Request for Information

For

ENERGY EFFICIENCY STRATEGIES FOR NEW AND EXISTING AFFORDABLE MULTI-UNIT RESIDENTIAL BUILDINGS

Date Issued: July 20, 2015

Solicitation Closes: August 21, 2015

Solicitation File: RFI-2015-01 for Energy Efficiency Strategies

Originating Department: CMHC

Inquiries:
Patricia Knott
Procurement Advisor
e-mail: pknott@cmhc-schl.gc.ca
Fax: (613) 740-5465

Security Classification: PROTECTED

Ce document est aussi disponsible en francais sur demande.

Canada

CMHC SCHL
HOME TO CANADIANS

1.1 Introduction and Scope

Canada Mortgage and Housing Corporation (CMHC), Housing Needs Research, undertakes research in support of promoting housing affordability, especially for low-income Canadians. Reducing operating and capital costs to promote affordability is one area in which this is accomplished; for example, incorporating energy efficiency measures and features (ie., highly insulated and air tight wall assemblies) or renewable technologies (such as photovoltaics) in new or existing construction.

CMHC is conducting a Request for Information (RFI) to gather information regarding projects or initiatives completed, in progress or contemplated by building owners and managers, architects and engineers, energy service or other stakeholders involved in the design, construction, management and operations of (low-) energy efficient new affordable multi-unit residential buildings (MURBs) or the energy efficiency retrofit of existing affordable MURBs.

1.2 CMHC Background

CMHC is the Government of Canada's National Housing Agency, with a mandate to help Canadians gain access to a wide choice of quality, affordable homes. It is a Crown corporation, with a Board of Directors, reporting to Parliament through the Minister of Employment and Social Development, and Minister responsible for Canada Mortgage and Housing Corporation, the Honourable Pierre Poilievre.

CMHC has more than 2,000 people located at its National Office in Ottawa and at various Business Centres throughout Canada. The Business Centre areas are divided into five regions: Atlantic; Quebec; Ontario; British Columbia; and Prairies & Territories.

1.3 Objectives of this Request for Information

The objective of this RFI is to identify projects or initiatives that are completed, in progress or contemplated for both New (identified in section "A", below) and existing (identified as section "B", below) affordable multi-unit residential buildings focusing on energy and/or water efficiency improvements.

Projects that are of interest to CMHC should fit into any one or more of the following Activities:

1. Activity 1 - Integrated Design Charrettes
2. Activity 2 - Development of Illustrative Design and Specifications
3. Activity 3 - Performance Monitoring of Low Energy, Low Rise, Affordable MURBs
4. Activity 4 - Documentation of Whole Building Energy Efficiency Retrofits
5. Activity 5 - Monitoring of Whole Building Energy Efficiency Retrofits
6. Activity 6 - Energy and/or Water Efficiency Technology and Practice

For the purposes of this RFI, CMHC is only interested in finding out about projects and initiatives that fit within the Activities listed above. Section 1.6, Requirements of this Request

For Information (see below), outlines the type, nature and extent of the information CMHC is requesting in the RFI submission.

Separate from this RFI, CMHC will review and assess the various submissions received. Projects and/or initiatives deemed to be of interest to CMHC may result in follow up interviews and discussions with the identified key contacts to better define the project and its status. Proceeding to the development of subsequent contracts or agreements between CMHC and the submitting parties may ensue in accordance with and in compliance with CMHC's procurement policies and practices.

For information purposes only, examples of Statements of Work are outlined below for each of the Activities. These Statements of Work are provided only to provide an indication of the level of effort anticipated by CMHC for the respective activity and may be used as the basis for the development of a Statement of Work for subsequent agreements. Where applicable, and upon further negotiations between CMHC and the submitting party, a Statement of Work tailored specifically to the project will be developed in the phase following this RFI. The submitting party should also be aware that the completion date for all agreements that might be developed (subsequent to this RFI) between CMHC and the submitting party to undertake any of the above Activities will be no later than March 31, 2016; including the submission of final approved reports.

A. **New multi-unit residential buildings:** build knowledge among designers and owners of new, low– and mid- rise (that is, less than 10 storeys) affordable multi-unit residential buildings (MURBs) in Canada of the technologies and practices that can be used to make significant reductions (greather than 50% over existing national/provincial building/energy code requrements) in energy consumption. Through integrated design charrettes, design development and post occupancy monitoring of low energy, low-rise projects, the project will provide feedback on the performance attained, occupant satisfaction, benefits and costs to help stakeholders make informed decisions regarding the design and construction of energy efficient affordable housing projects.

- **Activity 1: Integrated Design Charrettes**

  Under this activity, CMHC seeks to identify affordable housing providers or their design teams on projects targeting low-energy and other sustainable objectives. CMHC may support integrated design charrettes (IDCs) that the project stakeholders will use to explore design concepts, technologies, practices, building form and functions, performance target, cost-benefit analysis, etc for specific housing projects. The IDCs will include affordable housing providers, builders, architects, engineers, regulatory authorities, utility representatives, subject matter experts, cost estimators, building performance modellers and other stakeholders. Through the IDCs, an iterative process will be undertaken to optimize conceptual designs of low energy, low- or mid-rise (under 10 storeys) affordable MURBs within the context of an urban infill location. Participants would help identify and prioritize technologies and practices they would like to see deployed in affordable MURBs. The IDCs will include design concept

development, the identification of a range of appropriate technologies and practices, initial energy performance simulations and cost estimating to help optimize design, the identification of challenges and opportunities, and the preparation of more refined design concepts and options. The output of the IDCs will be reports on the conceptual designs, specifications and performance for low-rise, low energy, affordable MURB projects.

For the purposes of this RFI, the IDC and submission of the final reports must be completed by March 31, 2016

Activity 1 – Example of Statement of Work

A Consultant will be retained to organize and deliver an integrated design charrette (IDC) planned for (date) (location). The following tasks provide an overview of the objectives, activities and deliverables for the IDC:

Task 1: Development of the IDC work plan:

The Consultant will develop a detailed work plan for the IDC itemizing tasks to be carried and indicate where the partners will need to make a contribution. It will include identification of an appropriate time and venue for the workshop as well as a framework for the format of the IDC.

Task 2: Coordinate preparation and delivery of the announcement

The Consultant will design a suitable format and content for email announcement of the IDC so prospective participants can hold the date.

Task 3: Logistical Support for Design and Delivery

The Consultant will co-ordinate the logistics for the venue, food, room setup, signage, and audio-visual equipment. The Consultant will provide logistical support for facilitators and simulators and arrange for note taking by the partners at the event.

Task 4: Speaker/facilitator/resource/notetaker Package

The Consultant will develop and deliver instructions and background material for the participants, speakers, notetakers, facilitators and simulators in order to meet the IDC objectives.

Task 5: Participant Kit

The Consultant will liaise with the partners to request and obtain materials and collate and deliver the materials to the participants at the IDC event.

Task 6: Partner co-ordination/Project management

The Consultant will co-ordinate the project partners and keep them informed of progress, respond to inquiries and direct them appropriately as required, and clarify roles where needed.

Task 7: Charrette Facilitation

The Consultant will facilitate the IDC. This will include delivering the opening plenary session, organizing the working groups, managing the subject area experts, coordinating modelling, analysis and costing of options, documenting results, compiling options, listing challenges to be overcome, illustrating the evolution of the design of the building, and managing discussions on the outcome of the IDC.

Task 8: Charrette Report

The Consultant will compile and write summaries of the presentations and charrettes, based on notes from the note takers. Electronic copies of presentations, where made available by presenters, will be included in the charrette report. The report will document the following:

i. Identification of key objectives for achieving maximum energy efficiency in the building (targets and measures, design and technical approaches) as well as other sustainability issues, including environmental impact, resource conservation, healthy indoor environments and affordability.
ii. The development of the interdisciplinary design development team that guided the development of the technical guidelines for achieving maximum energy efficiency.
iii. The development of an Integrated Design Process (to follow on the Integrated Design Charrette) which will continue to refine and optimize the building through an iterative, consultative design process.
iv. The preliminary conceptual, starting point, design of the building.
v. The energy analysis undertaken to evaluate energy consumption based on various technologies and practices. The decision making processes outside of modelling that led to design improvements that optimize the performance of the building.
vi. The technical specifications for the site planning, building envelope, apartment and building design, mechanical systems, electrical systems, water systems (potable and waste) and renewable energy systems to meet targeted performance levels.
vii. Estimated incremental costs of the innovative technologies and practices over the base costs of a building code version of the building. Lifecycle costs and benefits will be included in the analysis.
viii. The identification of technology gaps/cost barriers that could prevent the building from achieving its performance goals in a cost-effective way.

- **Activity 2 - Development of Illustrative Design and Specifications**

  Based on the commitment of a building owner to progress from the conceptual design for a low energy affordable MURB to construction, CMHC may provide support to the design team to further develop the design and specifications for the building. This will include the assembly of an interdisciplinary design team that will identify sustainability objectives, identify baselines, and set targets. Innovative technologies and practices will be identified and assessed in terms of impact on performance targets, costs, benefits, implementation considerations and operation and maintenance requirements. Detailed energy consumption simulations will be performed to characterize impact on annual energy consumption and end-uses and related costs and benefits. Regulatory authorities will be engaged early to help identify and resolve barriers to implementing innovative technologies and practices, if possible. Based on input from the project owners and the available construction budget, the design and specification of the building will be prepared. Based on this information, an illustrative description for low energy affordable MURB design, specification, performance characterization, cost indicators, benefits, etc will be developed to support the decision making process of other affordable housing providers and their design teams.

Activity 2 – Example of Statement of Work

A Consultant will be retained to carry out the following tasks:

1. Based on the design and specifications for the affordable low energy MURB developed through an integrated design process, the design of the building will be further analysed to determine the various technical options for achieving low energy and other sustainable housing design objectives. In this task, the consultant will work with an interdisciplinary design team performance indicators will be selected, baselines identified and design targets identified.

2. The consultant will assess low energy and sustainable technologies and practices that can be deployed to achieve the performance targets. The assessment will include the identification of costs estimates, benefits, implementation considerations, and operation and maintenance requirements. Features to be assessed with include:
   a. Enhanced wall and window designs to reduce heat losses/gains and air leakage
   b. Enhanced roof design to reduce heat loss/gain
   c. Construction details to reduce/eliminate thermal bridges
   d. Heat recovery ventilation systems to improve livability, ease of operation and maintenance and energy performance
   e. Enhanced heating delivery and heat recovery to improve energy performance
   f. Enhanced control and monitoring of energy use to facilitate user knowledge and control options
   g. Reduced plug loads through the application of energy efficient appliances
   h. Improved light control, natural lighting and efficiency

i. Other design innovations including water efficiency and waste and storm water management, materials and systems to reduce material use, promote conservation
j. Specialized shading devices required to control energy gain
k. Indoor air quality provisions including low pollutant emitting products and materials
l. Innovations to reduce environmental impact
m. Affordability provisions – capital costs and operating

3. Detailed annual energy consumption analysis by end use, water consumption analysis, lifecycle costs and benefits etc of suite of energy efficiency and renewable energy technologies and practices. Building performance will be characterized for baseline (building code) levels of performance and the selected energy efficiency target.

4. Consultations with regulatory and permitting authorities for technologies as appropriate (e.g.; grey water recovery) to ensure selected technologies and practices can be implemented.

5. Assisting the project owners with identifying private, corporate or public initiatives that would support the installation of the innovative features and technologies through knowledge and/or funding.

6. Preparation of illustrative documents, diagrams, details showing the innovative technologies and features to be included in the building to achieve the targeted low-energy performance and other sustainability objectives including architectural, structural, mechanical and electrical systems.

- **Activity 3 - Performance Monitoring of Low Energy, Low Rise, Affordable MURBs**

  In this activity, CMHC is seeking to identify low-energy, low-rise, affordable MURB projects having key technologies and systems within the building for the purpose of monitoring and evaluating energy and/or water performance.. Based on previous CMHC research, post occupancy performance monitoring protocols will be developed for specific low energy MURB projects. Opportunities to engage occupants in both surveys of their perceptions of performance and strategies to modify behaviours to attain greater energy/water savings will be explored. Various energy systems servicing the subject building including solar, geothermal, waste heat recovery, etc., will be monitored for a shortened time period with completion of the project, including submission of the final report by March 31, 2016. Building monitoring will also include indoor environmental conditions, ventilation, envelope performance and water use. Occupant surveys will also be conducted to assess satisfaction with energy costs, comfort, indoor air quality and other indicators.

  Energy consumption models will be developed for the subject building that can be used to interpolate the monitoring results to characterize energy end use points such as space heating and cooling, domestic hot water, lighting, appliance and equipment and other end uses. This will support the analysis of costs and benefits related to the application of specific technologies later in the project. Cost information for innovative features will support the analysis of cost and benefits in terms of simple payback and return on investment or other selected indicators.

  The monitoring study (or studies) will provide tangible evidence of the performance of low energy, low rise affordable MURB projects and the technologies and practices used to construct them.

Activity 3 – Example Statement of Work

A Consultant will be retained to carry out the following tasks:

Task 1 – Development of Post Occupancy Performance Monitoring Plan

The consultant will develop a monitoring plan to characterize the energy, water and indoor environmental performance of the MURB project taking into consideration a shortened monitoring time period ending March 2016. Monitoring objectives, techniques, equipment and outputs will be described for each selected performance indicator. The monitoring program will reflect the overall design of the building as well as the technologies, systems and equipment installed in the building. The consultant will ensure the building is properly and fully commissioned to ensure all systems are operational and are operating properly. As a base, the monitoring program will include:

Task 2 - Energy and Water Monitoring:

The total building energy (electricity, fuel, renewable energy production) and water consumption will be monitored for one year post-occupancy. Central common area and insuite consumption will be monitored and described to ensure the overall energy use is captured. Monitoring will allow for an assessment of monthly energy and water consumption and costs. Any renewable energy production from photovoltaic and solar thermal panels will be monitored so that the impact on the overall "net" energy consumption of the building can be determined.

The results of the monitoring will be reconciled with the building energy simulation developed for the building and actual weather conditions. The simulation will be used to identify annual energy and power consumption associated with space conditioning, domestic hot water heating, lighting and appliances and other equipment on a monthly and annual basis.

Energy consumption will be expressed in terms of ekWh/m^2 of heated floor area and water m^3/suite.

Task 3 - Indoor Air Quality Monitoring:

Four indoor air quality indicators (temperature, relative humidity, formaldehyde, CO_2) will be monitored for two weeks during mid winter conditions in a representative number of apartments. The apartments will be distributed on the 4 different elevations on different storeys over the height of the building. Temperature, relative humidity and CO_2 shall be tracked continuously and reported on an hourly basis. The average formaldehyde concentration for the two week period will be calculated.

Task 4: Ventilation Performance Assessment:

Airflow measurements (via in-duct flow measuring stations) from the ventilation system in a selected number of apartments will be recorded to ensure the systems are in balance and airflows meet design expectations. Forced air changes will be calculated based on the volume of the apartments. The operating cycles and electrical consumption of the ventilation systems will be monitored for the two week period. Based on the monitoring, the energy consumption for fan energy and ventilation-related space conditioning will be calculated on both a monthly and annual basis for the suites tested and the results will be extrapolated to the entire building.

Task 5: Air Leakage Control Assessment

A protocol for the measurement of apartment and whole building air leakage will be developed. The air leakage tests will be used to characterize the air leakage rate of the building envelope in terms of normalized leakage areas (NLA – cm^2/m^2 envelope area at 75 Pa) and air change per hour (air changes per hour at 50 Pa). The apartment tests will be used to assess the level of indoor-outdoor leakage as well as the compartmentalization of the apartments from one another and the common areas.

Deliverable:

A report will be prepared that documents the annual and monthly energy, water, and indoor air quality, ventilation and air leakage performance of the building. The performance of the building will be presented and discussed in terms of the original design objectives and relevant guidelines.

B. **Existing Multi-unit Residential Buildings:** build knowledge among designers and owners of existing mid- and high- rise (that is, greater than 4 storeys) affordable multi-unit residential buildings (MURBs) in Canada of the technologies and practices that can be used to make significant reductions in space heating energy consumption. This research project will follow a multi-faceted approach to encourage building owners/managers of existing MURBs to consider and undertake increasingly higher energy and water efficiency performance levels when retrofitting or renewing their buildings' capital assets.

- **Activity 4: Documentation of Whole Building Energy Efficiency Retrofits**

  Under this activity, CMHC is seeking to identify MURB buildings whereby a comprehensive whole-building retrofit, including upgrades to the building envelope (ie. exterior walls, windows, roofs, improved air-tightness, etc.), have been completed to significantly improve the whole building energy performance and reduce space-heating demand and post-retrofit performance monitoring of the building has been completed. The collection of at least one full (continuous) year of monitoring data pre- and post-retrofit is desired. Funding under this activity will be provided for the preparation of a comprehensive case study featuring information on building characteristics, the measures used to reduce energy consumption and energy costs, available monitored data to demonstrate “before” and “after” consumption and, where available, construction costs associated with the retrofit work. The case studies will serve as useful tools and examples for property owners and managers, designers and developers to see what type of energy efficiency projects are being performed and how feasible they may be for their own building.

Activity 4 – Example Statement of Work

A Consultant will be retained to carry out the following tasks:

Task 1: Building Characterization

The building will be characterized in terms of:

- Age
- Heated floor area
- Number of storeys
- Number of units
- Tenure (condo, rental – private, public, co-op)
- Occupancy (seniors, families, singles, mixed)
- Construction (structure, building envelope – insulation levels, air and vapour barriers, window and door characteristics, window-wall ratio)
- Space heating system
- Domestic hot water heating system
- Ventilation System
- Lighting
- Appliances
- Equipment
- Parking garage (number of units, heating, lighting)
- Annual Energy (electricity- kWh, fuel- m^3gas or Litre oil, also normalized by heated floor area) and water ($m^3$and m^3/unit) consumption
- Objectives of owner/occupants
- Other building conditions/issues impacting or impacted by retrofit work

Task 2: Description of Energy Efficiency Retrofit Measures, Technologies and Practices

The energy efficiency retrofit measures, technologies and practices implemented in the building will be described in terms of their technical specifications, anticipated benefits and costs – along with a description of how the costs and benefits were estimated including any energy performance modelling. A supporting descriptive graphic will be provided for each feature, where possible. Any available and supporting pre-retrofit energy audits will be included in appendices to the case study report.

Task 3: Energy Consumption Analysis

A methodology to assess the before and after energy consumption of the building will be developed using utility bill analysis or sub-metering. Depending on the extent of the retrofit measures implemented, it may be possible to detect the impact through an analysis of at least one year of utility bills post retrofit. One year of sub-metering offers better resolution particularly when directed at the energy end-use most closely associated with the retrofit measures (e.g.; space heating energy use to assess the impact of adding

insulation to the building envelope, improving airtightness, etc.). The methodology selected must factor in variables including year to year changes in weather, occupancy changes and any other operational changes that may have impacted building energy consumption.

Where water efficiency measures are put in place, the same descriptive and analysis activities as described above for energy will be undertaken for water to assess costs and benefits.

Task 4: Reporting

A report documenting Tasks 1, 2 and 3 will be prepared. It will be supported by appendices containing available information on initial assessments and energy performance modelling, energy audits, utility billing, and technical information on the energy (and water) efficiency measures. Photographs of the technologies and their installation will be provided as well. The reports will include, to the full extent possible:

- Executive Summary
- Introduction
- Building Description
- Pre-Retrofit Energy (and water) Consumption (actual and normalized to heated floor area)
- Energy (and water) Efficiency Retrofit Measures (description, costs and benefits)
- Implementation (schedule, special provisions, occupant considerations, challenges)
- Post-Retrofit Energy and Water Consumption
- Cost and Benefit Analysis (including side benefits such as improved comfort, enhanced durability, etc)
- Knowledge Gained and Lessons Learned
- Appendices (any energy performance modelling, utility bill analysis, audits, technical information, graphics, photo records)

Drawing on the information provided in the full report, a 6-8 page Better Buildings Case Study will be prepared.

- **Activity 5: Performance Monitoring of Whole Building Energy Efficiency Retrofits**

  Under this activity, CMHC is seeking to identify existing MURB buildings whereby a comprehensive whole-building retrofits retrofit, including upgrades to the building envelope (ie. exterior walls, windows, roofs, improved air-tightness, etc.), has been completed to significantly improve the whole building energy performance and reduce space-heating demand but post-retrofit performance monitoring has not been performed. For this activity, energy efficiency measures that improve overall building performance by more than 25 percent against pre-retrofit performance is desired. Funding under this activity may be provided for the collection of pre-retrofit performance data (that is, using utility bills), post-retrofit monitoring (for a shortened time period with completion of the project, including submission of the final report by March 31, 2016) and the benchmarking of the energy models against the pre-and post retrofit building performance. The preparation of a comprehensive case study featuring information on building characteristics, the measures used to reduce energy consumption and energy costs, available monitored data to demonstrate "before" and "after" consumption and, where available, construction costs associated with the retrofit work. The case studies will serve as useful tools and examples for property owners and managers, designers and developers to see what type of energy efficiency projects are being performed and how feasible they may be for their own building.

Activity 5 – Example Statement of Work

(Note: Statement of Work is similar to Activity 3)

A Consultant will be retained to carry out the following tasks:

Task 1 – Development of Post Occupancy Performance Monitoring Plan

The consultant will develop a monitoring plan to characterize the energy, water and indoor environmental performance of the MURB project taking into consideration a shortened monitoring time period ending March 2016. Monitoring objectives, techniques, equipment and outputs will be described for each selected performance indicator. The monitoring program will reflect the overall design of the building as well as the technologies, systems and equipment installed in the building. The consultant will ensure the building is properly and fully commissioned to ensure all systems are operational and are operating properly. As a base, the monitoring program will include:

Task 2 - Energy and Water Monitoring:

The total building energy (electricity, fuel, renewable energy production) and water consumption will be monitored for a shortened time period, ending March 2016. Central common area and insuite consumption will be monitored and described to ensure the overall energy use is captured. Monitoring will allow for an assessment of monthly energy

and water consumption and costs. Any renewable energy production from photovoltaic and solar thermal panels will be monitored so that the impact on the overall "net" energy consumption of the building can be determined.

The results of the monitoring will be reconciled with the building energy simulation developed for the building and actual weather conditions. The simulation will be used to identify annual energy and power consumption associated with space conditioning, domestic hot water heating, lighting and appliances and other equipment on a monthly and annual basis.

Energy consumption will be expressed in terms of ekWh/m^2 of heated floor area and water m^3/suite.

Task 3 - Indoor Air Quality Monitoring:

Four indoor air quality indicators (temperature, relative humidity, formaldehyde, CO_2) will be monitored for two weeks during mid winter conditions in a representative number of apartments. The apartments will be distributed on the 4 different elevations on different storeys over the height of the building. Temperature, relative humidity and CO_2 shall be tracked continuously and reported on an hourly basis. The average formaldehyde concentration for the two week period will be calculated.

Task 4: Ventilation Performance Assessment:

Airflow measurements (via in-duct flow measuring stations) from the ventilation system in a selected number of apartments will be recorded to ensure the systems are in balance and airflows meet design expectations. Forced air changes will be calculated based on the volume of the apartments. The operating cycles and electrical consumption of the ventilation systems will be monitored for the two week period. Based on the monitoring, the energy consumption for fan energy and ventilation-related space conditioning will be calculated on both a monthly and annual basis for the suites tested and the results will be extrapolated to the entire building.

Task 5: Air Leakage Control Assessment

A protocol for the measurement of apartment and whole building air leakage will be developed. The air leakage tests will be used to characterize the air leakage rate of the building envelope in terms of normalized leakage areas (NLA – cm^2/m^2 envelope area at 75 Pa) and air change per hour (air changes per hour at 50 Pa). The apartment tests will be used to assess the level of indoor-outdoor leakage as well as the compartmentalization of the apartments from one another and the common areas.

Deliverable:

A report will be prepared that documents the annual and monthly energy, water, and indoor air quality, ventilation and air leakage performance of the building. The

performance of the building will be presented and discussed in terms of the original design objectives and relevant guidelines.

- **Activity 6: Energy and/or Water Efficiency Technology and Practice Assessments**

  In this activity, CMHC is seeking to identify existing MURB projects where individual energy and/or water efficiency technologies and practices have been completed, the technology or practice has been validated with the collection of at least one years' performance data and the energy (or water) impact on the overall building performance has been assessed. Funding under this activity will be provided for the preparation of a comprehensive case study featuring information on building characteristics, the measures (ie technologies and/or practice) used to reduce energy consumption and energy costs, available monitored data to demonstrate "before" and "after" consumption and, where available, construction costs associated with the retrofit work. The case studies will serve as useful tools and examples for property owners and managers, designers and developers to see what type of energy efficiency projects are being performed and how feasible they may be for their own building.

Activity 6 – Example Statement of Work

A Consultant will be retained to carry out the following tasks:

Task 1: Building Characterization

The building will be characterized in terms of:

- Age
- Heated floor area
- Number of storeys
- Number of units
- Tenure (condo, rental – private, public, co-op)
- Occupancy (seniors, families, singles, mixed)
- Construction (structure, building envelope – insulation levels, air and vapour barriers, window and door characteristics, window-wall ratio)
- Space heating system
- Domestic hot water heating system
- Ventilation System
- Lighting
- Appliances
- Equipment
- Parking garage (number of units, heating, lighting)
- Annual Energy (electricity- kWh, fuel- m^3gas or Litre oil, also normalized by heated floor area) and water ($m^3$and m^3/unit) consumption
- Objectives of owner/occupants
- Other building conditions/issues impacting or impacted by technology or practice to be implemented

Task 2: Description of Energy Efficiency Technology or Practice

The energy efficiency retrofit technology or practice that has been implemented in the building will be described in terms of their technical specifications, anticipated benefits and costs – along with a description of how the costs and benefits were estimated including any energy performance modelling. A supporting descriptive graphic will be provided for each feature, where possible. Any available and supporting pre-retrofit energy audits, calculations, assessments, etc. will be included in appendices to the case study report.

Task 3: Energy Consumption Analysis

A methodology to assess the before and after energy consumption of the building will be developed using utility bill analysis or sub-metering. Depending on the retrofit measure implemented, it may be possible to detect the impact through an analysis of at least one year of utility bills post retrofit. One year of sub-metering offers better resolution particularly when directed at the energy end-use most closely associated with the retrofit measure (e.g.; space heating energy use to assess the impact of adding insulation to the building envelope, improving airtightness, etc.). The methodology selected must factor in variables including year to year changes in weather, occupancy changes and any other operational changes that may have impacted building energy consumption.

Where water efficiency measures are put in place, the same descriptive and analysis activities as described above for energy will be undertaken for water to assess costs and benefits.

Task 4: Reporting

A report documenting Tasks 1, 2 and 3 will be prepared. It will be supported by appendices containing available information on initial assessments and energy performance modelling, energy audits, utility billing, and technical information on the energy (and water) efficiency measure. Photographs of the technology or practice and their installation will be provided as well. The report will include, to the full extent possible:

- Executive Summary
- Introduction
- Building Description
- Pre-Retrofit Energy (and water) Consumption (actual and normalized to heated floor area)
- Energy (and water) Efficiency Retrofit Measure (description, costs and benefits)
- Implementation (schedule, special provisions, occupant considerations, challenges)
- Post-Retrofit Energy and Water Consumption
- Cost and Benefit Analysis (including side benefits such as improved comfort, enhanced durability, etc)
- Knowledge Gained and Lessons Learned

- Appendices (any energy performance modelling, utility bill analysis, audits, technical information, graphics, photo records)

Drawing on the information provided in the full report, a 6-8 page Better Buildings Case Study will be prepared.

1.6 Requirements of this Request for Information

For the purposes of this RFI, the following specific information is requested and should be included in your responses:

1) Please provide the name and address of the firm together with complete contact information of the lead contact submitting information in response to this RFI.

2) Describe your company's ability and qualifications to provide the services specific to the Activities of interest. Include information about company structure, key employees qualifications (that will be involved in the Activity), experience

3) Please indicate under which category the submission relates to.
   A. New multi-unit residential building
   B. Existing multi-unit residential building

4) Please indicate under which Activity the submission relates to:
   A. Activity 1 - Integrated Design Charrettes
   B. Activity 2 - Development of Illustrative Design and Specifications
   C. Activity 3 - Performance Monitoring of Low Energy, Low Rise, Affordable MURBs
   D. Activity 4 - Documentation of Whole Building Energy Efficiency Retrofits
   E. Activity 5 - Monitoring of Whole Building Energy Efficiency Retrofits
   F. Activity 6 - Energy and/or Water Efficiency Technology and Practice Assessments

   Note: Under this RFI, submitting parties may make multiple submissions. For example, the submitting party may have gathered monitoring data documented to support the evaluation of a 'whole building energy efficiency retrofit and make a submission in accordance with Activity 4. In the process, the submitting party may have also collected sufficient data to evaluate the performance of a specific energy or water efficiency technology (such as the installation of a solar wall or insuite heat recovery ventilators). The company may also wish to submit project ideas under Activity 6.

5) For each activity that a submission is being made, provide sufficient information and description of the project in order to allow CMHC to adequately evaluate and assess the submission for further consideration. Examples of information for each Activity are as follows:

- Activity 1 & Activity 2 (Integrated Design Charrette & Development of Illustrative Design and Specifications) -
  Provide a brief description of the proposed project including:
  - building features and characteristics;
  - energy performance levels building is designed (or intended) to achieve (for example, 25 percent improvement over 2011 NECB);
  - the design stage the project is currently in, intended start date for construction.
  - The composition and expertise of the design team
- Activity 3 (Performance Monitoring of New Low-Energy Building)
  Provide the same information as above. In addition:
  - When was construction completed? (ie. How old is the building?)
  - Indicate the performance level the building was designed to achieve.
  - Indicate whether or not an energy model has been developed/created for the building
  - Has any performance monitoring been completed on the building? If so, to what extent?
  - What is the extent of any sub-metering (of individual systems) in the building?

- Activity 4, 5 and 6(Existing Buildings)
  Provide the same information as Activity 3, above.
  For Activity 6, provide specific information regarding the energy efficiency measures, technologies or practices that were incorporated into the building.
  - building features and characteristics;
  - Examples of energy efficiency technologies and measures may include construction of solar wall systems; installation of high performance windows; installation of suite ventilation systems (such as HRV's/ERV's) or heat recovery on central exhaust system; increasing thermal insulation in wall assemblies; installation of drainwater heat recovery system; installation of high performance and high efficiency mechanical and electrical systems (lighting, boilers/hydronic systems, tankless water heaters, etc.);
  - Examples of building practices may include installation of an energy management system, adoption of an air-sealing and/or weatherization program
  - Water efficiency measures may include replacement of existing toilets with dual or low-flush toilets, installation of faucet aerators, rainwater harvesting, etc.

1.7 Submission Requirements

Individuals or companies interested in responding to this RFI are invited to submit a brief information package pertaining to the above-stated high level requirements (Sec 1.6), ***on or before:***

August 21, 2015 2:00 pm EDT.

Please submit your response electronically to ebid@cmhc-schl.gc.ca. The subject line of the transmission must state RFI-2015-01. An automatic confirmation of receipt will be sent to all respondents. Responses may be submitted in MS Word, Lotus WordPro or Adobe Acrobat PDF, in English or in French. Please note that in certain e-mail programs the "Send" format may need to be specified as either "HTML" or "`Plain Text". Rich Text formatted or compressed (Zipped) documents cannot be opened by CMHC.

NOTES:

1. Respondents need not prepare expensive or detailed responses at this time.

2. Respondents should not include firm pricing, unit costs or quotations in their submission; however, CMHC is looking for an idea of what the market fee structure might be for this type of service.

3. Respondents should note that this RFI is neither a formal tender nor an intent to contract with any supplier and should not be interpreted as any form of commitment or obligation on CMHC's part. Following the receipt of responses and at its sole discretion, CMHC will determine whether or not to continue the project described herein.

4. In responding to this RFI, any assumptions that respondents have made should be clearly explained. Providing feedback on this project is not mandatory and will not serve as pre-qualification of respondents for any subsequent solicitation process; however, feedback from industry sources will assist CMHC in preparing for a possible solicitation process and assist the procurement strategy as a whole. Responses will not be formally evaluated.

5. Respondents are reminded that this is a Request for Information (RFI) and not a Request for Proposal (RFP). It is not necessary to respond to every point mentioned in the RFI; however, more complete responses will potentially reduce the chances for misunderstandings when and if CMHC proceeds to the solicitation process stage.

6. Due to the nature of this RFI activity, respondents must be aware that the aspects of their responses may be used as a basis for modifying the draft document, if CMHC prepares any future procurement. It shall be noted that these draft documents are subject to change.

7. CMHC encourages interested individuals and businesses capable of delivering the services concerned to respond. By responding to this RFI, your company will receive notification of any subsequent procurement.

1.8 Communication

All questions regarding this RFI must be sent by e-mail or facsimile to:

Patricia Knott
Procurement Advisor, Room #C2-442
Canada Mortgage and Housing Corporation
700 Montreal Road
K1A 0P7
Email: pknott@cmhc-schl.gc.ca
Fax: (613) 740-5465

1.9 Ownership of Responses

All responses and related materials become the property of CMHC and will not be returned. CMHC will not reimburse the Respondent for any work related to, or materials supplied in, the preparation of the RFI response.