



**INTEGRATED COMMUNITY ENERGY SYSTEMS:  
ORGANIZATIONAL PRIMER FOR COMMUNITY BUILDERS**

SEPTEMBER 2010

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## **Quality Urban Energy Systems of Tomorrow**

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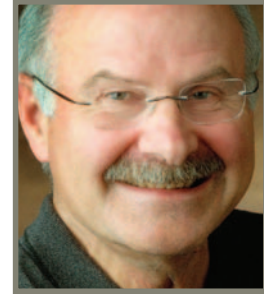


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## CHAIRMAN'S MESSAGE

Urban emissions represent 40% of Canada's current GHG emissions. Integrated Community Energy Solutions can play a key role in achieving Canada's energy and emissions goals at all levels of government. Sooner or later, we are going to have to rebuild our communities—adding new structures, renovating old ones, rethinking our transportation and so on. The time has come to get it right by getting the key players around the table with a common vision and long term goals.

The benefits of integrated community energy solutions will not be felt overnight. They will be experienced over generations, and will increase past 2050 as the building stock, transport networks, and overall urban form change. Our current sprawling, auto-intensive urban form is GHG and energy intense, and each year it looks more impractical. It's a wasteful development pattern which, if it continues, would lock in emissions and energy use for up to 100 years or more. Integrated community energy solutions represent a better alternative.



A handwritten signature in black ink that reads "Mike Harcourt". The signature is fluid and cursive.

Michael Harcourt  
QUEST CHAIRMAN



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## INTRODUCTION

This Primer is intended to help communities design and set up organizational structures, networks, and processes that support the implementation of *Integrated Community Energy Systems (ICES)*. Its goal is to be both helpful and inspirational. The Primer was developed using knowledge and insights gained during the QUEST III workshop that was held in Quebec City in October 2009.

Since 2007, QUEST has fostered collaboration among governments, industry sectors, academics, and a range of nongovernmental organizations and community groups across Canada. Its continuing success is premised on the ability to bring these groups and sectors together in pursuit of a common vision.

The information presented in this Primer can assist Canadian communities to significantly reduce their environmental impacts from energy use. QUEST members believe that this can be done while creating more local jobs and more liveable, sustainable, and safe communities. If implemented on a national scale, ICES will help jurisdictions across Canada to meet domestic and international goals, and targets on emission reductions (carbon and other substances), efficiency objectives and more.

### **QUEST – Quality Urban Energy Systems of Tomorrow**

QUEST brings together key players from industry, the environmental movement, governments, academia, the consulting community and others encouraging all involved to investigate, develop and support integrated approaches to providing energy services in Canadian communities.

Canadian communities are the places where the majority of energy is used, and the majority of greenhouse gas emissions are produced. QUEST is about creating and implementing a vision of a sustainable energy system for Canadian communities – an energy system which strives to constantly mitigate environmental and social impacts, while producing energy services that are more affordable and reliable.

**QUEST** advocates for an integrated approach to land-use and related waste, water, transportation, and energy services at the community level.

## IMPLEMENTING ICES

### The Challenge

Many new technologies supporting sustainable energy production and use are being developed and deployed, and improvements are constantly being made to enhance the performance of existing energy technologies. But effectively coordinating and focusing the efforts of the multiple professional, community, and sector organizations needed to implement ICES remains a challenge in Canada.

### The Root of the Problem

Governments, corporations, hospitals, schools, and a range of community organizations have adopted organizational structures based on establishing clear lines of responsibility and accountability within well-defined organizational layers. Bureaucratic structures such as these are designed to produce efficiencies within prescribed “lines of business,” but they also create barriers to cooperation in more complex, multi-sector initiatives, such as ICES, that are not under the direct control of any one organization or level of government. ICES solutions, by their nature, require new partnerships and high levels of cooperation to succeed.



### Short-Term Vision:

QUEST mobilizes community builders who recognize integrated energy solutions are central to achieving sustainable communities by fostering sustainable energy use in Canada.

### QUEST Principles

QUEST is premised on six principles that guide sustainability in urban energy systems:

- **Improve efficiency** – first, reduce the energy input required for a given level of service;
- **Optimize “exergy”** – avoid using high-quality energy in low-quality applications;
- **Manage heat** – capture all feasible thermal energy and use it, rather than exhaust it;
- **Reduce waste** – use all available resources, such as landfill gas, gas pressure drops and municipal, agricultural, industrial and forestry wastes;
- **Use renewable resources** – tap into local biomass, geothermal, solar, wind and other sources where available; and
- **Use grids strategically** – optimize use of grid energy and as a resource to optimize the overall system and ensure reliability.

## A First Step Toward ICES Implementation

At the QUEST III workshop in Quebec City, two exercises were designed to help participants understand the kinds of organizational forms and processes that are needed to successfully implement ICES. Prior to the workshop, QUEST members tested Critical Success Factor (CSF) and Ownership and Management (O&M) exercises that resulted in useful pre-workshop learning experiences related to implementing ICES. Three central challenges were identified during the tests:

- building political support for ICES at all levels of government,
- identifying barriers to ICES (and shaping public policies that remove these barriers and enable and support ICES), and,
- developing human resources capacity (notably, training professionals on how to implement ICES).

Following the pre-workshop test, the exercises were refined based on the insight that function-specific organizational hierarchies are not well suited to implementing ICES.

In Quebec City, the CSF exercise involved choosing breakout group participants to ensure that there was a high degree of overlapping expertise in each group. Groups were formed as specific “community builders”, such as property developers, utilities, or local governments, and were asked to define what they considered to be critical success factors – things that must go right to successfully implement ICES. Each breakout group also identified, from its perspective, other community builders that might have a similar (or dissimilar) set of CSFs.

### Community Builder

QUEST defines “community builder” as anyone involved in planning, designing, and building a community. This encompasses politicians, planners, developers, builders, federal and provincial governments, utilities, environmental organizations, consultants, and a wide range of community groups. It also includes construction experts and the owners and operators of the built environment.

### Integrated Community Energy System

ICES draws on opportunities and synergies at the community level by integrating components from multiple sectors, including:

- Land-use and community form,
- energy supply and distribution,
- water, waste management and other local community services,
- transportation;
- housing and buildings;
- and industry.

The O&M exercise involved carefully choosing participants to ensure that a diverse base of expertise existed within each group. It simulated bringing together cross-sections of professionals and sectors required to implement ICES. The O&M groups worked on ICES “solutions” for four case community write-ups that were provided in advance of their breakout sessions, with each case having distinctly different characteristics (e.g., rural/remote, suburban, and urban settings). This exercise was designed to give participants experience in developing team-building approaches to ICES, and it also helped them to appreciate the types of collaborative models that are most likely to succeed in different ICES settings.

### Critical Success Factor Exercise

In the CSF exercise, breakout groups considered three major touchstones: people, technologies, and markets. It emphasized organizational learning and measurable objectives. The exercise also involved discussing the governmental policy environment surrounding ICES.

Seven community builder groups that might have an interest in ICES were identified by the CSF breakout groups:

- Real estate developer group
- Developers/development industry group (i.e., the full supply chain for buildings and community infrastructure)
- Energy infrastructure/utility group
- A national associations advocating for sustainability enterprises and related jobs)
- Knowledge development and transfer group
- Local/community government group
- Applied research group supporting sustainable regional development

The community builder groups noted above are not an exhaustive list; rather, they reflect the views of the participants in the QUEST III workshop. Additional reference groups may be defined after further work.

### How is Energy Used?

Energy is utilized in three ways:

- Mobility - moving people and goods around,
- Heating/Cooling - providing or extracting heat, and
- Plug Load - powering appliances, computers, lighting, etc.

Community energy is needed for three different user groups:

- Industry,
- Commercial, and
- Residential.

Several observations were made during a roundtable presentation and discussion that was held after the CSF exercise had been completed. These included:

- Despite much common ground, no strong alignment of CSFs was found among the seven community builder groups, although there was somewhat more agreement across public sector groups and across private sector groups than between the public and private sectors.
- Frequent themes in each of the CSF categories identified by the community builder groups included:
  - A need for a sound business case for ICES
  - Development of training programs to develop necessary expertise for ICES understanding and implementation
  - Engagement of all key stakeholders
  - Integrated energy as a fundamental component of planning, design, and evaluation process.
  - Supportive policy and regulatory framework

The conclusion was reached in Quebec City that there is more common ground than potential conflict among the community builder groups on what is essential to the success of ICES implementation.

### Ownership and Management Exercise

The redesigned (O&M) exercise aimed to develop an appreciation of the need to get all of the key players to the table to implement ICES. This was done through, creating prior to the Quebec City workshop, four “sample community” write-ups with widely differing characteristics (e.g., rural/remote, suburban and urban). The write-ups were considered to be of secondary importance to the insights obtained in Quebec City on how to implement ICES in different settings and they are therefore not included in this Primer. The exercise, however, created the conditions needed for workshop participants to innovate, learn, and deliver insights on the advancement of ICES initiatives across Canada.



In contrast to the CSF exercise, the O&M exercise chose the greatest possible diversity of professional and sectoral experience within each breakout group – mixing industry, government, and civil society participants, as well as participants from several regions of Canada.

The four communities and localities chosen offered different physical, economic, institutional, and political contexts for ICES. They were based on real communities, but were also presented in simplified form and adjusted to ensure a diversity of opportunities for developing ICES.

All of the breakout groups were encouraged to decide for themselves the extent to which they should consider wildly optimistic or “skunk works” solution - a unique notion of allowing creative solutions to be imagined with none of the usual constraints. The challenge was to construct a consortium of stakeholders that would have enough leverage and resources to implement ICES solutions for the sample community. The initial charge given to each group was to discuss the types of initiative that could be achieved by the expertise represented within the group, and to identify the additional stakeholders and resources that would be needed to make the initiative work better.

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## WHAT WE LEARNED AT QUEST III

The workshop exercises confirmed that the QUEST approach of committing to a common vision, principles, and building blocks requires customization to deal with local circumstances. However, the QUEST approach was affirmed as the right way to handle the challenges of implementing ICES in a range of community settings.

An overarching lesson from both QUEST experiences since 2007 and the results of the Quebec workshop exercises concerned the starting point for implementing ICES. This was all about getting the right players (i.e., the different community builders) around the table at the start of the ICES process and ensuring that they engage in open, collaborative thinking. Discussions can then focus on achieving a common vision, as opposed to endlessly debating different interests and perspectives.

The following guidance for implementing ICES initiatives was identified at the Quebec City workshop:

- Refrain from using traditional silo-based sequential planning models.
- Identify and involve all of the community builder groups at the beginning of the ICES process.
- Work with real data to assess how and where energy is being used in the community, and to inventory the full range of energy resources that are available.
- Work collaboratively to create a vision for the growth of the community and its need for services time.
- Make sure each group identifies its contribution to making the vision real.
- Identify the regulations/bylaws/practices that need to be changed to make an integrated community energy system possible.
- Address capacity building in the community.

With this guidance in mind, the following high-level findings about ICES-type initiatives in different settings are noted to help community builders looking to implement ICES.

**Rural settings** – must address the overwhelming reality of resource constraints.

Part-time councillors and limited local technical expertise in rural settings mean that provincial government support is needed to assemble the resources required to inform the ICES process. In addition, a group of topic professionals/experts, such as those who might be recommended by a QUEST provincial caucus (or even provided to the community as resources permit), must formally commit time to the process.



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**Urban settings** – need to develop business models that work in unique circumstances.

Different urban areas have different waste heat profiles, provincial-municipal public transportation models, and even city powers in some cases. Moreover, metro regions that operate with city governments, versus regions that are largely under one local government, require community builders to explore business models for district energy systems and public transit that fit with unique physical situations, as well as with differences in planning processes.



**Suburban settings** – recognize that compact development will not happen everywhere.

Existing and new-build suburban areas require unique solutions. These may involve leveraging the opportunities of high density nodes and corridors, while continuing with some level of low-density development.



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## LOOKING INTO THE FUTURE OF QUEST

Achieving the QUEST vision will require market transformation – taking ICES from the demonstration stage to mainstream in community development. But continued support for demonstration projects, efforts to promote greater shared understanding of ICES, and the development of local capacity to implement ICES are all required to achieve this transformation. In 2010 and beyond, QUEST will broaden its scope of activity to build a more solid foundation of integrated community energy systems across Canada.

The following actions will be taken by QUEST:

- Work with the federal government to ensure that supportive national policies and programs are in place.
- Work with the provinces to identify and remove barriers to ICES via provincial QUEST caucuses.
- Engage and empower municipalities to implement ICES through sharing of learning and experiences.
- Build relationships with the private sector to enhance their understanding of ICES and encourage private investment in solutions.
- Facilitate knowledge creation and a broader understanding of ICES through the promotion of impartial evaluation of demonstrations, research and academic collaboration.
- Build human resources capacity by working with the federal government, centres of excellence, universities, colleges, and professional associations.
- Build awareness of ICES through presentations, media engagement, and the QUEST website portal.

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## QUEST SUPPORTERS

QUEST is a collaborative among a range of organizations across Canada. Participants in QUEST workshops and other initiatives include federal, provincial and municipal officials, industry associations and company representatives, academics, environmental organizations, charitable foundations, technical experts and consultants.

Supporters include:

- BC Hydro
- Canadian Association of Petroleum Producers
- Canadian Electricity Association
- Canadian Energy Pipeline Association
- Canadian Gas Association
- Canadian GeoExchange Coalition
- Canadian Petroleum Products Institute
- Canadian Urban Institute
- Federation of Canadian Municipalities
- Government of Nova Scotia
- Imperial Oil Foundation
- Natural Resources Canada
- Ontario Power Authority
- Pollution Probe
- Transport Canada