

# Partners Needed for Research on Vacuum Insulation Panel (VIP)

## Project Title: Application of High Performance Vacuum Insulation Panel (VIP) in Building Construction.

### Background

Recent global awareness about the necessity to conserve energy and spiraling demand of energy have intensified the focus and interest on the high performance thermal insulation throughout the world. Latest advances in the vacuum-technology and nanoporous material manufacturing process have once again opened up exciting new opportunity of applying vacuum- and nanotechnology together for the development of vacuum insulation panel (VIP) that has about 10 times higher thermal insulating capacity than the conventional insulating materials currently used in building construction.

With its tremendous potential, VIP is now widely recognized as the next generation thermal insulation for the building envelope construction. However, higher cost, absence of long-term performance data in extreme climate and unavailability of insulation system design guidelines are among the few major factors that are holding back the extensive use of VIP in the building construction industry. These unresolved challenges obviously merit urgent research initiatives that can deliver scientific but practical solutions to these pressing concerns.

Researchers at the Institute for Research in Construction (IRC) of the National Research Council (NRC) Canada have been working on various aspects related to the long-term performance and development of VIP through its participation in the international IEA/ECBCS (<http://www.iea.org/>) Annex 39 project and the Canadian CCTI project. Substantial scientific progresses have been made during the last five years in terms of developing new test facilities (e.g. vacuum guarded hot plate), understanding

the performance of VIP as an insulating material and moving towards the development of cost-effective VIP for the building construction industry<sup>1</sup>. However, these successes have also opened up new research opportunities and the new set of objectives. These new research opportunities must be seized upon for the benefit of the stakeholders of the building construction industry, insulation manufacturers and design professionals.

### Objectives

1. Develop economically competitive high performance VIP for the building construction industry.
2. Establish long-term thermal resistance (LTTR) value of VIP for the thermal design of building envelopes.
3. Prepare application guidelines for the use of VIP in building construction.

### Methodology

1. Laboratory experiments to develop VIP that offers long-term serviceability and cost-effectiveness. IRC's newly developed vacuum guarded hot plate (VGHP) will be widely used in this investigation.
2. Field experiments and accelerated aging tests in the laboratory will help to establish the long-term thermal resistance (LTTR) values of VIP.
3. Application guidelines will be prepared with the information available from the laboratory and field investigations, and the global high performance VIP insulation research community.

*Mukhopadhyaya, P.* 'High Performance Vacuum Insulation Panel - Research Update from Canada', Global Insulation Magazine, PRo Publications International Limited, [www.GlobalInsulation.com](http://www.GlobalInsulation.com), October 2006, pp. 9-15.

## **Benefits**

1. Cost reduction due to the development of alternative materials for VIP construction.
2. Energy efficient houses with VIP as the primary thermal insulating material.
3. Progressive construction industry that is armed with the knowledge and confidence to use VIP as the insulation material for building envelope construction.

## **Deliverables**

1. Guidelines for manufacturing cost-effective high performance VIP for the building envelope construction.
2. Long-term thermal resistance (LTTR) value of VIP for the building envelope construction.
3. Design considerations for the application of VIP in the building envelope construction.

## **Time Duration**

This project will take at least three years for successful completion.

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NRC-IRC is seeking funding partners from the private and public sectors to continue its research on high performance vacuum insulation panel. Organizations participating in this project will benefit in a variety of ways. A few of the benefits include:

- Early access to concepts and technologies developed out of the research project.
  - Research reports that detail project findings.
  - Opportunities to share experiences and opinions with leading researchers, organizations and professionals.
  - Recognition for participating in this project in various internal (NRC-IRC) and external publications, if desired.
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