

Integrated Community Energy Solutions and Energy Infrastructure in Canada

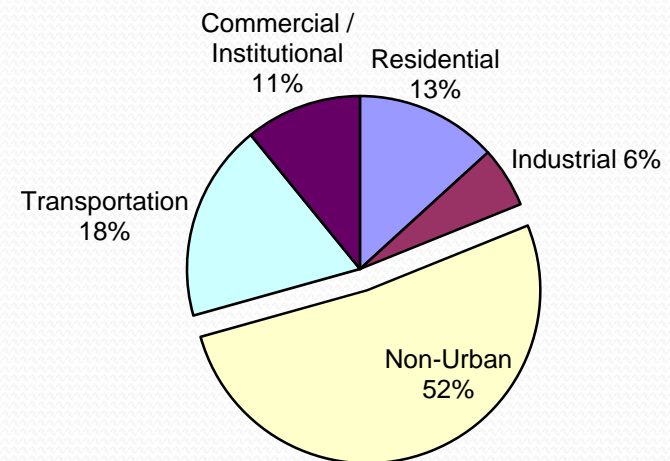
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The Opportunity in Canadian Communities

- Communities represent about 50% of Canadian energy use and GHG emissions.
- An integrated approach to energy systems in Canada's communities will deliver GHG reductions and build a sustainable energy future.
 - No or low carbon environment.
 - Reduction of other environmental impacts (air, water, waste).
 - More affordable energy.
 - More resilient & adaptable energy systems delivering safe, reliable energy services.

Canada's Urban Energy Use - 2005



What is an Integrated Community Energy Solution?

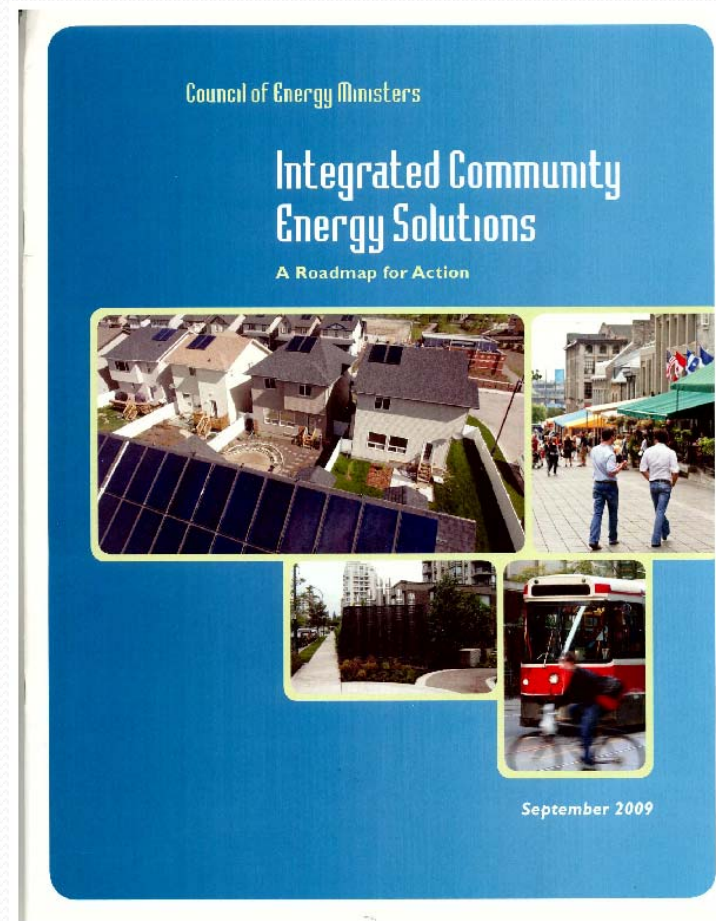
- Capitalizing on the cross-cutting opportunities and synergies available at the community level by integrating physical components from multiple sectors, including:
 - land use and community form;
 - energy supply and distribution;
 - water, waste management and other local community services;
 - transportation;
 - housing and buildings;
 - and industry.

Integrated Community Energy Solution Interest is Growing Rapidly in Canada

- Federal, Provincial & Territorial Governments
- Municipalities & First Nations
- Associations
- Industry
- ENGOs
- Academia

Federal Action – CEM Roadmap on ICES

- Released September 1, 2009 at the Council of Energy Ministers meeting
- Endorsed by all CEM ministers (provinces, territories and federal government)
- Builds on CEM document: Moving Forward on Energy Efficiency
- Tool for federal, provincial and territorial governments in moving ICES forward
- Focused on all communities (large, medium, small – urban, rural, remote)

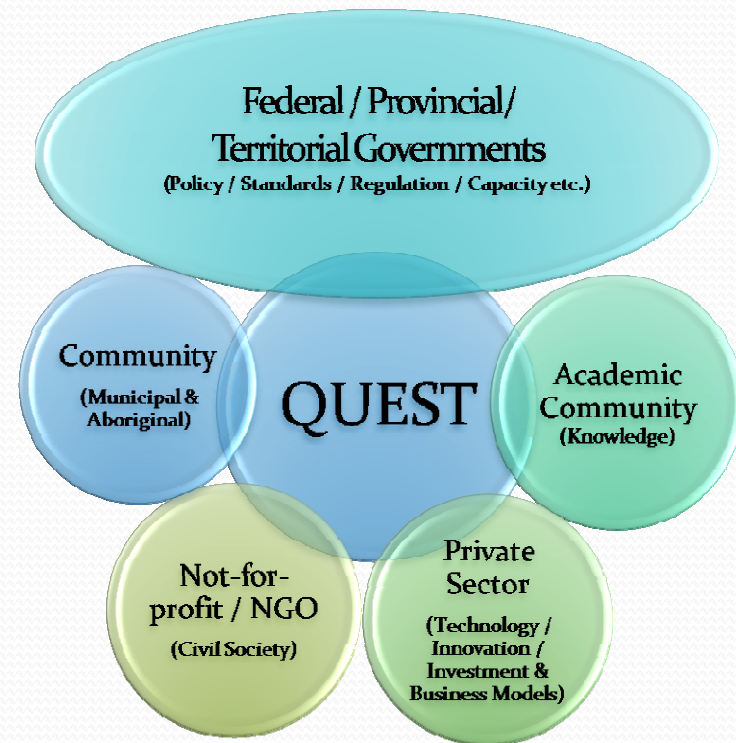


What is going on provincially

- British Columbia
 - Carbon Tax
 - Zero emissions government by 2012
- Alberta
 - Cap and Trade System up and running
- Ontario
 - Places to Grow
 - Green Energy Act
 - Commitment to remove coal by 2014
- Nova Scotia
 - House resolution to support ICES / QUEST

Who and What is QUEST?

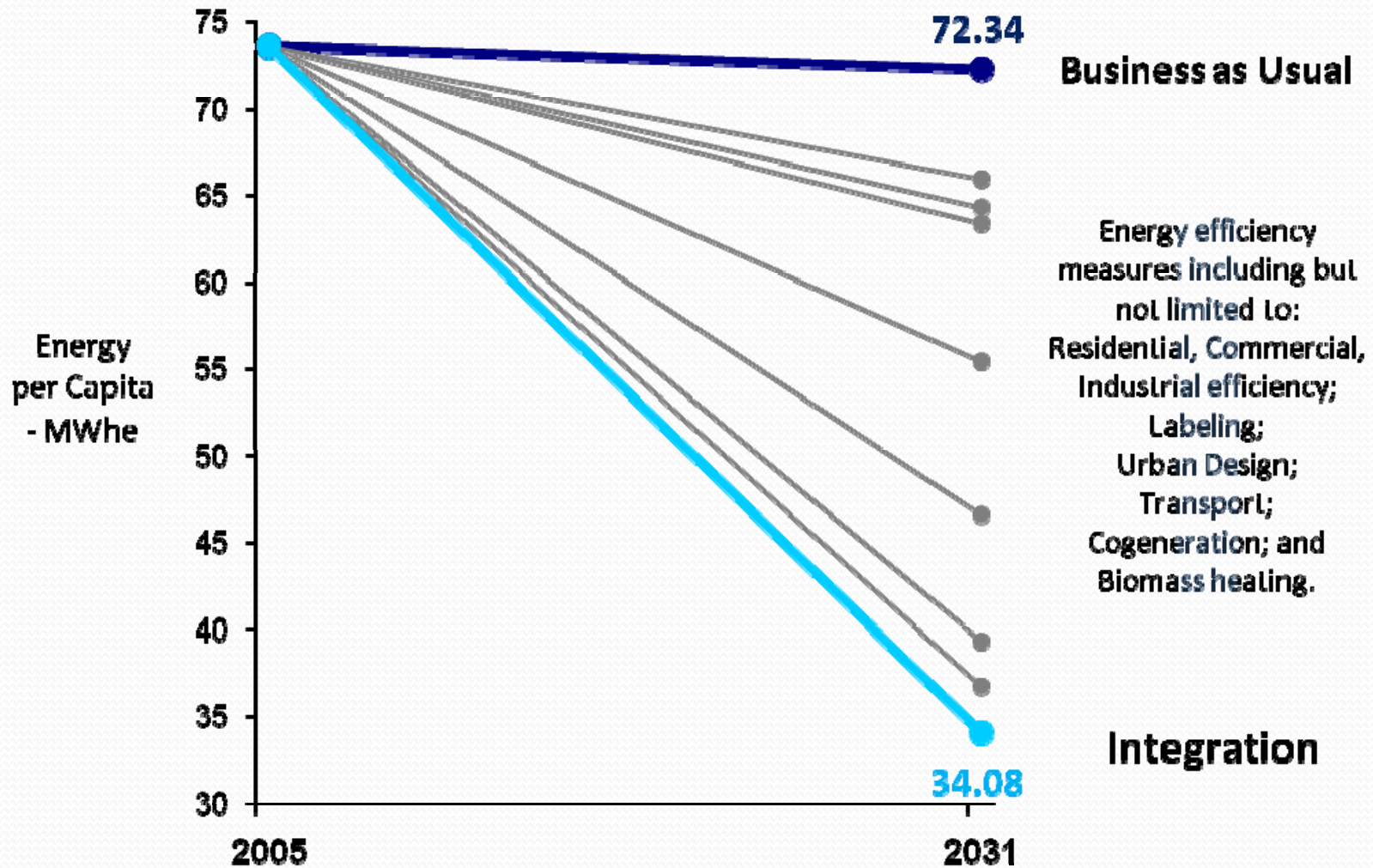
- **QUEST is a coalition** for action drawing from a diverse group:
 - All three levels of Government
 - Energy & Renewable Industries
 - Environmental Groups
 - Developers & Builders
 - Academics
- **QUEST Vision:** *“By 2050 every community in Canada is operating as an integrated energy system, and accordingly, all community development and redevelopment incorporates an integrated energy system.”*



QUEST - Six Guiding Principles

- **Improve efficiency** – reduce the energy input required for a given level of service;
- **Energy optimization** – 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 and wind energy; and
- **Use grids strategically** – optimize use of grid energy and as a resource to optimize the overall system and ensure reliability.

Guelph ON – Cumulative Strategies



The Potential of Integrated Community Energy Solutions

- **Stringent land use policy** to encourage densification, including constraints on the geographic footprint of cities, specification of densification corridors with fast and reliable transit, and reform of the property tax system to reflect marginal infrastructure building and maintenance costs, **has the capacity to reduce urban emissions by approximately 40 – 50%.***
- The given emissions reduction estimates include some but not all the potential energy cascading benefits made possible by densification, including district heating, combined heat and power, waste recovery systems and other local alternative energy sources.

*Source – Exploration of the capacity to reduce GHG emissions by 2020 and 2050 through application of policy to encourage integrated urban energy systems. MK Jaccard and Associates Inc., 2009

QUEST Efforts in 2009

- **Policy:** Accelerate adoption of integrated community energy planning
- **Research:** Quantify the potential energy savings and associated environmental benefits
- **Advocacy:** Build support for long-term effort
- **Matchmaking:** Connect community builders with the actors and enablers within their region
- Annual Workshop – Integrated Energy Systems: Putting the Pieces Together, Québec City, October 26 – 28, 2009.

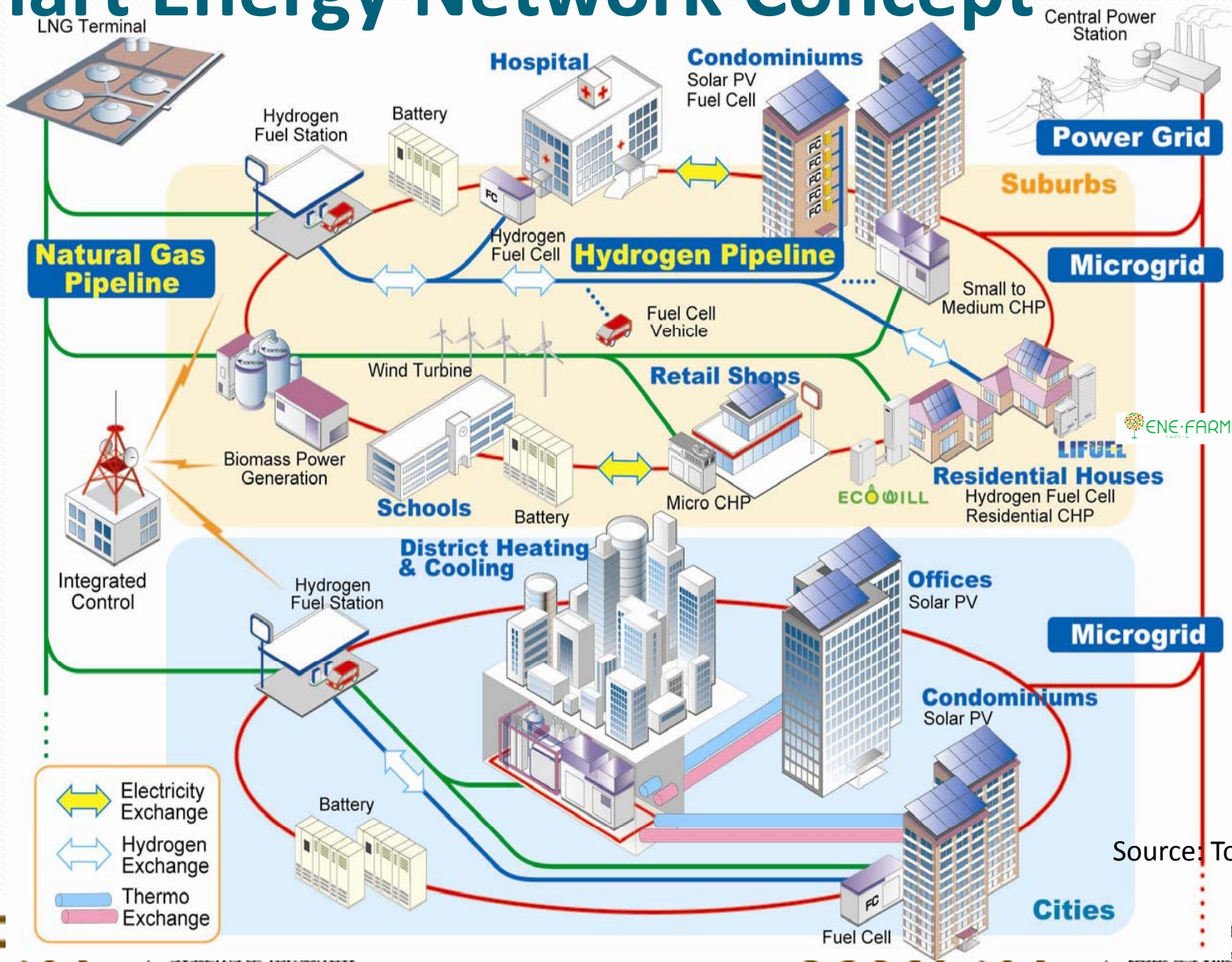
QUEST Priorities in 2010: Making it Real

- Expanding our network,
- Advancing political interest,
- Mobilizing our vision into action,
- Developing the capacity needed,
- Learning and developing knowledge, and
- Celebrating success.

The economic opportunity for energy service suppliers – a three tiered approach

1. Understand how energy is used:
 - To Heat
 - To Move
 - And for Plug load
2. Understand where we use energy:
 - Large industry
 - Small industry
 - Communities
3. Determine where the opportunity is by starting at the demand end of the energy chain
 - Land-use
 - Waste sources
 - Smart & New grids – hot & cold

Smart Energy Network Concept



Source: Tokyo Gas

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ICES Example - Dockside Green

- 15 acres
- Former industrial land
- LEED Platinum project
- Incorporates 26 buildings with 1.3 million sq ft of mixed residential, office, retail and commercial space.
- Functions as a total environmental system in which form, structure, materials, mechanical & electrical systems are interrelated and interdependent.
- A largely self-sufficient, sustainable community where waste from one area will provide fuel for another.



ICES will affect all forms of infrastructure

- Roads
- Public Transit systems
- Water distribution systems
- Waste streams
- Building design
- Community Development
- & Energy delivery, transportation and supply systems