**Partners:** University of Waterloo, Ryerson University, NSERC.

**Audience:** Researchers, design professionals, builders, developers and the industry in general.

## Characterization of Wind-Drive Rain Loads

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### Description

- Develop a method to assess the wind-driven rain loads on mid-rise multi-unit buildings and evaluate the impact of wind-driven rain on building envelopes.
- Develop technical solutions to reduce building envelope failures related to wind-driven rain and provide recommendations on building envelope detail design.
- A BC Housing building will be identified as a candidate to install overhangs and monitoring equipment to conduct the study.

**Status:** Project to be completed by 2014.

**Partners:** Ryerson University, NSERC, NRCan, FPInnovations.

**Audience:** Researchers, design professionals, builders, developers and the industry in general.

## CONSUMER EDUCATION PROJECTS

### ***Maintenance Matters – Building Envelope Maintenance Bulletins***

#### **Description**

- A series of bulletins on building envelope maintenance issues for multi-unit residential buildings.
- Addresses a range of questions and issues, e.g., why maintenance work is necessary, when and how often maintenance work should be done, and who should undertake the work.
- Publications released include:
  - *Paints, Stains and Coatings*
  - *Maintaining Your Roof*
  - *Avoiding Condensation Problems*
  - *Residential Windows and Exterior Doors*
  - *Sealants*
  - *Decks and Balconies*
  - *Building Envelope Maintenance and Renewals Planning*
  - *At-Grade and Below-Grade Assemblies*
  - *Exposed Wood Structures*
  - *Cladding*

Bulletins available at [www.hpo.bc.ca](http://www.hpo.bc.ca)

Videos available at BC Housing's YouTube channel

#### **Status:**

Four new bulletins are currently under development on the following subjects:

- *Developing a Maintenance and Renewals Program*
- *Implementing a Maintenance and Renewals Program*
- *Tuning up Multi-Unit Residential Buildings for Energy Performance*
- *Heat Recovery Ventilators*

**Partners:** Polygon Homes, CHOA.

**Audience:** Residents of multi-unit buildings, strata owners, strata councils, builders, developers, property managers, housing co-ops, and the industry in general.

### **Consumer Seminars**

#### **Description**

- Includes seminars related to the following main topics:
  - HPO Consumer Guides on *Buying a Home* and *Home Warranty Insurance in British Columbia*
  - HPO New Home Registry
  - *Maintenance Matters* - on the importance of maintenance
- Various seminars were delivered during 2011.

#### **Status:**

Seminars delivered, as opportunities arise, at Condominium Home Owners' Association of BC, Canadian Condominium Institute, Greater Vancouver Home Builders' Association, and other HPO events.

**Partners:** CHOA, CCI.

**Audience:** Consumers, builders, developers, and warranty providers.

### ***Consumer Guidelines to Managing a Renewals Project in Multi-Unit Residential Buildings***

#### **Description**

- Develop guidance materials to help strata corporations, property managers and other industry stakeholders implement renewals projects on a consistent and effective basis.
- The documents will provide key steps involved with managing these renewals projects such as planning, scheduling, budgeting and arranging for contractors throughout the process.

#### **Status:**

Project currently in progress. Guideline to be released in 2012.

**Partners:** CHOA.

**Audience:** Consumers, strata corporations, property managers.

## INDUSTRY EDUCATION PROJECTS

### ***Building Smart Education Seminars***

#### **Description**

- A series of educational seminars targeted to those involved in the design and construction of single detached houses and townhouses (Part 9 construction). For example:
  - *Building Smart #15 – Homes for Life: Building for Now and the Future* explores adaptable homes that are safe, comfortable, energy efficient and can be customized to meet the needs of homeowners today and in the future.

**Status:** *Building Smart #16 – 2012 Code Changes – Safety, Efficiency and Sustainability*

Seminars will be delivered to 22 locations across B.C. Subscribe to receive notification of upcoming registration at [www.hpo.bc.ca](http://www.hpo.bc.ca).

**Partners:** Building and Safety Standards Branch, City of Vancouver, CHOA, CHBC BC.

**Audience:** Builders, contractors, developers, architects, engineers, design professionals, building officials, building trades, home inspectors and suppliers.

### ***BCIT School of Construction and the Environment (SOCE) – Asbestos Course***

#### **Description**

- This online asbestos course will provide participants with the knowledge and skills required to address the environmental approaches and hazards in dealing with asbestos in residential construction.
- Topics will range from government regulations and legal liability to how to deal with the asbestos in buildings.
- The course will be an addition to other resources (a dedicated webpage and builder document) currently under development by the HPO.

**Status:** Course to be available in the later part of 2012.

**Partners:** BCIT, WorkSafeBC, and others to be determined.

**Audience:** Builders, contractors, designers, building officials, engineers, trades, suppliers, students, apprentices, and others involved in house construction.

### ***Building Envelope Guide for Houses – Part 9 Residential Construction***

#### **Description**

- The Guide describes new minimum requirements for the building envelope for houses, including new requirements for “rainscreen” in coastal areas, as well as building practices for the design and construction of wall assemblies that go beyond the minimum requirements of the code (best practices).
- Guide available for order by fax, phone and online at [www.hpo.bc.ca](http://www.hpo.bc.ca) and [www.publications.gov.bc.ca](http://www.publications.gov.bc.ca).
- Additional construction details related to insulating concrete form construction, basements, soil gas provisions, masonry cladding, and exterior electric meter and fixture detailing to be added.

**Status:** New updates to the guide to be completed in 2013.

**Partners:** Building and Safety Standards Branch, BC Ready-Mixed Concrete Association.

**Audience:** Builders, contractors, architects, house designers, building officials, engineers, trades, suppliers, students, apprentices, and others involved in house construction.

## ***Illustrated Guide to Seismic Requirements Part 9 Buildings***

<p><b>Description</b></p> <ul style="list-style-type: none"> <li>The objective of the guide is to explain, through text and drawing, the prescriptive lateral bracing requirements for buildings built under Part 9 of the 2010 edition of the NBC and located in high wind and seismic zones as defined in the NBC.</li> <li>The illustrations will explain the application of design requirements, suggesting a sequence of application of the requirements on a sample of houses that are representative of houses built in high wind and seismic zones in British Columbia.</li> </ul>	<p><b>Status:</b> In progress. Guide to be completed early 2012.</p> <p><b>Partners:</b> Building and Safety Standards Branch, CHBA BC, National Research Council, FPInnovations.</p> <p><b>Audience:</b> Builders, contractors, house designers, building officials, educators, and others involved in house construction.</p>
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## ***Building Enclosure Design Guide – Wood-Frame Multi-Unit Residential Buildings***

<p><b>Description</b></p> <ul style="list-style-type: none"> <li>Current best practice in design and construction of wood-frame multi-unit buildings are reflected in the Guide with the main focus on heat, air and moisture transfer.</li> <li>The Guide builds on previous work first published in 1999 by CMHC as part of the response to the leaky condominium problems.</li> </ul>	<p><b>Status:</b> Formative stages – future topic updates are currently being identified (e.g. firewall design details and others).</p> <p><b>Partners:</b> APEGBC and AIBC.</p> <p><b>Audience:</b> Builders, contractors, architects, house designers, engineers, trades, suppliers, students, apprentices, and others involved in house construction.</p>
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## ***Update of the NRC User's Guide - Application of NBC Part to Existing Buildings***

<p><b>Description</b></p> <ul style="list-style-type: none"> <li>Support with the review and analysis of the first draft of the Building Envelope requirements for the Part 9 Illustrated Guide re-development by the National Research Council Canada (NRC). The guide will be updated to reflect current knowledge, change emphasis as appropriate and reformat drawings.</li> <li>Contents of the updated guide to align with the HPO's publication <i>Building Envelope Guide for Houses Part 9- Residential Construction</i>.</li> </ul>	<p><b>Status:</b> NRC will complete the guide in 2012.</p> <p><b>Partners:</b> NRC and other partners.</p> <p><b>Audience:</b> Builders, contractors, architects, house designers, building officials, engineers, trades, suppliers, students, apprentices, and others involved in house construction.</p>
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## ***Window and Door Retrofit Guidelines***

<p><b>Description</b></p> <ul style="list-style-type: none"> <li>Develop guidance material that will help to establish consistent and effective replacement window and door installation practices as well as more informed stakeholders, including the consumer.</li> <li>Produce builder guidelines for replacement window and door installation practices in wood frame buildings (houses and multi-unit residential). Also, produce a consumer guideline.</li> <li>It will consider the wide variety of current window installation practices and the variety of window types that exist.</li> </ul>	<p><b>Status:</b> Project in progress. Two guides to be completed in 2012: one for builders and one for homeowners.</p> <p><b>Partners:</b> Window and Door Manufacturers Association of BC, City of Vancouver, BC Hydro PowerSmart, Canada Mortgage and Housing Corporation.</p> <p><b>Audience:</b> Builders, contractors, window manufacturers, window installers, architects, house designers, building officials, engineers, and homeowners.</p>
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## ***Evaluation of Drainage Components and Sheathing Membranes***

<p><b>Description</b></p> <ul style="list-style-type: none"> <li>• Determine drying potential of wall assemblies (wood or steel frame) leading to a better understanding of the capacity of various wall assemblies to drain and dry when wall systems are configured with different claddings or different components.</li> <li>• Apply knowledge acquired to the development of test methods and a guide to evaluations for use in Canada.</li> </ul>	<p><b>Status:</b> Project in progress. Research estimated to complete in 2013.</p> <p><b>Partners:</b> National Research Council, Institute for Research in Construction, Air Barrier Association of America (ABAA).</p> <p><b>Audience:</b> Builders, contractors, window manufacturers, window installers, architects, house designers, building officials, engineers, and homeowners.</p>
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## ***Builder Insight Technical Bulletins***

<p><b>Description</b></p> <ul style="list-style-type: none"> <li>• HPO publication to provide practical information to Licensed Residential Builders and others in the industry on new technologies, research results, good building practices and emerging technical issues.</li> <li>• Publications released to date:             <ul style="list-style-type: none"> <li>○ <i>Poured-in-place Concrete Residential Construction: Moisture Management Strategies</i></li> <li>○ <i>Rainscreen Walls: Field Monitoring and Performance in Coastal British Columbia</i></li> <li>○ <i>Compatibility of Fasteners and Connectors with Residential Pressure Treated Wood</i></li> <li>○ <i>ASHRAE 90.1 – Requirements for the Building Enclosure.</i></li> <li>○ <i>Fenestration Energy Performance: A Roadmap for Understanding Requirements for residential Buildings in British Columbia</i></li> </ul> </li> <li>• Completed bulletins available online at <a href="http://www.hpo.bc.ca">www.hpo.bc.ca</a>.</li> </ul>	<p><b>Status:</b> New technical bulletins are being developed on the following subjects:</p> <ul style="list-style-type: none"> <li>○ <i>Sidewall Venting Appliances – Guidelines for their Location and Installation of Gas Appliances</i></li> <li>○ <i>Avoiding Concrete Driveways Defects</i></li> <li>○ <i>Managing Environmental Risks in Existing Buildings (asbestos, vermiculite, others)</i></li> <li>○ <i>Heat Recovery Ventilators</i></li> <li>○ <i>LEED Gold Building Design and Associated Costs</i></li> </ul> <p><b>Partners:</b> Building and Safety Standards Branch, warranty providers, others.</p> <p><b>Audience:</b> Builders, contractors, developers, and the industry in general.</p>
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## ***Building Envelope Solutions Theory and Practice Course Update***

<p><b>Description</b></p> <ul style="list-style-type: none"> <li>• The Building Envelope Solutions Theory and Practice (BEST Series) course was updated to bring the content in line with the BC Building Code requirements.</li> <li>• The course is delivered at BCIT, Part-time Studies, Architectural and Building Engineering Technology.</li> </ul>	<p><b>Status:</b> Course updated in 2010. Scheduled for delivery in 2012/13.</p> <p><b>Partners:</b> British Columbia Institute of Technology.</p> <p><b>Audience:</b> Residential builders, design professionals, developers and industry in general.</p>
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## CHBA BC Builder Course Update and Development – Phase III

<b>Description</b>	<b>Status:</b> Completion in 2012.
<ul style="list-style-type: none"> <li>Partnership arrangement for HPO funding towards the update and development of CHBA BC builder courses and programs to meet the National Education Benchmark for Homebuilders and Renovators.</li> <li>Entering the final phase of completion of the Master Builder Program including a residential builder course on the BC Building Code which will feature updates to reflect the 2012 Code.</li> </ul>	<b>Partners:</b> CHBA BC.
	<b>Audience:</b> Residential builders.

## Education & Training Resources for Residential Construction – HPO Online Resources

<b>Description</b>	<b>Status:</b> Online directory is updated on an ongoing base. Existing resource list available at <a href="http://www.hpo.bc.ca">www.hpo.bc.ca</a> .
<ul style="list-style-type: none"> <li>Updating and expanding the HPO's existing online directory of education and training resources available in BC.</li> <li>Phase III of this project will involve organizing the weblinks according to construction sequence and building trades.</li> </ul>	<b>Partners:</b> GVHBA, CHBA BC.
	<b>Audience:</b> Builders, developers, students, those interested in embarking on a career in residential construction, or for those who want to expand their existing skills.

## BCBEC – HPO Building Smart with Windows Workshop

<b>Description</b>	<b>Status:</b> Online currently under development.
<ul style="list-style-type: none"> <li>Event highlighted emerging trends in building enclosure design, integrated energy efficient solution, thermal performance and regulatory issues.</li> <li>Held on January 19, 2012 in Vancouver.</li> </ul>	<b>Availability:</b> Visit the BCBEC website for details at <a href="http://www.bcbec.com">www.bcbec.com</a>
	<b>Partners:</b> BCBEC, CMHC, WDMA BC, NRC.
	<b>Audience:</b> Design professionals, builders, developers and the industry in general.

## BCBEC Building Research Symposium

<b>Description</b>	<b>Status:</b> A new symposium to be scheduled in Vancouver on September 26, 2012.
<ul style="list-style-type: none"> <li>The event highlights emerging trends in building enclosure design, integrated energy efficient solution, thermal performance and regulatory issues.</li> </ul>	<b>Availability:</b> Contact the BCBEC website for details at <a href="http://www.bcbec.com">www.bcbec.com</a>
	<b>Partners:</b> BCBEC, CMHC, others.
	<b>Audience:</b> Design professionals, builders, developers and the industry in general.