

# Infrastructure Canada | Smart Cities Challenge

Oxford County, Blandford-Blenheim, East Zorra-Tavistock, Ingersoll, Norwich, South-West Oxford, Tillsonburg, Woodstock, Zorra

## Preliminary proposal details

### Question 6

Please describe your preliminary proposal and its activities or projects.

This section should include:

- Planned activities or projects to achieve the outcome (or outcomes) set out in the Challenge Statement.
- Clear links from the identified projects to the attainment of the outcome (or outcomes).
- Scope and size of each planned project in your preliminary proposal, describing how it is feasible and suitable for achieving the outcome (or outcomes) in a manner that is impactful for the community, ambitious, and transformative.

By creating a Building Transformation project, Oxford County will demonstrate the goals of improving occupant health, reducing energy consumption and improving overall affordability can be met through proper building design, construction and finally, through building performance monitoring activities. This will include the development of occupant monitoring applications that utilize the data harvested by UWO building science researchers and in cooperation with our utility partners.

To accomplish this, we have begun to apply Passive House standard for all new community housing projects and demonstration of the net zero energy building concept.

In partnership with a not-for-profit social housing developer/operator, we have designed a 34 unit social housing project that will create an affordable, comfortable and sustainable living space for some of Oxford County's most vulnerable residents – particularly those dealing with poor mental health or addiction. By implementing aggressive energy reduction techniques, we will reduce heating and cooling energy loading to 15 kWh/m<sup>2</sup>, which is 80% lower than what the Ontario Building Code requires. Furthermore, this building will provide well regulated indoor air temperatures and exceptional air quality for residents.

With the help of the University of Western Ontario, we will install multiple measuring tools throughout the building to harvest data for the development of performance algorithms once construction is complete. Working with Ryerson University, we will leverage that data to be included in the Ryerson Future and Smart Cities program. Additionally, this data will be used to develop an experiential learning environment for members of the International Renewable Energy Academy, which we have hosted alongside York University for two consecutive years. Efforts such as these demonstrate our commitment to information sharing, education, connected technology, innovation and the power of compelling data.

By measuring our success, we hope to show the rest of the country that sustainable, affordable housing is possible. Our expected measurements will:

- Demonstrate a reduction in building operation, utilities and maintenance costs
- Illustrate energy efficiency improvements, which can play a

- Measures put in place to 1) make the proposal open, interoperable, scalable, and replicable or a description of your plan to do so going forward for the benefit of your own community and other communities in Canada; and 2) enable other uses of the technology, innovation, and data in your proposal.

meaningful role in poverty reduction by minimizing the cost of living

- Prove that the quality of life outcomes in high-performance buildings are completely replicable and scalable within Oxford County and beyond
- Demonstrate low carbon energy outcomes through building performance coupled with solar photovoltaic installation under a net metering agreement with the local electric utility
- Show that lowered energy requirements enable total energy offsets through renewable energy resources in a cost-effective manner

The second example is the retrofit of a 1950's-era building to International Passive House Standard at 75 Graham Street, which is planned to operate as an incubator – or “living lab” – for continued training and development in the area of environmental sustainability, technological innovation, data sharing and social enterprise.

Finally, our newest Waste Management building will meet the Canadian Green Building Council's net energy building standard in order to demonstrate practical low carbon outcomes in a non-housing setting. The waste management net zero energy building will be an operational administration facility for County waste operations, while doubling as a public education center. This net zero energy facility will include a 120 KW net metered solar installation complete with live energy (both load and renewable generation) and other relevant operational data that will available to anyone with an Internet connection.

These projects are good for both the local community and society, as a whole. They represent positive action that will benefit our environment, our community wellbeing and grow our economy. Not only are we improving the lives of our impoverished residents by eliminating energy poverty and providing high-quality housing, but we are also demonstrating sustainable development, which will have lasting implications for future generations. We hope to motivate other communities to do the same, as we can all benefit with fewer greenhouse gas emissions and a reduced energy dependency.

As stated by The Journal of Hunger and Poverty (2008), dealing with energy inefficiency at the local level will have an effect on all Canadians:

“If energy is being wasted, it will become scarce and the result will be an increase in energy costs and taxes. Another main issue that concerns the Canadian population is energy conservation. Energy that is being wasted in low income households or in rental housing is part of the overall energy expenditure, therefore, contributing to energy conservation in low-income housing is something that all Canadians should be concerned with” (p.24).

Scope and details of the specific advanced building technology

projects in process are as follows:

**Blossom Park:**

- In partnership with not-for-profit social housing developer/operator, design and build a 34 unit social housing project to International Passivehouse Standard
- In cooperation with developer, create affordable living space for some of Oxford County's most vulnerable residents
- Ensure design outcome provides high level of air quality and extremely well regulated indoor air temperatures
- By implementing aggressive energy reduction techniques in building design, reduce heating and cooling energy loading to 15 kwh/m2 (up to 80% lower than Ontario Building Code)
- Based on energy performance, illustrate that lowered energy requirement now enables total energy offset to that of renewable energy resources in a cost-effective manner
- Demonstrate how the above noted improvements will significantly reduce the cost of building operation (including utilities and maintenance)
- Demonstrate the potential of this concept to reduce energy poverty and how this approach can play a meaningful role in poverty reduction through cost of living mitigation
- Demonstrate how performance and quality of life outcomes of high-performance buildings are fully repeatable and transferable to other jurisdiction.
- Demonstrate low carbon energy outcomes through high-building performance combined with solar photovoltaic installation under net metering agreement with electric utility.
- Working with UWO, install multiple sensors throughout building and harvest data for development of performance algorithms
- Working with Ryerson U, leverage data for inclusion in Ryerson Future and Smart Cities program
- Working with York University, create a host location for IREA and develop experiential and lab learning environment

**75 Graham Street:**

- In support of the Blossom Park project concept, retrofit an existing building (vintage 1950's) to International Passivehouse Standard, applying the EnerPhit standard for building retrofit
- Based on Architectural review of building, complete interior retrofit of building design to EnerPhit standard
- Using the now high-performing building as a host, develop a Sustainability Cluster concept that will host social and technology innovation and an incubator for continued sustainability program training and development
- By working within a Passivehouse standard building, provide a 'living lab' environment to accelerate sustainability practices and expertise within and outside of Oxford County
- Demonstrate low carbon energy outcomes through high-building performance combined with solar photovoltaic installation under net metering agreement with electric utility.
- Working with UWO, install multiple sensors throughout building and harvest data for development of performance algorithms

- Working with Ryerson U, leverage data for inclusion in Ryerson Future and Smart Cities program
- Working with York University, create a host location for IREA and develop experiential and lab learning environment

Net Zero Energy Building (Oxford County Waste management facility)

- In support of Blossom Park project concept, design and build a net zero energy administration building to the Canadian Green Building Council's zero energy building standard.
- Demonstrate low carbon energy outcomes through high-building performance combined with solar photovoltaic installation under net metering agreement with electric utility.
- Working with UWO, install multiple sensors throughout building and harvest data for development of performance algorithms
- Working with Ryerson U, leverage data for inclusion in Ryerson Future and Smart Cities program
- Working with York University, create a host location for IREA and develop experiential and lab learning environment

Linking our Planned Outcomes

Buildings form the nucleus of the application and basis for the story Oxford is delivering. The Future Oxford Community Sustainability Plan is best illustrated by the three pillars of sustainability. In fact, advancing Economic vitality, Community health and wellbeing and taking definitive action to enhance our natural Environment is the essence of the Oxford Smart Cities application.

These projects will:

1. Deliver Affordable, Accessible and Energy Efficient Shelter Using Advanced Building Technologies:

- Reduces Core Housing needs in our community
- Reduces the financial burden, time and stress through housing stability for the most vulnerable
- Improves the personal security and stability of the most vulnerable
- Enhances the personal wellbeing, mental and physical health of the most vulnerable by:
  - Creating disposable income to address food insecurity
  - Opportunity for improved diet and exercise
  - Enhanced in home air quality and comfort
- Advances Oxford's commitment to achieving Zero Poverty enhances our overall Community Wellbeing  
Directly enhancing Oxford's COMMUNITY (Health and Wellbeing)

2. These Projects Advance Building Technology Implementation and will:

- Demonstrate the value of advanced building technologies

- Capital cost effective
- Operating cost effective - conserves energy by reducing building related energy use/costs
- Reduces greenhouse gas (GHG) emissions
- Reduces dependency on fossil fuels
- Advances Oxford's commitment to achieve 100% Renewable Energy
  - Optimize opportunities to advance enhances value and application of renewable energy opportunities (Solar, RNG, energy storage) through Net Metering and Virtual Net metering applications
- Enhances our natural environment and eco systems
  - Reduces waste, support Oxford's commitment to achieving Zero Waste
  - Enhances air quality
  - Reduces Climate Change risks
- Improves community health and wellbeing
- Enhances the viability and community value of an Oxford Sustainability Cluster (Living Lab) for:
  - Technology commercialization research and development in partnership with academia and industry  
Enhance community readiness and support for entrepreneur growth/development and that will advance:  
Renewable energy solutions and technologies
  - Advanced Zero Waste technologies and programs
  - Agricultural advancements
  - Stimulate social enterprise
  - Create enhanced arts, culture and educational opportunities
  - Enhance community access and connectivity
  - Enhanced access to medical care and other services that enhance wellbeing
  - Open data sources
  - Information sharing
  - Demonstrating sustainability achievements and performance
  - Encourage accelerated implementation and achievement  
Directly enhancing Oxford's ECONOMY, COMMUNITY (Health and Wellbeing), and ENVIRONMENT

Measures to ensure broader application

The Oxford Smart Cities proposal will ensure our advanced technology building projects are open, interoperable, scalable, and replicable. Further, we believe these projects will stimulate technology applications, further innovation and provide open data sources that will demonstrate the value and impact of this leading work. We will ensure we deliver through:

- builder/developer/architect and Oxford County sharing all aspects of design, procurement, funding and lessons-learned
- building energy modelling outcomes will be shared
- building performance monitoring will be conducted for several years post-occupancy; all aggregated and individual data will be shared publicly (within the limitations of privacy law)

	<ul style="list-style-type: none"><li>• Building energy performance outcomes will be monitored and shared publicly</li><li>• Additional metrics such as air quality, temperature, humidity and other occupant health and comfort attributes will be continuously monitored and Academic partners will harvest building data for purpose of creating performance and continuous improvement action to enhance building performance</li><li>• Capital and operation/maintenance costing will be reported and shared for the purpose of continuous improvement</li></ul> <p>Lessons learned through three unique high-performance building projects will be shared publicly for both proof-of-concept and replicability across building sectors in Oxford County and across Canada.</p>
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