CITY COUNCIL AGENDA

DATE March 16, 2011 – 6 p.m. – Committee Room C

Please turn off or place on non-audible all cell phones, PDAs, Blackberrys and pagers during the meeting.

COMMUNITY ENERGY INITIATIVE AND GUELPH HYDRO INC.

To provide an overview of the activities and achievements of the Community Energy Initiative and an in-depth overview of Guelph Hydro Inc.

Guelph Hydro Inc. will present information on its dual role as a critical partner to the Community Energy Initiative and as a Local Distribution Company in a rapidly changing energy sector.

Introductions

Overview of the Community Energy Initiative:- Rob Kerr, Corporate Manager, Community Energy

- Mayor's Task Force on Community Energy
- Planning: Energy Density Mapping
- Economic Development
- Corporate Energy Activity

Electricity Information Overview:- Barry Chuddy, CEO, Guelph Hydro Inc.
Guelph Hydro – A Valuable Asset to the Community

- Supporting the Community Energy Initiative
- The Energy Sector Today
- What Utilities Are Up Against – Industry Issues
- Evolution of the Electricity Market
- Rising Electricity Prices
- Guelph Hydro Electric Systems Distribution Rate Increases
- Looking Forward

Questions & Answers

ADJOURNMENT

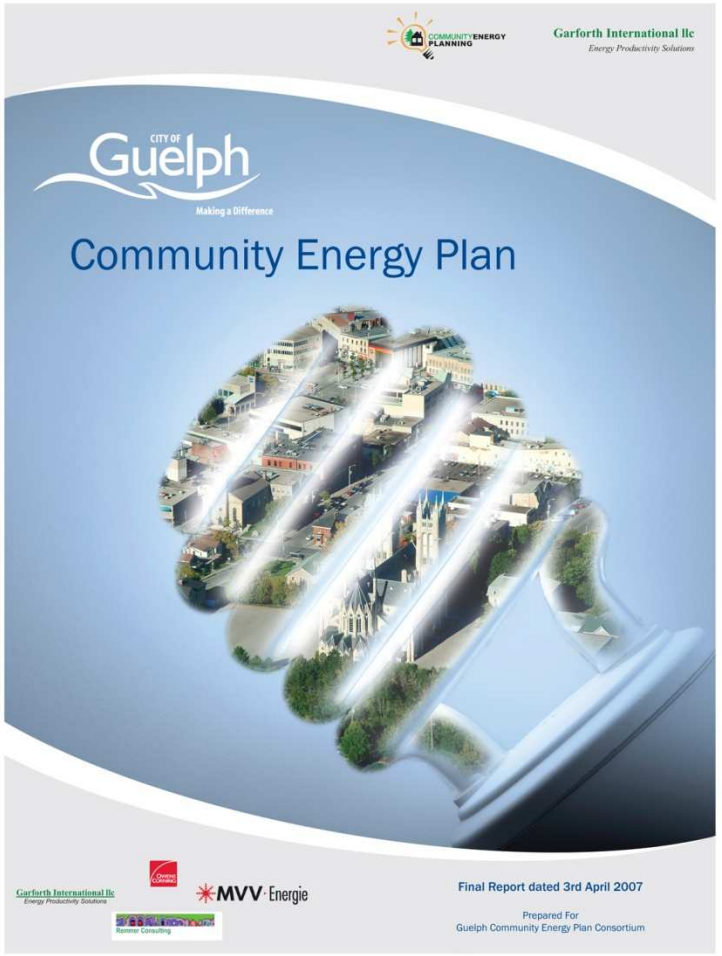
Guelph City Council
Information Session

The City of Guelph's Community Energy Initiative

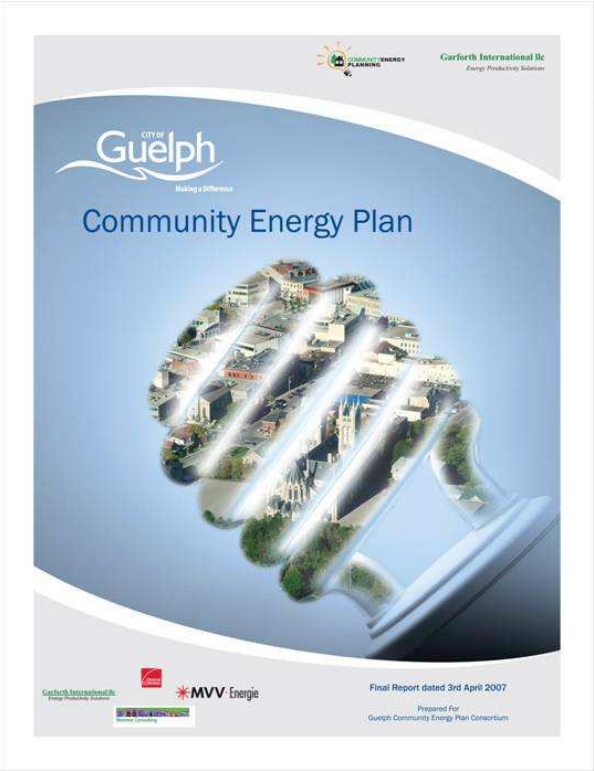
and

Guelph Hydro Inc.

March 16, 2011



Community Energy Plan (2007 – 2031)



50% less energy use per capita

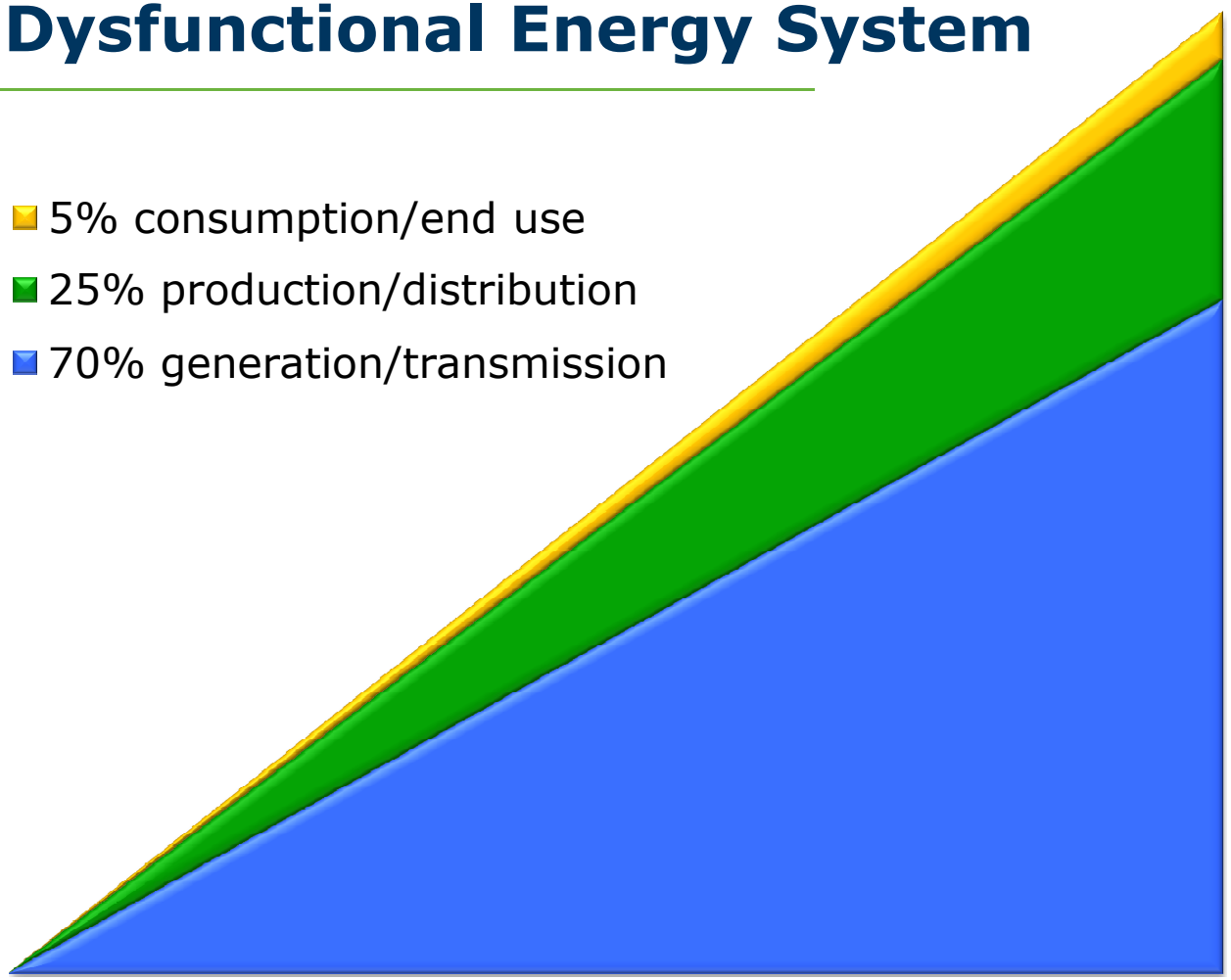
60% less GHG emissions per capita

Population expected to grow by 50% by 2031 to 175,000 persons

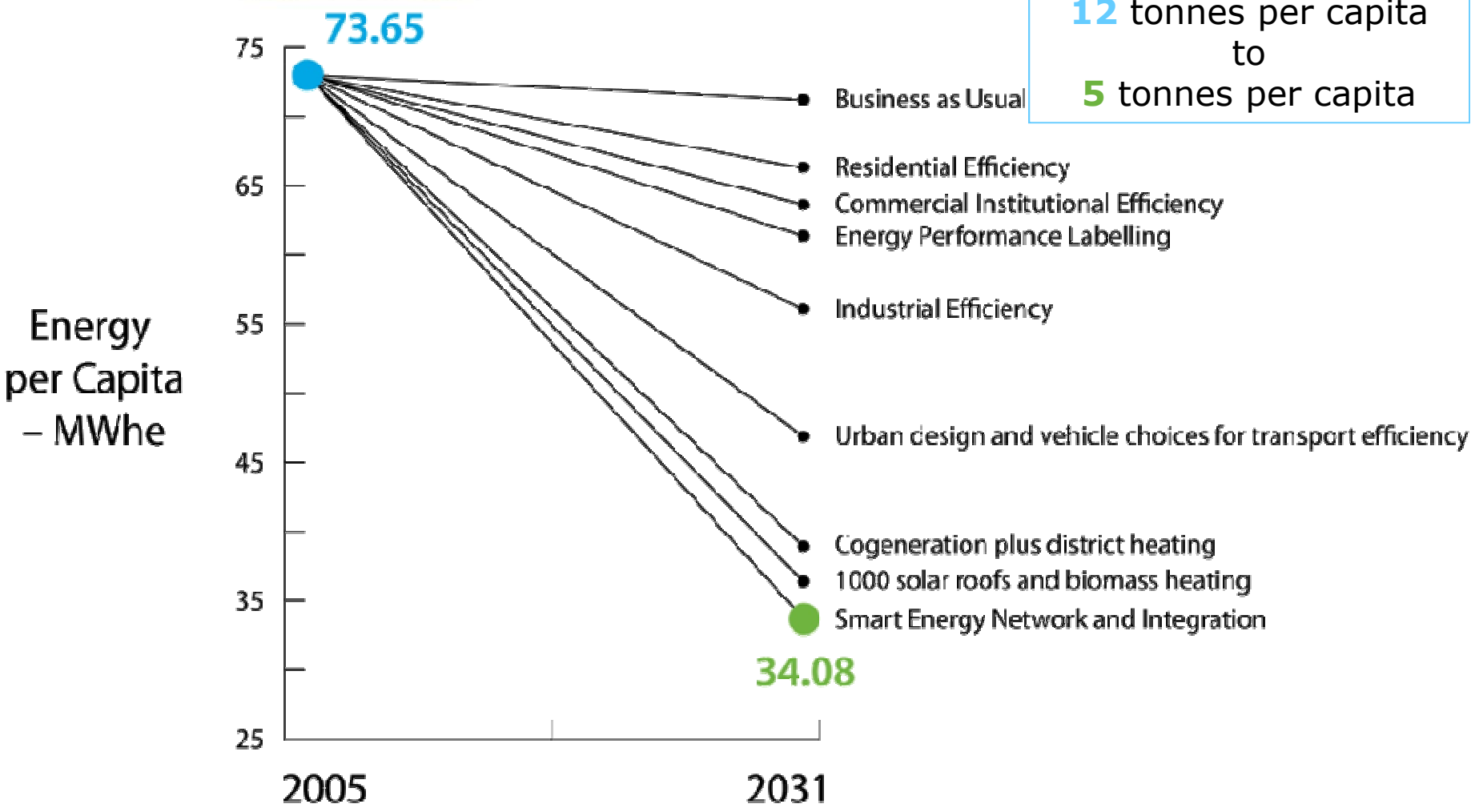
1. **Generation**
2. **Transmission**
3. **End-Use Efficiency/Conservation**
4. **Urban Form/Density**
   - **Transportation**
   - **Energy Services**

Dysfunctional Energy System

- 5% consumption/end use
- 25% production/distribution
- 70% generation/transmission



GHG reduction from:
12 tonnes per capita
to
5 tonnes per capita



External Drivers

- Climate change
- Energy security
- Declining supply (peak oil)
- Rising cost of energy
- Political and social pressure (CSR)
- Provincial, national & international policy & regulation

Local Drivers

- Increase competitiveness
- Community resiliency
- Energy security
- Environmental sustainability
- Managing population growth
- Political and social pressure
- Demonstrating municipal leadership ("Making a Difference")

Outcomes (Local Benefits)

- **Increased investment in Guelph**
- **Recruitment, development and retention of talent**
- **Grow reputation/centre of excellence**
- **Reliable, competitive energy, water and transportation services**
- **Lower than average per capita use of energy and green house gas emissions**
- **Visibility of investments into CEP goals**

Highlights: From Planning to Implementation

- **Council endorsement, April 23rd, 2007**
- **In 2008, Community Energy Plan was ranked Council's #1 priority project for achieving the goals of the City's Strategic Plan**
- ***Think Tank* - A Consultation and Decision Process for Implementation**
- **Green Energy Act – January 2009**
- **Hiring of Community Energy Plan Program Manager (now Corp. Manager – Community Energy)**
- **Community Energy *Plan* (CEP) relabeled to Community Energy *Initiative* (CEI) to reflect implementation activity**

Overview

1. Mayor's Task Force on Community Energy
2. Planning: Energy Density Mapping
3. Economic Development
4. Corporate Energy Activity

Task Force – The Concept of "Scale Project"

- **Defined in the CEP document as projects that "accelerate progress towards a successful implementation of the CEP" and "ensure long term implementation".**

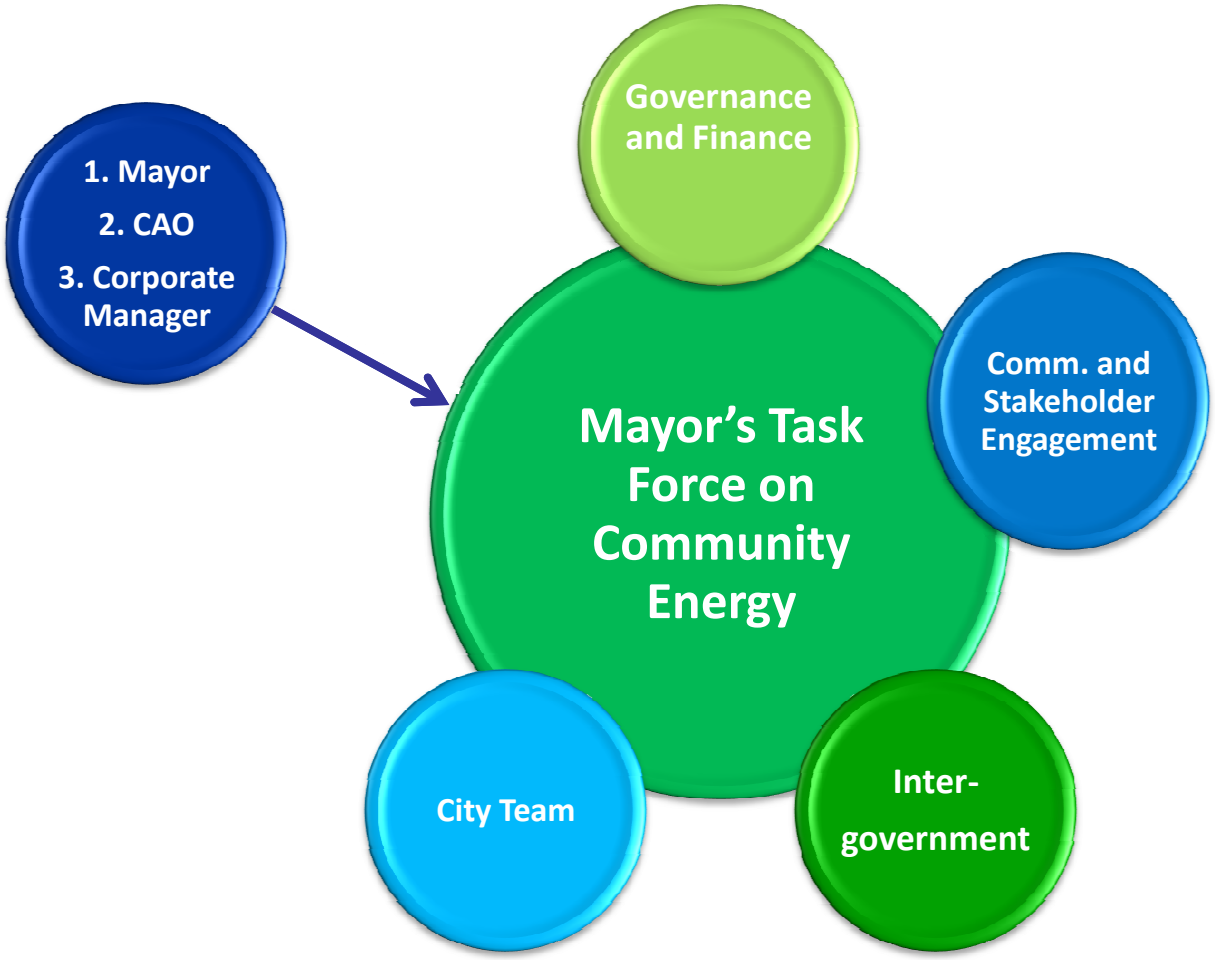
Scale Projects Identified in the CEP:

- **Guelph Innovation District**
- **Downtown District Energy**
- **University of Guelph Integrated Energy Master Plan Initiative**
- **Stakeholder Engagement & Governance**

Task Force – Creation and Purpose

At it's meeting of September 28, 2009 Council approved:

- **The creation of a Mayor's Task Force on Community Energy to provide a governance structure to the multi-stakeholder implementation of the CEP;**
- **The management and administration of the Task Force be under the direction of the City's Chief Administrative Officer in consultation with the Mayor's Office;**
- **Council receive quarterly update reports from the Task Force.**


1. Mayor
2. CAO
3. Corporate Manager
Governance and Finance
Mayor's Task Force on Community Energy
Comm. and Stakeholder Engagement
City Team
Inter-government

Building the Task Force – 2010

- Membership recruitment
- Inaugural meeting: April, 2010.
- Total three meetings in 2010. Bi-monthly scheduled for 2011
- Committees struck, chairs appointed.
- Mandates and Charters ratified for Task Force and Committees.
- All Committees underway, with work plans complete or in development
- Two year mandate – end 2012

Task Force Membership

Canadian District Energy Association	Canadian Solar Solutions Inc.	Canadian Urban Institute
City Staff	The Cooperators	Guelph Chamber of Commerce
Guelph Environmental Leadership	Guelph Hydro Inc.	Linamar
Ontario Centres of Excellence	Ontario Power Authority	QUEST
RLB	Rowan Williams Davies and Irwin Inc. (RWDI)	School of Engineering, University of Guelph
Union Gas Limited	Wellington Catholic District School Board	

Task Force Committees

Governance and Finance

Chair: Guelph Hydro Inc.

- *Analyze investment requirements and resulting economic, environmental and social impacts based on the targets specified in the CEI*
- *Develop specific community indicators*
- *Develop, update as necessary and recommend to the Task Force governance principles and policies, applicable to the Task Force, and monitor compliance with such principles and policies.*
- *Develop sustainable funding model*

Communication and Stakeholder Engagement

Chair: Guelph Chamber of Commerce

- *Develop an overall communication strategy for the Community Energy Initiative for the community through partners and stakeholders*
- *Develop a framework for engaging community-level stakeholders on issues specific to the Community Energy Initiative*

Task Force Committees

Inter-Governmental

Chair: Ontario Power Authority (OPA)

- ***Conservation and Demand Management: Aggregate and leverage multi-party CDM activity toward a common CEI based goal***
- ***Federal/Provincial Advocacy: Creation of a team to develop an advocacy strategy to maintain proactive and supportive relationships with Provincial and Federal agencies.***

City Implementation Management Team

Chair: Executive Director Mark Amorosi

- ***Corporate: Set targets, develop policy, establish programs, implement projects and report on results that establish the Corporation of the City of Guelph as a leader in energy efficiency and greenhouse gas emissions.***
- ***Community: Pursue the goals of the Community Energy Initiative through the ongoing development of Planning and Economic policy, programs and processes.***

Task Force Achievements - 2010

- **Governance is well established. Activities are quickly moving beyond governance to oversight and management.**
- **Strong alignment with emerging national and provincial policy and programming on Integrated Community Energy Systems (ICES).**
  - **Maintaining leadership role**
  - **Funding!!**
  - **Consulted on advocacy, policy and program development**
- **$400K Expression of Interest to OPA's Conservation Fund. Several million dollars in funding opportunities. Main reasons:**
  - **Integrated**
  - **Strong Commitment, Governance and Oversight**

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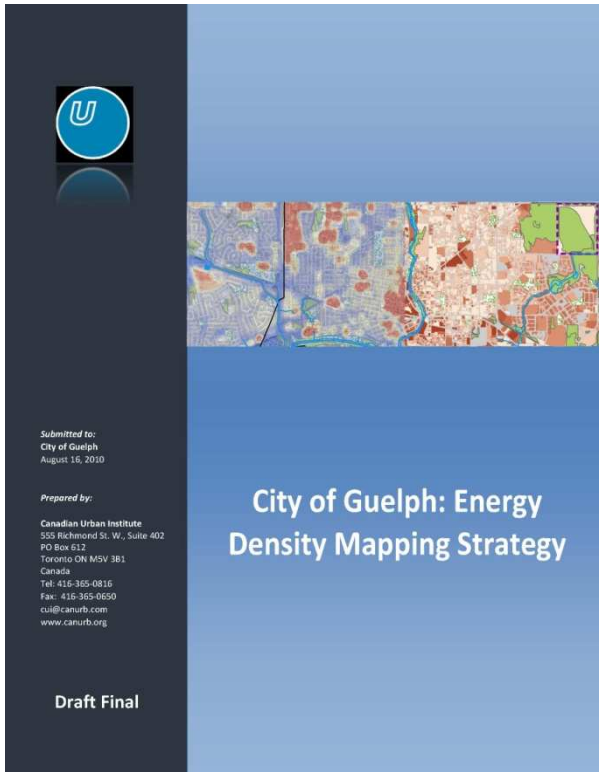
Energy Density Mapping – Part 1 Overview

- Early 2009, City entered in a agreement with the Canadian Urban Institute (CUI) to participate in multi-city project to develop energy density mapping tools and related planning processes.
- Total project valued at over $900K – City contribution $60K
- Main funders Ministry of Energy, Ontario Power Authority and Natural Resources Canada
- Guelph the first City to complete first phase of long term development
- Provincial-municipal alignment of Place to Grow Act and Green Energy Act with Growth Management Plan and Community Energy Initiative

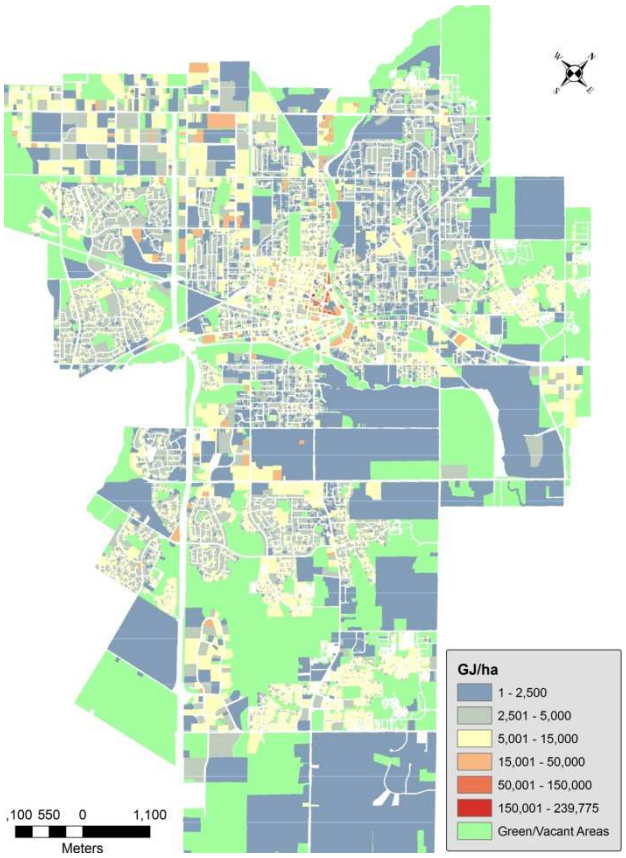
Energy Density Mapping – Part 1 Deliverables



Draft Final Report

- **Set baseline of current energy use across community**
- **Modeled various scenarios for improved efficiencies in new and existing buildings**
- **Reviewed various scenarios for energy efficiency transportation strategies**
- **General policy and program considerations**

Energy Density Mapping – Part 1 Deliverables



Early Stage Mapping Tool

- **Based on standard Geographical Information System (GIS) platform**
- **Actual electricity and natural gas data from utilities**
- **Shows concentrations of energy use and where it is located**

Energy Density Mapping – Part 2 Overview

- **Initial assessment of Phase 1 is that more work needs to be done on assessing the integration and implementation of a Energy Density Mapping Strategy**
- **Three key areas of assessment:**
  - **Administrative and related resource requirements**
  - **Legislative framework – Planning Act etc.**
  - **Market-based viewpoint: feedback, support and market intelligence from the development and property management industry.**
- **Three workshops conducted in late 2010 with representatives from the three areas of assessment**
- **$45K support from the Ontario Power Authority**

Energy Density Mapping – Part 2 Deliverables

- **Final report delivered December, 2010**
- **Key findings in three areas:**
  - **Maximizing Policy Opportunities - EDMS Implementation Workshop #1**
  - **Advancing Guelph Internal Capacity and Knowledge – EDMS Implementation Workshop #2**
  - **Engaging the Development Community – EDMS Implementation Workshop #3**

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Economic Development and the CEI

- **Canadian Solar Solutions Inc.**
  - **500 jobs**
  - **First of growing number of renewable companies and suppliers**
- **Innovation Guelph – Solar Cluster**
- **Renewable Energy Co-ops**
- **Cleantech – Renewables component of the City's Prosperity 2020 Ec. Dev. Plan**

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Corporate Energy - Achievement Highlights – 2010

- **Energy Density Mapping – development and implementation review**
- **Economic Development – two solar energy companies locating in Guelph**
- **Mandating Guelph Hydro to develop corporate energy efficiency and renewable energy generation projects**
- **Solar PV on City Rooftops**
- **Integrate "Program Manger, Energy" – the corporate energy manager position with Community Energy**
- **Conservation and efficiency projects saved approx. $100K**
- **Cost saving procurement strategies for streetlights**

Corporate Energy Goals 2011

1. **Improve corporate energy accounting functions and related reporting and communication strategies**
2. **Integrate CEI goals into City Planning Activities**
3. **Integrate CEI goals into Vision 2020 and related Ec. Dev. Activities**
4. **Develop and mobilize corporate CEI communication and capacity building/training strategy**
5. **Continue to identify and support energy conservation and efficiency projects in City facilities and operations**

Guelph Hydro Inc.

A critical and unique partner to the CEI

- **City is sole shareholder of GHI**
- **Manages critical relationship with ratepayer**
- **Tasked by province with overseeing extensive Conservation and Demand Management programs**
- **Has strategically integrated the CEI into business strategy**
- **Has been mandated by council to develop energy projects with City assets**

COMMUNITYENERGY PLANNING

Garforth International llc
Energy Productivity Solutions

CITY OF Guelph
Making a Difference

Community Energy Plan

Garforth International llc
Energy Productivity Solutions

Owens Corning

MVV Energie

Remmer Consulting

Final Report dated 3rd April 2007

Prepared For
Guelph Community Energy Plan Consortium

2. EXECUTIVE SUMMARY

For over two centuries, the ready availability of low cost energy has allowed the world's industrialized countries to achieve unprecedented levels of well being and prosperity. Recent dramatic increases in costs and price volatility are putting the spotlight globally on how effectively we use energy. The rapid growth of China and India is putting further pressure on the world's energy supplies and climate. Despite its plentiful energy resources, Canada is increasingly exposed to the full force of the global energy market pressures and can look forward to energy costs trading upwards combined with pricing uncertainty.

The evidence is growing that the human use of energy is causing greenhouse gas emissions that are beginning to have significant effects on the climate. Recent opinion polls indicate that this is now viewed as the most critical issue for most Canadians, underlined by the renewed political commitment to meet international greenhouse gas emissions targets.

Over half of the world's population lives in cities, and in Canada that proportion is closer to 80%. Of all the energy used in Canada, over half is for buildings, homes, and transportation within cities. Homes and buildings use over 30% of all energy in the country and consume more than half of all the electricity. Cities are increasingly recognizing that the quality of life and competitiveness will in part be driven by how effectively they manage the use of their energy and water resources.

Guelph's leaders recognized the growing importance of effective management of energy and water to the economy and environment, and in 2004 formed a Consortium to proactively develop a community energy plan. The Consortium represents all facets of the community including the administration, academia, business, the gas and electric utilities, and other community groups. In 2006, the Consortium decided to formalize a long-term Community Energy Plan (CEP) which would guide the city's energy future for years to come. The CEP team had a balanced mix of local and global expertise ensuring the plan incorporated the best elements of urban energy management from around the world.

Guelph, with its current population of 115,000, plus an additional 18,000 students during the academic year, is a thriving town well situated in the "Golden Triangle", an area to the west of Toronto that is attracting significant growth. Guelph's population is expected to grow to 180,000, probably within its current boundaries, supported by significant commercial and industrial development.

In rough numbers, the growth will add about 20,000 homes and somewhere between 400,000 and 500,000 square meters of non-residential construction, along with significant industrial growth.

To support this growth, the city has made a commitment to implement an energy plan that will ensure the long-term competitiveness and environmental performance of the city. The Guelph CEP was developed to be much more than an inspirational statement. It was created very much with implementation in mind. For this reason the team looked at success stories from the USA, Canada and Europe to adopt the best ideas that had clearly worked elsewhere. All of these success stories underlined the need to take a long-term, multi-decade view and to have community leadership that ensured long-term, consistent implementation of the basic strategies year after year. Another key element was to see the energy supply of the city as an integrated whole.

City of Guelph Community Energy Plan

The overall vision of the CEP is simple:

Guelph will create a healthy, reliable and sustainable energy future by continually increasing the effectiveness of how we use and manage our energy and water resources

This vision is supported by five goals that focus on the CEP's role in attracting quality investment, in ensuring reliable and affordable energy, in reducing environmental impacts, in enhancing Guelph's competitiveness, and in aligning public investment with the CEP. Each has recommended long-term measurements detailed in the plan.

- ***Guelph will be the place to invest, supported by its commitment to a sustainable energy future***
- ***Guelph will have a variety of reliable, competitive energy, water, and transport services available to all***
- ***Guelph energy use per capita and resulting greenhouse gas emissions will be less than the current global average***
- ***Guelph will use less energy and water per capita than comparable Canadian cities***
- ***All publicly funded investments will visibly contribute to meeting the other four CEP goals***

Successful delivery of these goals brings tangible financial and other benefits to residents, local business, the city administration, developers and builders, banks and investors, and the energy suppliers.

Guelph was an early pioneer in the development of community energy solutions by being a key player in developing municipal energy distribution in Ontario 100 years ago. Taking the lead for the next 100 years is entirely consistent with this tradition. Today the city covers about 86,000 km2. The population of 115,000 is estimated to grow by at least 2% per year to approximately 180,000 by 2031. Residential growth will be from a mixture of redevelopment in some older areas, and new development on greenfield sites. Industrial and commercial developments are planned in six areas around the city.

Today, Guelph uses a total of 6,030 gigawatt hours of equivalent energy (GWh_e) from fuels of all types, or 52.45 megawatt hours of equivalent energy (MWh_e) for every inhabitant of the city. If the heat wasted in the production of electricity for the city is included, the total rises to 8,475 GWh_e or 73.71 MWh_e /capita. This is the energy directly consumed in the cities buildings, vehicles, and industries, and does not include energy used in ships, airplanes, long-haul freight or other transportation. In general, the Guelph CEP focuses on the energy directly used in the city as this can be more easily influenced by community action. In 2005 a total of 19.2 million cubic meters of water was pumped and treated. Lost water totaled approximately 14 percent of all water pumped. The average daily water demand was 52,579 cubic meters.[2]

[2] http://guelph.ca/uploads/ET_Group/waterworks/Waterworks_Summary_Report_2005.pdf

This use is comprised of 230-250 litres per equivalent population per day for household use, with the balance being used by commerce and industry.

Guelph's climate, with over 4,352 heating degree days compared to only 180 cooling degree days, puts a high demand on space heating, and the plan addresses the heating alternatives in some detail.

The CEP was developed using the following priorities:

- Maximize the energy and water efficiency for buildings, vehicles and industry
- Maximize use of heat generated in electricity generation and existing industrial processes
- Incorporate as many renewable energy sources as feasible
- Team with the existing electricity and gas networks to avoided wasteful duplication of assets

Cities that systematically implement these principles year after year typically have energy levels at least half of the current levels of Guelph, with all the associated economic and environmental benefits that this brings.

On the first priority, efficiency, detailed assessments were made of the present 33,000 homes and 1.7 million m^2 non-residential buildings by age and energy use. The needs for the future industrial energy use and transport fuels use were similarly assessed.

Following these priorities, the CEP recommendations are:

Use efficiency to create at minimum all the energy needed to support the growth of the residential sector

It is feasible to add about 20,000 homes with no net increase in energy needs and this is the recommended target. Ontario recently passed stringent new energy efficiency building codes that will be fully in force by 2012. The CEP is recommending that the city explore incentives and other approaches to immediately implement the full code. This alone, combined with energy efficiency requirements on major residential renovations creates all the energy needed for growth.

From 2012 onwards, the CEP is recommending a steady annual improvement in energy efficiency of about 1% per year, which by 2031, would be a level that aligns with global best practice from Scandinavia and Germany.

Use efficiency to create all the energy needed to support the growth of the commercial and institutional sectors

Similarly, all the energy needed to support the entirety of the growth of commercial and institutional buildings energy needs can be met by the same combination of immediate implementation of the new codes and efficient renovation.

Adopt an energy performance labeling scheme for buildings as a voluntary initiative for the city, teamed with Natural Resources Canada and a local mortgage bank, to act as a pilot for the whole of Canada to gain about 5% incremental delivered efficiency

The CEP is recommending that all new and existing buildings have an Energy Performance (EP) Certificate that guarantees the building's energy consumption in normal operation at the

time the building is sold or even rented. There is no Canadian EP Certification at present. It is the subject of much discussion at a Federal level in Canada, and the recommendation is to offer Guelph as a national pilot.

The recommendation is to model around an emerging approach being discussed in Canada that is an amalgam of the Canadian Energy Guide and the European Union approach.

The experience in other jurisdictions is that this stimulates somewhat higher quality buildings and a certain amount of "efficiency competition" between developers.

Add to Guelph's attractiveness for quality industrial investment by offering world class tailored energy services and achieve annual investment growth rates higher than the underlying population growth, with no overall increase of the primary energy needed to serve the first fifteen years of growth.

Increasingly, industrial investors are looking at energy services as a key part of their decision on where to invest. The CEP is recommending developing tailored energy services for selected industrial development areas that not only deliver gas and electricity, but also selectively deliver other energy forms such as compressed air, process steam heating and cooling, etc.

Meet Guelph's growing transport requirements while reducing the transportation energy use by 25%, using sensitive urban design, effective alternative transport options, and encouraging vehicle efficiencies.

Transport fuels collectively represent 30% of all the energy used in Guelph, and account for a huge 45% of all the greenhouse gas emissions caused by the city. The CEP recommends a multi-pronged approach that includes various measures to encourage more efficient vehicles, urban design that reduces vehicle journeys, and focused attention on appropriate competitive mass transit.

Many of these measures were already being developed in detail in Guelph's wider transport and urban planning. The CEP is underlining the importance of their success to meeting the overall energy and climate change goals.

Incrementally create energy distribution architecture in Guelph that will allow the majority of the city to be served with fuel choices that optimize cost, availability, and environmental impact long into the future.

Over the coming years major changes will happen in energy and environmental legislation, fuel availability, the viability of emerging alternative energy technologies and their relative costs. To be able to achieve maximum benefit from these changes, the CEP is recommending a stepwise development of district heating networks covering the higher density areas of the city to supply space heating and domestic hot water. These networks also provide an efficient and economic way to distribute heat from a variety of existing and new energy sources.

In evaluating benchmark cities such as Mannheim or Copenhagen, we find that a common feature of these very efficient and reliable energy and water systems was the existence of all energy services being supplied by a single company. This avoids the inefficient use of primary fuel, and allows a rational integration of alternative energy sources. The CEP is recommending this approach.

Within fifteen years, at least a quarter of Guelph's total energy requirement will be competitively sourced from locally created renewable resources

The challenge around climate change will increasingly turn the focus on renewable fuels as a viable and essential way to reduce greenhouse gas emissions. Currently the economic value of greenhouse gas reductions is zero, but this is likely to change as various market mechanisms come into force.

The CEP is strongly recommending a target to install the equivalent of a "Thousand Roofs" of solar photovoltaic electricity.

The heat demand of the area makes it a natural fit for integrating bio-mass heat sources combined with district heating to provide about 10% of the base load heat needs through the winter. The local wind quality makes energy from turbines marginal under the current technology. Last but not least, the growing need to find environmentally acceptable ways to manage municipal waste merits a rigorous assessment of the waste-to-energy potential.

Target – At least 30% of Guelph's anticipated electricity requirements will be associated with Combined Heat and Power (cogeneration) by 2031.

As the city's energy evolves to include more district energy, it begins to include small and medium scale combined heat and power installations. Today Guelph's 1,627 GWh annual electricity use in reality uses 4,074 GWh_e of fuel, the difference being lost as heat, creating non-productive costs and significant greenhouse gas emissions. By implementing CHP within larger developments, much of this heat can be effectively captured and used, creating major cost and environmental benefits. The CEP recommendation is to proactively seek CHP projects with a total electric capacity in the 75 to 100 MW range with a comparable level of heat recovery.

Guelph will reduce the magnitude of the summer grid electrical peak by at least 40% by 2031 to avoid the need for investment in new electrical infrastructure to serve the growth of the city

One of the consequences of growing prosperity and the norms of new construction is the increasing use of air-conditioning, even though climatically there is relatively little need. The result is very high electrical demands for a few hours a day during the summer months. This peak drives substantial investments in underutilized generation, transmission and distribution assets by the electric utility.

The cumulative effect of many of the preceding measures including efficiency, cogeneration, heat recovery and solar PV will moderate and reduce the peak.

Guelph will systematically create an integrated energy metering, billing and management network across the entire city to allow cost-effective management of all energy forms

The energy breakthroughs foreseen by the CEP arise as a result of seamless integration of energy efficiency along electrical, gas and district heating networks, with a flexible and, over time, changing mix of renewable and non-renewable energy sources. Such an approach requires a high degree of management and data sharing across the different parts of the system to deliver maximum benefit. The recommendation is to establish a common data management and metering architecture within the city.

City of Guelph Community Energy Plan

Guelph will implement large area high-efficiency Scale Projects that accelerate progress towards a successful implementation of the CEP by creating early success and developing a deep pool of community expertise

All too often, CEPs fail to deliver due to a lack of sufficient scale and early success. The Consortium was committed to make sure that did not happen in Guelph. As a result, the CEP is recommending implementing neighborhood energy plans in relatively large, but bounded areas of the city.

The plan is calling for the early identification and implementation of Scale Projects. Some specific ideas are included as part of the CEP, and include various business and industrial areas, the greenfield mixed use developments targeted for the south of the city, the University of Guelph Campus as a whole, and the revitalization of the St. Patrick's Ward. These are offered as viable examples of potential Scale Projects.

The CEP also recommends elements that will ensure long-term successful implementation. Many Federal, Provincial and local programs exist and the CEP is recommending the city maintain information and offer assistance to capture as many of these resources as possible. The Consortium clearly recognizes that some of the measures proposed will require adjustment or interpretation of regulatory or other legal constraints, and is committed to clear these kinds of market barriers wherever possible. Since many of these challenges will be of interest beyond Guelph, the CEP is suggesting that Guelph can be a national prototype as these market and regulatory structures emerge. A high priority in this area will be to establish the market framework of a municipal energy service organization that is structured to ensure the highest reliability, least cost and least environmental impact energy services of all types.

Guelph's elected officials, business community, financial institutions, neighborhood groups, utilities, architects, developers, construction industry, academia and the city administration are clearly committed to the vision, goals, recommended actions and progress of the CEP as a key measure of Guelph's overall success in becoming a world class city in which to live, work and play.

In support of this, the CEP is recommending community and neighborhood groups be instrumental in ensuring Scale Projects are sensitively implemented and the energy and environmental goals are fully achieved. The CEP also presents an amazing opportunity for the University of Guelph and other colleges to build on the city's commitment to the CEP by developing specialist areas of study, training and research such that Guelph will become a center of excellence on the theory and practice of sustainable urban development.

The goals that the CEP has established are intentionally very aggressive and are generational in nature. The CEP is strongly recommending the city put in place a regular reporting system to track the progress towards the goals and to share best practices with the community, both through conventional and electronic media, and as a regular topic at City Council Meetings.

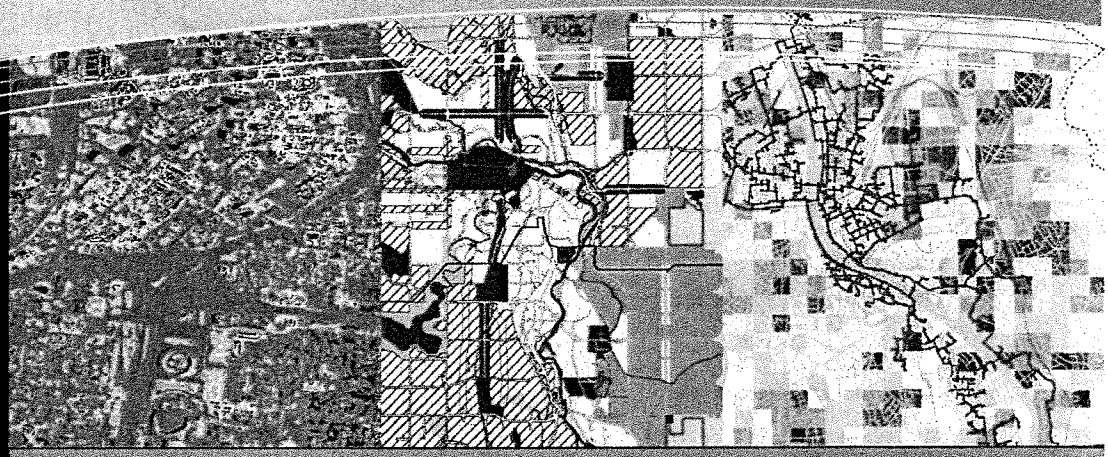
Guelph is already blessed with a number of commercial, non-profit and general interest groups as well as individuals working towards sustainability, energy efficiency and alternative energy in some way. The CEP made a first step to create an inventory of some of these resources, and this should be the basis of a developing resource database.

Despite the anticipated growth of the population and increase in economic activity, the overall fuel use required by the city to deliver all its energy service will actually decrease from today's total of 8,475 GWh_e to 6,135 GWh_e in 2031. This represents a decrease of greenhouse gas

emissions, currently at an estimated 16 tonnes per inhabitant, to about 7 tonnes. This is still some distance from the ambitious goal, but at a level that is clearly putting Guelph among the top energy performers in the world.

At the same time, Guelph will take its place as one of the most competitive and attractive cities in Ontario and Canada, with a core energy productivity expertise that will be sought out around the world.

Canadian URBAN Institute



Submitted to:
Natural Resources Canada
July 13, 2009

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Community Energy Planning In Canada

The Value of Energy Mapping Symposium Summary Report

Symposium Advisory Committee:

François Dubrous
Natural Resources Canada

Brent Gilmour
Canadian Urban Institute

Claude Lefrançois
Natural Resources Canada

Tony Turner
Natural Resources Canada

Jessica Webster
Natural Resources Canada

Acknowledgements:

We would like to thank the Federation of Canadian Municipalities for their generous support.

FCM
Federation of Canadian Municipalities
Fédération canadienne des municipalités

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SYMPOSIUM EXECUTIVE SUMMARY

On March 10, 2009, Natural Resources Canada, CanmetENERGY hosted a symposium entitled *Community Energy Planning in Canada: the Value of Energy Mapping.* The session was attended by members of the federal and municipal government, NGOs, industry representatives, and academic representatives. Attendees were invited based on their leadership, knowledge and commitment in the area of energy mapping and planning. The purpose of the session was to assess the potential application for energy mapping and encourage knowledge exchange about the potential role of the federal government in deploying energy mapping across Canada. Participants were welcomed by François Dubrous of CanmetENERGY and were given an overview of the expectations for the session by Brent Gilmour with the Canadian Urban Institute.

The morning session included presentations from federal staff, Geographic Information System (GIS) specialists, and industry experts from across Canada, the United States, Austria and New Zealand. Claude LeFrançois of the Office of Energy Efficiency, Natural Resources Canada reviewed the Community Energy Solutions Roadmap currently being developed for the Council of Energy Ministers. This policy document is directed at the potential role of federal, provincial and municipal governments to achieve energy efficiency improvements and reduce greenhouse gas emissions. Juan Carlos with the Canadian Urban Institute presented a brief summary of how Geographic Information Systems (GIS) can be used in energy planning and provided some examples from around the world for the application of energy mapping.

Helmut Strassler of the SIR-Salzburg Institute for Regional Planning and Housing in Salzburg, Austria presented on current European initiatives and programs in energy mapping and focused on the capacity of GIS to contribute to municipal energy planning and renewable resource assessment. This was followed by a presentation from Brad Swing, Boston **Mayor's** Office of Environmental and Energy Services City of Boston about the development of an on-line interactive solar mapping initiative. Brad identified the potential for replicating the initiative in Canada and emphasized the importance of partnering with utilities. Dr. Alexandre Pavlovski with Green Power Labs Inc. reviewed the solar energy mapping initiative for Dalhousie University Campus and discussed the importance of using an energy mapping hierarchy at the regional, local and site level to make informed decisions.

John Warren of the Canadian Urban Institute talked about the extensive energy mapping approach that was created for the City of Calgary. He reviewed how the study undertook to prepare a comprehensive land-use and energy tracking model that involved base-lining all energy consumed for every building in the city and working closely with municipal staff to forecast the amount of built form required to accommodate the expected growth in people and employment. The process involved developing a realistic model of what **Calgary's** physical form might look like in the future in terms of the number and type of buildings, as well as their size, height and location. This information was used to prepare scenarios and maps to evaluate appropriate alternative energy sources for use in the city and where they might be located.

After lunch, participants engaged in roundtable discussions that focused on three questions:

1. How do you see your organization moving towards better community energy characterization?

    a. What role do you see for energy mapping?

2. How would you build capacity to use energy mapping for planning and infrastructure investment practices?

3. What could the federal government do to support the use of energy mapping across Canada? Provide ideas for immediate and long-term actions.

A number of key themes and suggested actions emerged from these discussions. A summary of the opportunities and constraints is provided below.

Participants identified four main areas where energy mapping could contribute, including:

- Enhancing decision-support capacity for all orders of government and a variety of organizations across Canada.
- Establishing new capacities to encourage the integration of a variety of energy and environmental issues at one time through a simple framework.
- Contributing to the identification of regulatory barriers that hinder the implementation of alternative and renewable energy sources in communities.
- Advancing market transformation by establishing the correct market signals for private sector developers and utilities regarding long-term investments in energy supply and building demand.

During the general discussion, participants outlined a number of challenges to advancing energy mapping, such as access to needed information, the standardization of data from one community to the next, lack of general awareness and interest in energy planning, and other market challenges. Participants outlined a variety of solutions, which included:

- Establishing a nationally recognized approach for the collection of data and creating standards and uniform ways of measuring and reporting energy at the municipal level to allow for comparison and evaluation of municipalities.
- Developing a certification program to create credibility in terms of expertise and approaches for energy mapping and establishing centres of research excellence to exchange practical experiences and knowledge.
- Working with established institutions and organisations across Canada to champion the idea of energy mapping and to use established industry and government networks to provide support and advance the mainstreaming of energy mapping into the daily decision-making process of a community.

Participants suggested that Natural Resources Canada and other federal agencies have a direct leadership role in terms of advancing energy mapping. Specifically, participants felt that Natural Resources Canada could:

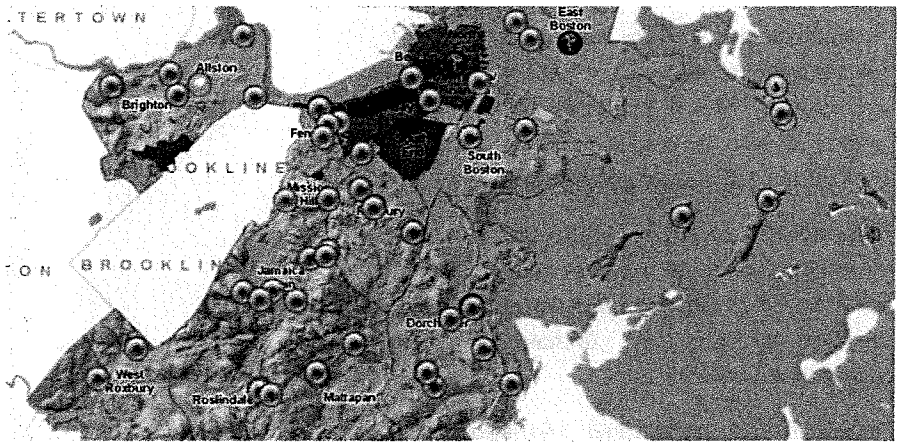
- Set standards for the collection of energy at the municipal level and establish a consistent approach for energy mapping, as well as for the types of indicators to report energy use.
- Prepare best-practices through the development of guidelines for undertaking an energy-base line for a community, the development of GIS data layers for energy mapping and the types of energy unit measures to be used in energy mapping.
- Develop new market instruments to encourage the application, as well as off-set the cost of undertaking energy mapping.
- Produce high quality research and information about advancing the business case for energy mapping for the private and public sector.

1 Energy Planning In Canadian Communities

Traditionally, Canadian communities have participated in sustainable energy planning in one of two ways. The first is directly through the management of energy services, including the owning and operating of various types of energy corporations, such as district energy facilities, lighting on streets and providing energy efficiency services. The second is indirectly through the development of energy policies that promote energy sustainability. These issues can include decisions on compact urban form, transportation oriented development, water distribution, waste management, building standards, infrastructure improvements, industrial processing, and affordable housing.

One approach that has gained increased acceptance to help communities undertake sustainable energy planning is through the development of a community energy plan (CEP). A number of communities across Canada have undertaken a CEP or are in the process of preparing an energy plan. CEPs have contributed to enabling communities to identify local solutions to demand-side management practices, including improved building energy efficiency, and integrating renewable and local energy sources as a means of reducing dependency on fossil fuels. At the same-time, CEPs also work to engage communities to manage their own energy use and delivery more efficiently.

Increasingly, communities involved in energy planning in Canada and abroad are starting to examine the affect of connecting land-use decision-making and transportation to energy demand impacts. One approach that is gaining support to assist communities with preparing a comprehensive energy strategy is the use of energy mapping. Energy mapping builds on the core elements of what a CEP attempts to do, including the establishment of energy and greenhouse gas targets, and can include a course of actions to connect land-use and built form with actionable demand-side management and energy supply activities to address local energy challenges.



Screenshot from the City of **Boston's** solar GIS depicting current solar installations. Boston Solar Energy Map: http://gis.cityofboston.gov/solarbostonDrivers for Energy

Energy Mapping Resources

Natural Resources Canada, Sustainable Buildings and Communities Groups
http://canmetenergy-canmetenergie.nrcan-rncan.gc.ca/eng/buildings_communities.html

Canadian Urban Institute
http://www.canurb.com

Quality Urban Energy Systems of Tomorrow
http://www.questcanada.org

Boston Solar Energy Map
http://gis.cityofboston.gov/solarboston

SIR-Salzburg Institute for Regional Planning and Housing
http://sir.at
http://www.e5-gemeinden.at

Green Power Labs
http://www.greenpowerlabs.com/

2 DRIVERS FOR ENERGY MAPPING AT THE COMMUNITY LEVEL

Energy mapping can provide decision-makers in a community with important information that can be used to reduce energy costs and lower environmental impacts. There are a variety of reasons for using energy mapping, including climate change, achieving energy reduction goals, transitioning to new energy sources and for sustainable community planning.

Mapping At the Community Level

Energy mapping can provide decision-makers in a community with important information that can be used to reduce energy costs and lower environmental impacts. There are a variety of reasons for using energy mapping, including climate change, achieving energy reduction goals, transitioning to new energy sources and for sustainable community planning.

Response to Climate Change

The awareness and growing concern around the world about climate change is helping to shift governments at all levels, utilities, developers, planners and others to explore the role for energy reduction and alternative energy use at the community level. Energy mapping offers a visual way to align greenhouse gas and demand-side management strategies by connecting various policies and initiatives for meeting greenhouse gas, energy and clean air targets.

Meeting Energy Reduction Targets

The demand for energy is continuing to grow for communities due to increases, in part, from energy intensive products and with the addition of more people and jobs. A dependable supply of energy is seen as critical for ensuring the economic attractiveness and competitiveness of cities and is leading to an increased focus on reducing energy demand at the community level through improved performance standards for buildings, reduction in automobile trips, and encouraging local alternative, as well as renewable sources of energy. Energy mapping offers a way for municipal governments and local utilities to evaluate existing energy use in a community and to improve energy efficiency and encourage alternative energy sources.

Transitioning to New Energy Sources

Energy mapping has an important role in enabling communities to transition from a fossil fuel based economy to a low intrinsic energy world particularly in terms of building, transportation and land-use. Energy mapping can provide an approach to identify the types of energy sources available to a community and assess where and how an alternative or renewable energy application could be used.

Supporting Sustainable Community Planning

Sustainable community planning is an emerging process that encourages more efficient use of local resources, both built and human, as well as smart investments in

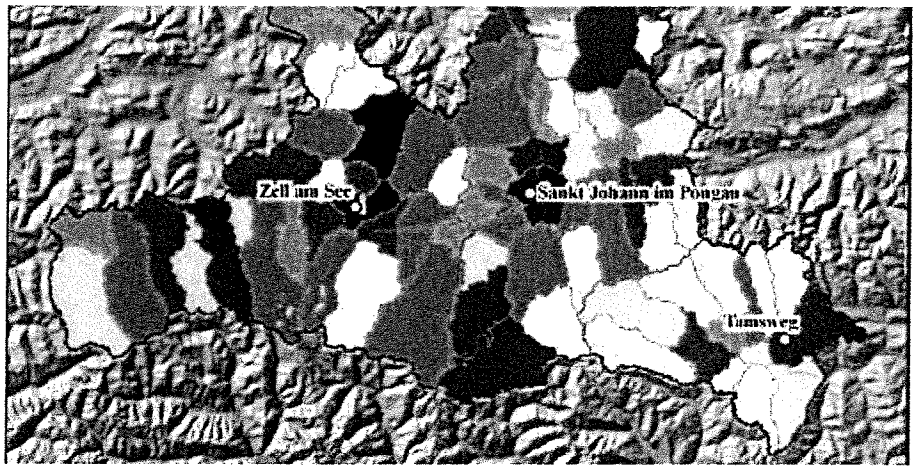
community infrastructure. The process of energy mapping can provide communities with new measures to evaluate the progress of achieving growth targets, as well as land-use and transportation energy reduction targets.

3 ENERGY MAPPING IN ACTION

Panel presentations explored emerging trends and challenges for energy mapping in Salzburg, Austria; Boston, Massachusetts; Halifax, Nova Scotia, and Calgary, Alberta. A number of approaches were identified for integrating energy mapping into energy assessments for communities, the planning and deployment of alternative renewable sources and connecting with land-use planning.

A Process for Success in Europe

Helmut Strassler with the SIR-Salzburg Institute for Regional Planning and Housing, outlined the role of GIS as a central component for guiding regions and municipalities in energy issues, such as with the e-5 program for energy efficient communities and the European Energy Award (EEA). The European award winning program has used energy mapping to provide a continuous process for quality management in energy decision-making and improving local structures and frameworks for effective energy policy, certification and benchmarking. Helmut identified how GIS has contributed to improving comprehensive energy reduction strategies for communities at two levels. The first is at the national and regional level to prepare assessments of the various types of energy resources available to a community and the second is at the building and site level. He noted that the use of GIS can be highly effective for developing strategies in terms of evaluating different alternative energy sources and undertaking detailed planning and scenario development to prepare comprehensive energy strategies. GIS can be an effective tool for allowing communities to track, benchmark and compare one another. Helmut identified that two of the key challenges to the effective deployment of GIS for energy mapping at the local level is accessibility of information and the standardization of data.



Map illustrating the potential of biomass supply for communities in a region of Austria. e-5 program and SIR-Salzburg Institute for Regional Planning and Housing: http:// www.35-gemeinden.at

Meeting the Solar Challenge Through GIS

Brad Swing with the City of Boston reviewed the successful online solar mapping model that is engaging citizens, businesses, utilities and other organizations to address climate change and meet the established goal of 25 MW of solar energy production for the City. Brad identified how the use of GIS can be instrumental in engaging people in a community and within city departments to become aware of how they can participate in the production of local renewable energy and overcome the challenges of encouraging renewable energy installation on private property. He outlined how the Solar Boston Energy Mapping Program has served as an effective management tool for guiding investment in renewable energy, as well as monitoring and benchmarking renewable energy production in the City. Brad outlined how the Green Affordable Housing initiative is an example of how solar energy mapping has been instrumental in achieving the goals of the program by requiring solar ready designs for all affordable housing. The project was funded from a $2M Block Grant from the U.S. federal government. With a new U.S. federal focus on renewable energy, Brad identified that the federal government is now offering block grants to cities for energy efficiency delivery services to stimulate future growth and implementation in renewable energy.

"One of the challenges to effective deployment of GIS for energy mapping is access to information and the standardization of data."

Helmut Strassler
SIR- Salzburg Institute for Regional Planning and Housing

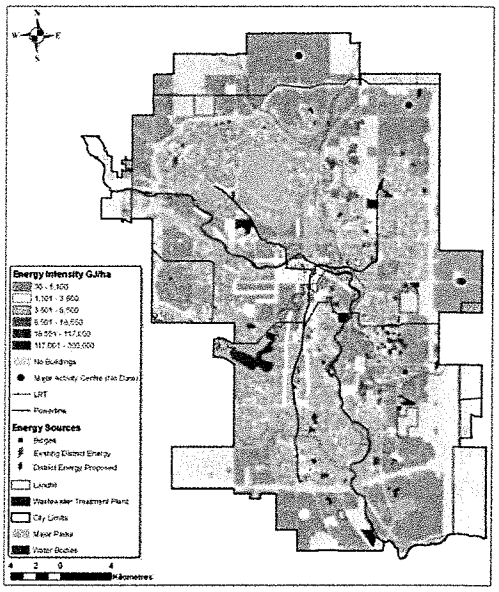
Planning For Solar Suitability

Alexandre Pavlovski of Green Power Labs Inc. reviewed the process of the solar energy mapping study undertaken for the Dalhousie University Campus in Halifax. Two important factors helped drive this work, an aggressive sustainability planning agenda and a campus master plan that included a campus energy mapping process. Alexandre described the process of solar energy mapping as a three-tiered process. The first step was directed at providing solar resource monitoring and mapping resources at a national level. Alexandre noted that the federal government is best placed to disseminate the availability of solar resources across Canada. The next step put forward focused on determining the solar generation potential with different technologies and solar suitability mapping. This can allow communities to better understand the potential for every facility in a defined area that could benefit from solar energy planning. The last step identified involved examining the facilities in an area that might benefit from solar systems. Alexandre suggested that a community could also engage in a site suitability assessment of potential solar sites and buildings. Recently, Green Power Labs created a solar online rating program to provide a flexible learning tool for the public about the efficient use of solar energy and how it can be applied in a community.

Map of the solar radiation potential for all of Nova Scotia.
Green Power Labs: http://www.greenpowerlabs.com/

Energy Land Use Planning

John Warren with the Canadian Urban Institute reviewed the energy mapping study that was prepared for the City of Calgary. The study undertook to prepare a comprehensive land-use and energy tracking model for Calgary. John summarised the modelling process. The first stage involved base-lining all energy consumed for every building in the City. Total energy consumed and relative energy cost within the boundaries of the City of Calgary was provided by local utilities and the information used to create energy intensity factors for seven buildings types. The next step involved sorting all building types in Calgary into seven categories and assigning an energy intensity factor to prepare an energy profile of the City. John indicated that the process required working closely with municipal staff to forecast the amount of built form necessary to accommodate the expected growth in people and employment for the City. The final step involved developing a realistic model of what **Calgary's** physical form might look like in the future in terms of the number and type of buildings, as well as their size, height and location. This information was used to prepare scenarios and maps to evaluate appropriate alternative energy sources for use in Calgary and where they might be located. John outlined that the Calgary study followed a three stage energy decision assessment. The first stage was to use energy efficiency improvements to serve as a catalyst to curb energy demand and reduce environmental risks. The second stage was to maximize alternative energy systems across Calgary. The third stage was to link the decisions about the built environment, land-use designations and alternative energy sources to establish a long-range plan that connected planning decision-making and energy inputs.



The ultra-high energy and land-use efficiency map created for the City of Calgary.
City of Calgary. www.calgary.ca

4 Opportunities and Constraints for Energy Mapping

Participants were asked to review and assess three questions. Major themes and a summary of the discussions relating to the questions are provided.

Identifying A Role for Energy Mapping

Decision Support Tool

Participants commented that the various applications of energy mapping were wide ranging and could greatly enhance the decision-making capacity for all orders of government and other organizations. For instance, energy mapping could be used as a strategic process to identify energy constrained areas and the information used to develop strategies for locating renewable and alternative energy sources. At the same time, participants commented that the application of energy mapping is relatively new and that the **"value add"** of energy mapping needs to be demonstrated. Participants suggested that the development of a clear business case would help explain to municipalities why they should be engaged in energy mapping.

"Energy mapping provides the basis and rationale for good urban design, diversity, compact form, and transit support. If you can start to get that right, you can start to get a lot of other things right."

Dan Leeming
Planning Partnership

Capacity Building

Participants suggested that the concept of energy mapping provided an opportunity to encourage the integration of a variety of energy and environmental issues at one time through a simple framework. However, participants noted that keeping up-to-date on the applications and concepts of energy mapping would be a challenge. Community planners, engineers, architects, builders, developers and government offices interested in the idea of energy mapping are not likely to be familiar with the concept, application and approaches. Participants also noted that there are limited opportunities to share experiences and challenges with implementing energy mapping and discuss technical solutions for advancing the concept.

Policy and Regulation

Participants felt energy mapping could contribute to identifying a number of regulatory barriers that hinder the implementation of alternative and renewable energy sources in communities. Participants also noted that it was important to consider how energy mapping applications could be used to better align greenhouse gas and demand-side management strategies to achieve provincial and municipal initiatives for energy and clean air targets.

Market Stimulation

Participants commented that energy mapping could contribute to market transformation by establishing the correct market signals for private sector developers and utilities concerning long-term investments in energy supply and building demand.

Summary of key roles for energy mapping:

- An approach to encourage **"energy literacy"** by contributing to the development of an integrated and holistic community energy plan.

- A method used to contribute to defining future physical form (redevelopment or creation of new land uses and densities) and provide the foundation for an economic model for energy infrastructure investment.
- A process for training and educating students by using universities as living laboratories. Universities and colleges should use campuses as research and development incubators and learning centres for implementing energy mapping.
- A model for the preparation of studies such as the expansion of urban growth boundaries, official plans and secondary plans. Energy mapping should be part of the fundamentals of any growth studies undertaken by a municipality. The process can influence other components of planning studies such as transportation systems, sewage systems and environmental systems. Energy mapping provides the basis and rationale for good urban design, diversity, compact form, and transit support.
- An approach for testing various land-use development scenarios to determine the most energy efficient land use configuration and built form for a community.
- A cost effective assessment tool to identify the opportunities for energy sharing and for obtaining the highest and best use from a given primary-energy input.
- A dissemination process to better communicate how energy information is presented to the general public, politicians and planners.
- A method for creating predictable and timely investments in renewable and alternative energy sources.

"A primary challenge for advancing energy mapping is accessing the data and reporting results in a consistent manner. This is where the federal government can really help to standardize the process."

John Warren
Canadian Urban Institute

Capacity Building for Energy Mapping

Several opportunities were identified about how to advance capacity building for energy mapping.

Improve Access to Information, Funding Resources and Tools

One of the primary challenges to advancing energy mapping is accessing the required information to undertake various energy and land-use assessments. Participants noted that there is minimal standardization of data from one community to the next. Participants felt that establishing a framework for the collection of data and creating a standard and uniform way of measuring and reporting energy at the municipal level would improve the ability to compare, rank and encourage positive competition among municipalities for energy efficiency. It was also mentioned by participants that financial support or fiscal incentives would contribute to offsetting the cost to undertake energy mapping and that access to professional expertise would be beneficial.

Build Knowledge, Know-How and Technical Skills

One of the common challenges mentioned by participants was that there might be a lack of public awareness and shortage of local experience and expertise about how energy mapping can be used to meet the energy sustainable development objectives of a community. While a community might be interested in reducing reliance on centralized energy, encouraging alternative and renewable electricity generation and lowering greenhouse gas emissions, other critical issues related to growth management, building the tax base and additional community priorities might deter from using energy mapping. In particular, energy mapping initiatives can become hampered due to uncoordinated and sometimes conflicting policies and regulations. Participants indicated that establishing a certification program and providing training programs,

conferences and forums to exchange experiences and knowledge for energy mapping could contribute to increasing awareness across the country.

Develop Strategic Partnerships and Provide Support

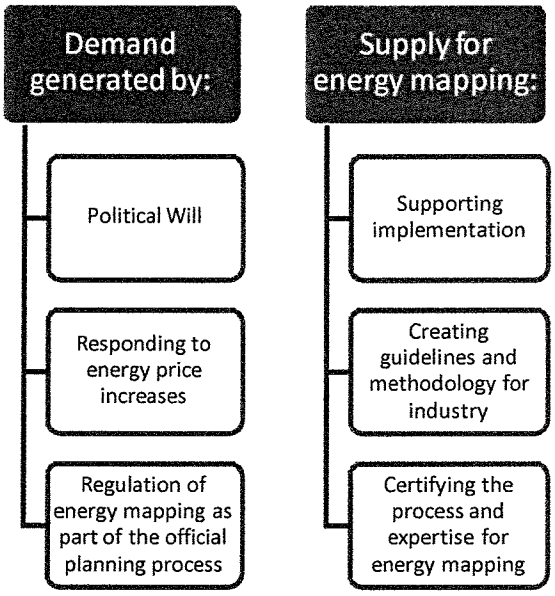
Participants noted that energy mapping can require a number of technical and expert decisions that involve a larger number of stakeholders and can involve crossing over several areas of government jurisdiction and responsibility.

Participants suggested that forming partnerships with utilities or between federal departments to make data available could quickly enhance the uptake of energy mapping. Participants also suggested that working with relevant municipal associations, Canadian Institute of Planners, Quality Urban Energy Solutions of Tomorrow (QUEST) and the Federation of Canadian Municipalities (FCM) to advance multi-stakeholder decision-making would be beneficial. Summary of capacity building opportunities for energy mapping:

- Local utilities can contribute to sharing information and all orders of government should encourage developing constructive partnerships with utilities for the exchange of information to support energy mapping.
- There is a need to identify and support local leaders to actively champion the concept of energy mapping to overcome departmental and jurisdictional boundaries.
- Use fiscal incentives to encourage the uptake of energy mapping at the municipal level by offering to finance the process or make it a condition of receiving federal funding using a similar model to the federal gas tax program.
- Establish a collection of regional centres of excellence to provide technical services to smaller municipalities that do not have the capacity to undertake energy mapping.
- Create a simplified web-based GIS tool that would be an analogy to the screening tool that was created for the original federal commercial building incentive program (CBIP) or RETScreen. The tool would allow non-GIS practitioners to visualize some energy information and become familiar with the applications for energy mapping.
- Consider European models, such as the e-5 initiative, to encourage competition between municipalities.
- Establish a standardized methodology (best approach) for measuring energy at the community level.
- Develop a process that would allow data for energy use and building data from different municipalities to be available for comparison, ranking and assessment.
- Document the competitive advantage created from avoided energy costs, new jobs and long-term capital and operation costs that can be captured through energy mapping.
- Encourage energy mapping to be incorporated into the planning process in a similar fashion as urban design guidelines and other supportive reports for the practise of urban planning.

Participants suggested a conceptual model for building capacity for energy mapping. The model presented was developed in response to the question **"how** do you get the human capacity for energy **mapping?"** The suggested approach put forward was once demand was generated this would contribute to sustaining capacity for energy mapping.

Model for Capacity Building



"How do you get the human capacity for energy mapping? The answer involves looking at supply and demand. The capacity will be sustained once you have consistent demand."

Julia McNally
Ontario Power Authority

A Federal Government Role for Energy Mapping

Participants identified a number of actions the federal government could undertake immediately and over a longer period of time to support energy mapping.

Develop Decision Support Tools and Best Practices

A challenge identified by participants was the limited number of examples of completed energy mapping initiatives in Canada that address the integration of all land-uses and urban-form, building types, transportation, industry and energy supply, as well as distribution options. Lack of completed projects hinders the opportunity for knowledge exchange and inhibits the advancement of technical expertise, as well as limits the ability of various orders of government to identify the types of services (financial, technical etc.) required to advance the application of energy mapping. Participants identified the importance of having an energy mapping study that incorporates transportation to encourage the use of the process. Suggestions were also put forward for the development of best practice guidelines and request for proposal templates that are similar to the Natural Resources Canada materials developed for CEPs.

Set Standards

An issue consistently raised by participants was the importance of securing accessible information that can be easily validated and quantified for use in an energy model and GIS applications for energy planning and mapping purposes. All participants identified that Natural Resources Canada would be the appropriate federal agency to develop standards for the consistent reporting of energy use at the municipal level. Participants also identified Natural Resources Canada as the appropriate department to establish a consistent approach for energy mapping and to determine the best indicators to report energy use in a consistent manner to measure energy use at the community level.

Participants outlined three areas of involvement for Natural Resources Canada including:

- Energy Data Layers – Support is necessary to establish agreement on the input layers used to create a CEP, (e.g., is "residential energy use" applied the same across all municipalities).
- Accessing and Sharing Geospatial Information. The standards of geospatial data discovery, access, sharing and online mapping should be promoted, as well as the principles of closest-to-source data access. These standards and principles are currently part of the Canadian Geospatial Data Infrastructure and could be widely disseminated as part of the process followed for energy mapping.
- Energy Reporting and Energy Sources – A requirement exists to establish general agreement on the units of measure that can be used in CEPs to improve evaluating, monitoring and verification between communities (e.g., Gigajoules vs. British Thermal Units).

Provide Leadership and Encourage Market Transformation

Participants identified the importance of expanding existing government market instruments to encourage the application, as well as to off-set the costs of undertaking energy mapping. Participants suggested the establishment government market instruments, similar to the federal gas tax program, could be used to move energy mapping process into the mainstream for municipal planning and energy assessment.

Collect, Research, and Publish Timely Information

Participants acknowledged that the federal government could provide an important role for producing high quality information that could advance knowledge about energy mapping, as well as support the business case to a range of stakeholders. Among the areas identified for research by participants was assessing mechanisms to encourage the involvement of the financial community to establish products for energy improvements (underwriting liability; long-term guarantees etc.), evaluating the competitive advantage and cost savings of developing local energy systems vs. centralized systems, and working with the provinces to assess the cost/benefit opportunity of adopting higher building standards for all building types.

Summary of federal government support roles for energy mapping:

- Identify federal agencies (Natural Resources Canada, Statistics Canada) with energy database information and other organizations and establish a formal process to share information, set standards and benchmarks for energy mapping. The federal government is well placed to create best practices or standards for municipalities and provinces to follow.
- Develop training and certification program(s) for agencies, consultants and energy specialists interested in energy mapping and work with federal departments to support courses and training at colleges, union centres, industry and trade centres across Canada.
- Conduct research to identify the cost savings from transmission and generation capital and operating costs due to implementation of local alternative energy supply systems.
- Prepare an assessment of the GIS capacity of major municipalities across Canada to deliver geospatial applications related to energy mapping.

- Make GIS available to smaller municipalities and provide support on how the tools can be effectively applied.
- Create a web portal or centres of excellence where all federal departments engaged in energy mapping activities can share resources and identify any cross-fertilization opportunities or possible gaps.
- Establish a strategy to overcome the privacy issues for data collection and use. Offering information at the building level or street level will require developing relationships and synergies with utility companies and agencies regulating property data.
- Work with organisations such as the Federation of Canadian Municipalities, Canadian Institute of Planners and others to promote energy mapping and other support services.
- Advance market transformation by offering fiscal support to municipalities for undertaking energy planning. The approach could be similar to the U.S. block grants or the current ecoEnergy programs for improving energy performance of buildings.

APPENDIX - PROGRAM

Community Energy Planning in Canada: The Value of Energy Mapping Symposium

Tuesday March 31, 2009 9:00 – 12:00 pm

8:00 **Registration and Light Breakfast**

8:35 **Welcome and Introduction**
François Dubrous, CanmetENERGY, Natural Resources Canada

Expectations of the Session and Agenda Overview
Brent Gilmour, Moderator

8:45 **Community Energy Solutions Road Map**
Claude Lefrançois, Office of Energy Efficiency, Natural Resources Canada

Decision Making With GIS
Juan Carlos Molina, Canadian Urban Institute

9:00 **Questions of Clarification**

9:15 **Energy Mapping In Action: An International Perspective**
International guests outline the role of energy mapping in their own countries and how communities can repeat the success.

Energy Mapping in Europe: A Process for Success
Helmut Strasser, Salzburg Institute for Regional Planning and Housing, Salzburg, Austria

Meeting the Solar Challenge Through GIS
Brad Swing, City of Boston

10:00 **Questions of Clarification**

10:15 **Nutrition Break**

10:30 **Energy Mapping In Canada: Select Case Studies**
How is energy mapping being used in Canada today? What are the advantages of considering energy mapping within land-use and energy planning?

Dalhousie University – Planning For Solar Suitability
Dr. Alexandre Pavlovski, Green Power Labs Inc.

City of Calgary – Energy Land Use Planning
John Warren, Canadian Urban Institute

11:20 **Community Energy Planning Response and Discussion**
What has community energy planning achieved to-date? How can energy mapping contribute?

12:00 **Lunch Supporting Organization**

1:15 **Applying Energy Mapping: Opportunities & Constraints**
Participants will explore in small working groups the opportunities and constraints to the use of energy mapping to support community decision making.

1:45 **Report back from Roundtables and Interactive Discussion**

2:45 **Nutrition Break**

3:00 **Deploying Energy Mapping: A Role for the Federal Government**
Interactive panel discussion with François Dubrous, Michel Gélinas, Tony Turner & Julia McNally

3:30 **Wrap-up and Adjourn**

APPENDIX - DELEGATES

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Materials for

Information Session for Councillors

Enclosed are a variety of reference materials for your review prior to the Information Session for Councillors on Wednesday, March 16 from 6:00 p.m. to 9:00 p.m.

Recommendation: If you do not have a good understanding of District Energy or Combined Heat and Power, we would highly recommend you:

- Watch this 10-minute video produced by the International District Energy Association located at: **http://www.youtube.com/watch?v=H3ef6dz8BGg**
- Read the attached article

Other materials included in this information package:

- How Energy is Produced in Ontario educational poster
- Time-of-Use pricing for electricity – samples of customer materials
- Samples of Time-of-Use pricing materials for customers that are available for your constituents in 23 different languages (Italian and Chinese provided)
- Phantom Power information sheet
- Sample of Guelph Hydro bill and bill breakdown

For additional copies of any of the materials, please contact:

Sandy Manners
Director, Corporate Communications
Guelph Hydro Inc.
smanners@guelphhydro.com
Tel: 519.837-4703

What is Combined Heat and Power / Cogeneration?

In a combined heat and power (CHP) or cogeneration plant, one fuel source is used to generate two forms of energy.

When electricity is generated at large, centralized power stations, about 60 per cent of the primary energy in fuel is wasted as heat that is generally exhausted to the atmosphere.

In a combined heat and power plant, waste heat from producing electricity is captured and used to heat buildings or drive chillers which produce the cool water to provide air conditioning. This chilled water may also be produced electrically in a more efficient manner in a central plant, in which event the thermal distribution system also delivers hot water or steam and chilled water. By recovering waste heat and using it, overall fuel consumption is reduced from what it would be in the two separate plants (electricity and thermal) and fewer emissions are released into the atmosphere.

The efficiency of a combined heat and power plant that generates two forms of energy can reach in excess of 80 per cent versus a coal-fired power generating station that is generally around 38 per cent and only generates electricity. Compared to conventional forms of power generation, combined heat and power can also provide CO_2 savings of 10 per cent. As we consider other fuels to produce the electricity and thermal energy, this can be done so much more cost effectively in a larger central plant than can be done in individual buildings.

Since combined heat and power facilities are located at or near the point of consumption, they are considered a form of distributed generation and are often co-located with a factory, university campus, hospital, commercial building or industrial facility.

What is District Energy/Community Energy?

District Energy (also known as Community Energy) uses an underground network of insulated pipes to deliver thermal energy (in the form of hot water, steam or chilled water) from a central plant to heat and cool a cluster of buildings, such as those in an industrial park, hospital, university, large hotel/convention centre, factory or neighbourhood. In some cases, turbines used to create thermal energy to heat and cool buildings also generate electricity which is sold into the electricity grid. By producing both heat and power from the same facilities in our communities, district energy plants achieve tremendous energy efficiencies and reductions in greenhouse gas emissions.

Buildings or neighbourhoods that are part of a district energy system do not need to own or operate their own furnaces, boilers, air conditioning systems or cooling towers resulting in space savings and reduced capital costs.

Additional Resources:

Video: **District Energy: Now's the Time**
Educational film detailing district energy – what it is, how it works, benefits and case studies.
http://youtu.be/H3ef6dz8BGg
Produced by International District Energy Association – www.districtenergy.org

Videos: **Remarks on Guelph Hydro Inc. and Dalkia Canada announcement – http://pitch.pe/118415**
Dave Levac, MPP Brant and Parliamentary Assistant to the Ontario Minister of Energy
Karen Farbridge, Mayor of Guelph
Roger Prosser, Vice President, Business and Infrastructure Development
Barry Chuddy, Chief Executive Officer, Guelph Hydro Inc.

Guelph Hydro Developing Combined Heat and Power / District Energy Projects in Guelph

Last fall, Ontario's Minister of Energy issued a directive to the Ontario Power Authority to strategically integrate 500 MW of combined heat and power (CHP) projects into Ontario's electricity system. This will supplement the approximately 450 MW of combined heat and power the OPA currently has under contract in the province.

"Under the Green Energy and Economy Act, we have seen a lot of emphasis placed on the development of "green" energy in the form of wind and solar as the foundation of a cleaner energy future for Ontario," says Barry Chuddy, CEO of Guelph Hydro Inc. and Board member of the Canadian District Energy Association. "While this has been a welcome development, it is unfortunate that the rather more lackluster, but tried and true, high energy efficiency, low-carbon technologies such as combined heat and power and district energy seem to have been neglected as potential major contributors to a well-rounded energy portfolio."

"That's why we were so pleased when the Ontario Power Authority announced they will be launching a Combined Heat and Power Standard Offer Program (CHPSOP) under the province's Clean Energy Standard Offer Program (CESOP)," says Chuddy. "We expect this new offering will encourage a wide variety of public and private organizations to invest in community energy systems that will help:

- Improve business competitiveness by increasing energy efficiency and reducing energy costs,
- Reduce the need for large-scale central generation,
- Reduce the reliance on grid transmission infrastructure,
- Advance environmental goals by reducing CO2 emissions,
- Diversify and increase the security of the energy supply, and
- Contribute to sustainable community development."

Guelph Hydro Inc. is helping to create a sustainable energy future for the Guelph community by developing combined heat and power, district energy, solar and biogas energy projects that will reduce the community's carbon footprint.

Guelph has been identified as one of Ontario's fastest growing communities with a population expected to grow by 50 per cent to 175,000 residents by 2031. In 2006, Guelph formalized a long-term Community Energy Plan* that is the City's commitment to decouple energy consumption from population growth, use energy more wisely and more efficiently, and fight climate change.

In 2010, Guelph Hydro was proud to be named by the City of Guelph as the key implementer of sustainable energy projects under the City of Guelph's Community Energy Initiative and a lead member of the Mayor's Task Force on Energy. Preliminary energy projects included installing a solar power installation on the roof of the Guelph Hydro building and submitting applications for about 1 MW of rooftop solar installations on municipal buildings.

In January, the company took an important step by signing an agreement in principle with Dalkia Canada to develop three combined heat and power / district energy projects that have the potential to bring more than 28 megawatts (MW) of clean, efficient, local power generation to the City of Guelph. These projects will be submitted under the Ontario Power Authority's Combined Heat and Power Standard Offer Program when it is launched later in the year.

Dalkia is a global energy, utilities and facilities management group operating in over 118,000 customer facilities in 42 countries. Dalkia owns and manages the largest portfolio of district energy networks in North America in such cities as Montreal, Philadelphia, Baltimore and Boston. Dalkia's 16 urban district energy networks include 25 central utility plants with a capacity of 13 million pounds of steam per hour, 260 megawatts of electricity generation from combined heat and power systems, and 170,000 tons of chilled water. These plants serve the requirements of more than 1,350 customers covering 300 million square feet of building space.

"Combined heat and power plants, which are very popular in Europe, are all about conserving fuel, increasing energy efficiency and reducing our carbon footprint," says Chuddy. "We are delighted that Dalkia, Europe's leading energy services company and the largest operator of district energy systems worldwide, has chosen to partner with Guelph Hydro, invest in the Guelph community and help build a sustainable energy future for Guelph."

"I believe," says Chuddy, "our industry needs to take a new look at combined heat and power and district energy to begin to understand the strategic role they can play in Ontario's long-term

energy supply. To begin, we need to identify the political, industry and technical barriers that are impeding the potential of this energy efficient technology."

Challenges to increasing combined heat and power capacity include fundamental unfamiliarity with combined heat and power and district energy technologies on the part of government, industry, academia and the public; lack of supportive provincial policy development; regulatory ambiguity; complexities of attributing energy efficiency and emissions benefits; uninspired municipal planning and restrictive bylaws; technology limitations; and a lack of incentives.

Addressing these challenges will require all levels of government, government agencies and industry to work together to ensure energy efficiency technologies such as combined heat and power and district energy take their rightful place as cornerstones in our sustainable energy future.

**Now called the Guelph Community Energy Initiative*

COMMENT FROM CANADIAN DISTRICT ENERGY ASSOCIATION

Over the past eight years, the McGuinty government has sparked unprecedented levels of electricity conservation, eliminated energy shortages, brought on line more than 8,000 MW of new generation – largely from green energy sources – and made unprecedented investments in upgrading our transmission infrastructure.

Now as Ontarians, we have the opportunity to evolve to community energy management, considering communities' integrated energy needs--linking electricity use with thermal energy use. This is an essential next step given that 60 per cent of energy consumption in our cities goes to heating and cooling, largely from non-electrical sources. Therefore, to plan and build sustainable energy communities we need to consider all energy needs.

District energy is in widespread use around the world and in more than 110 projects across Canada. There are proven success stories operating here in Ontario, including Markham District Energy, the Hamilton Community Energy, and the Enwave system in downtown Toronto. The potential exists to expand community energy to many more neighbourhoods and districts to reduce heating and cooling costs for hundreds of large buildings, saving energy and dollars while cutting greenhouse gas emissions.

We are encouraged by the OPA's Combined Heat and Power Standard Offer Program and look to work with government and government agencies, and private and public utilities to develop a policy framework to support energy-efficient and cost-effective district energy projects to heat and cool numerous buildings linked by a common underground system.

This will build on our Smart Growth and Green Energy Act initiatives, and ensure that Ontario communities have the infrastructure to operate sustainably over the long term.

Mary Ellen Richardson
President, Canadian District Energy Association

INTERNATIONAL DISTRICT ENERGY ASSOCIATION

Energy-Efficiency Comparisons

Guelph Hydro Inc.

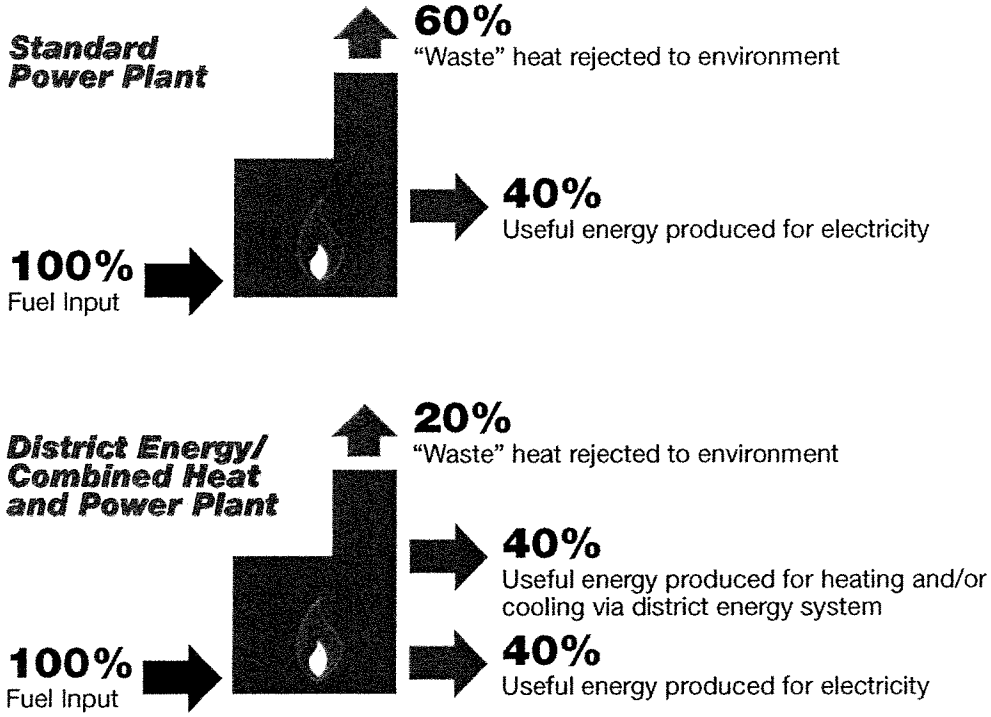
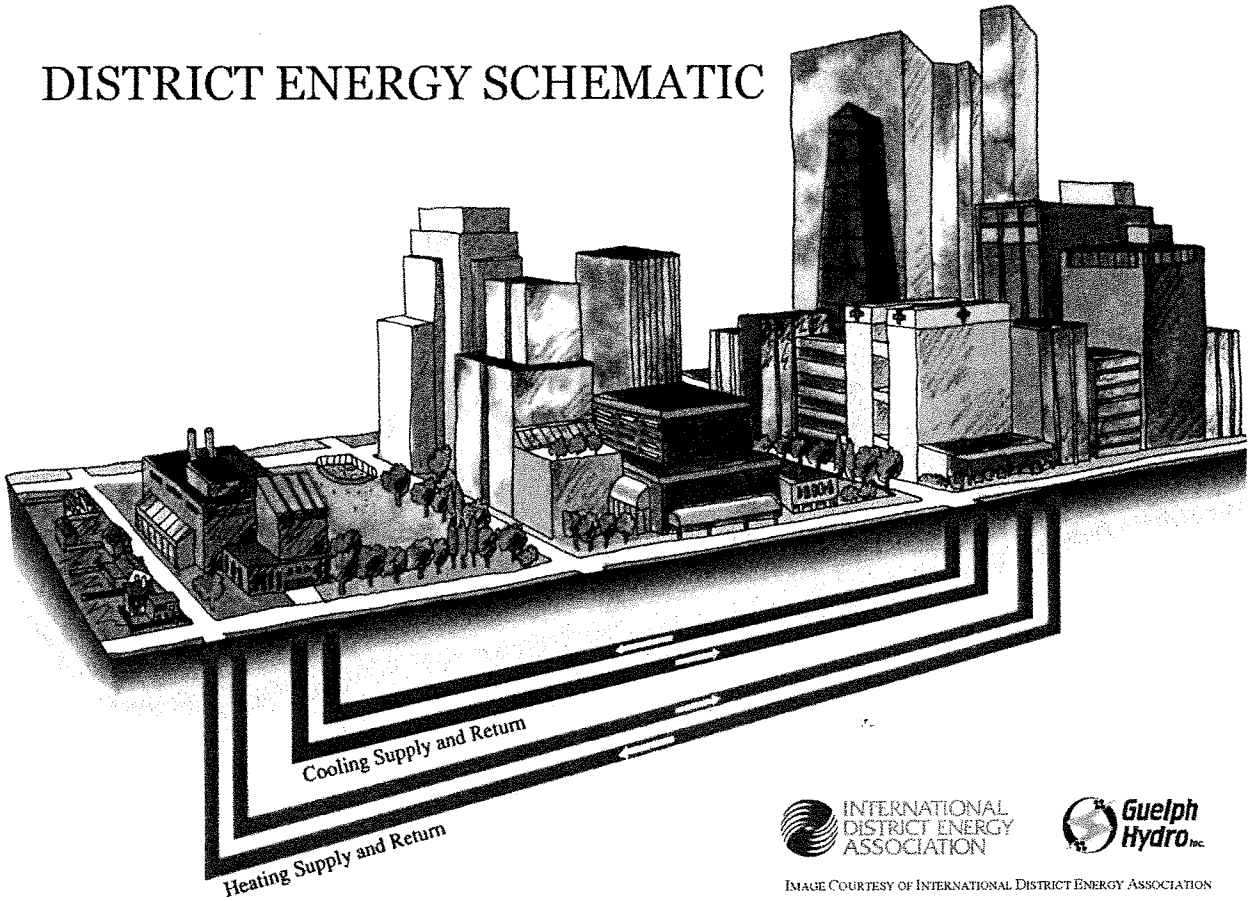


Image Courtesy of International District Energy Association

DISTRICT ENERGY SCHEMATIC



INTERNATIONAL DISTRICT ENERGY ASSOCIATION

Guelph Hydro Inc.

IMAGE COURTESY OF INTERNATIONAL DISTRICT ENERGY ASSOCIATION

Electricity Information Session for Councillors

Barry Chuddy
Chief Executive Officer
Guelph Hydro Inc.

Agenda

- Guelph Hydro – A Valuable Asset to the Community
- Supporting the Community Energy Initiative
- The Energy Sector Today
- What Utilities Are Up Against – Industry Issues
- Evolution of the Electricity Market
- Rising Electricity Prices
- Guelph Hydro Electric Systems Distribution Rate Increases
- Looking Forward
- Recap

Guelph Hydro
A Valuable Asset to the Community

Serving a Critical Role in the Community

- Public trust invested in us to:
  - Deliver power from the transmission supply point (Hydro One) to the meter base in the most safe, reliable and cost-effective way to do so
  - Maintain, upgrade and expand network to support growth and economic development needs of the community
  - Provide an appropriate return on investment for the shareholder – the City of Guelph
  - Support the Guelph Community Energy Initiative

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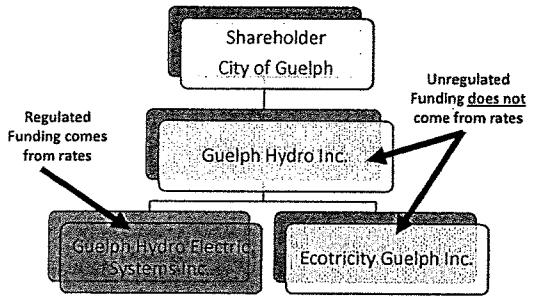
How We Are Structured



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Guelph Hydro Inc. – Holding Company

- Regulated – ***Guelph Hydro Electric Systems Inc. (GHESI)***
  - Wires business – local distribution company (LDC)
  - Required to achieve community energy conservation targets through conservation and demand management efforts
  - Costs are covered by ratepayers
  - For-profit business
  - Must justify budgets by submitting rate applications
  - Evaluations of rate applications are a public process - Interveners participate
  - Rates approved by the Ontario Energy Board
  - Dividends paid to Guelph Hydro Inc. that pays dividends to City of Guelph
- Unregulated – ***Ecotricity Guelph Inc.***
  - For-profit business
  - Investing in sustainable energy
  - Costs do not affect ratepayers
  - Owns and operates Eastview generation facility

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Dividends Paid to the City by GHESI

- The following dividends were paid out over the last five years:
  - 2009 - $2.2 million
  - 2008 - $1.5 million
  - 2007 - $1.5 million
  - 2006 - $1.5 million
  - 2005 - $1.5 million

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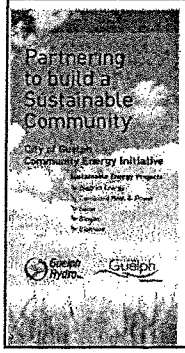
Guelph Hydro Inc.
&
Ecotricity Guelph Inc.
Unregulated Companies

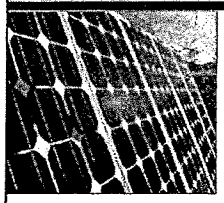
Supporting the Community Energy Initiative

Guelph Hydro – Supporting the CEI



- Key implementer of sustainable energy projects under the CEI
- Active participant on Mayor's Task Force
- Goal is to assist in helping City achieve targets set out in the CEI

Investments in Sustainable Energy



- Solar Power
  - Guelph Hydro rooftop solar
  - Applications for 1 MW of rooftop solar on municipal buildings
  - Actively leasing other rooftops – commercial, industrial and institutional
  - Solar cooperatives
  - Partnership with Canadian Solar
  - 15 applications to the OPA

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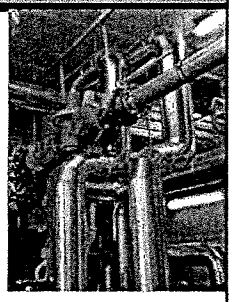
Investments in Sustainable Energy

- Combined Heat and Power/Cogeneration and District Energy
  - Partnership with Dalkia Canada
  - New Hanlon Business Park
  - Other developments being planned



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Investments in Sustainable Energy

- Bioenergy
  - Ecotricity landfill gas site
  - Other developments - Cargill

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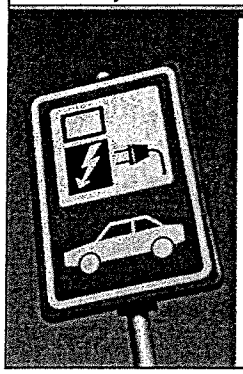
Transportation



- CEI transportation goals
- Electric vehicles market research
  - Survey indicates Guelph is an ideal community for a pilot project

Guelph Hydro Inc.

The Energy Sector Today

Guelph Hydro Inc.

What is Happening in the Energy Sector?

- Helping to curb climate change – More sustainable
  - Improving the environment
  - More renewable energy
- Ontario being positioned as a leader in renewable energy
- Refurbishing an outdated electricity system
  - New and refurbished generation sources required to meet long-term supply requirements
  - Laying the groundwork for a more sophisticated electricity distribution network – smart grid
- Upgrading the transmission and distribution systems
  - Accommodate generation in different ways

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Guelph Hydro Inc.

What is Happening in the Energy Sector?

- Trying to effect social change
  - Energy conservation
- Moving to a rate structure that more closely reflects the actual cost of electricity
  - Time-of-Use pricing
  - Better utilization of assets (transmission, distribution and generation)
- Preparing for electric vehicles
  - Many implications

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Guelph Hydro

Guelph Hydro

MAJOR TRANSFORMATION

RESULT:
COSTS ARE GOING UP

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What the Public Sees and Focuses On

- Rising electricity prices
  - Are they really unreasonable?
- Blame Harmonized Sales Tax
- Blame smart meters
- Blame renewables
- Renewable agenda with limited consultation

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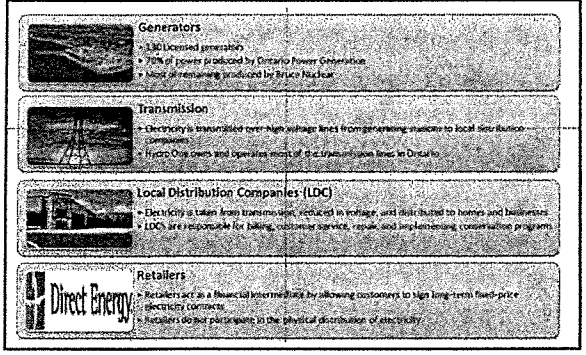
Guelph Hydro

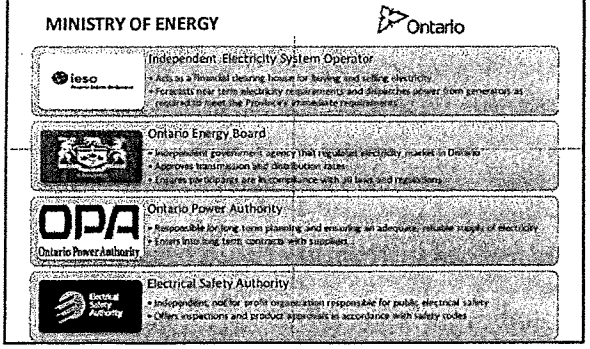
What Utilities are Up Against

Industry Issues

Confusion – Lots of Market Participants



Confusion – Lots of Market Regulation



What Utilities Are Up Against

- Speed and amount of change in the industry is unprecedented
- Electricity pricing is the top political issue
  - Election in October - Political uncertainty
  - Local utilities have no control over the commodity price of electricity, taxes, and other charges on the electricity bill but consumers do not differentiate between all the players in the Ontario energy industry
- We get called first - Often for items over which we have little control
  - Bill structure
  - Hydro One issues
  - Energy pricing
  - Regulatory obligations
  - Smart meters
  - Taxes
  - Debt retirement charge

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What Utilities Are Up Against

- Ever increasing Regulatory burden
  - New energy conservation targets
  - Requirement to connect renewable energy
  - Smart meters and Time-of-Use pricing
- Need to invest in capital
  - To upgrade and maintain network to ensure reliability
  - To expand network to serve growing community
  - To upgrade to accommodate distributed generation (renewable energy and smart grid)
  - To ensure network can support electric vehicles
- New role in communities served
  - Marketing and promotion of energy conservation programs
  - Support of Community Energy Initiative
  - Developing sustainable energy projects

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What Utilities Are Up Against

- Disconnect between public perception of role of regulated local electricity distribution companies and actual role
  - Local electricity distribution companies are responsible for:
    - Delivering a safe and reliable supply of electricity
    - Maintaining, upgrading and expanding the network
    - Operating in a financially responsible manner that provides value
  - Most local electricity distribution companies are rate-based **for-profit** businesses - consumers see them as **public services**
- Confusion between regulated (rate-based) and unregulated businesses (that finance their operations through investment of capital and profit-making activities)

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What Utilities Are Up Against

- Challenges in preaching energy conservation
  - Energy conservation targets now a condition of license
  - Canada is one of the world's highest consumers of energy on a per capita basis – weather related?
  - Ontario currently has a surplus of power
  - Consumer sense of entitlement
    - Large air-conditioned homes
    - Large-screen TVs, electronic gadgets, computers
  - Delta between on-peak and off-peak price of electricity is not significant enough to change consumer behaviour
  - Electric cars on the horizon – load of an electric car is equal to that of an entire home

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Guelph Hydro

Guelph Hydro

LET'S TAKE A STEP BACK ...

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Guelph Hydro

How We Got Where We Are Today
Evolution of the Electricity Market

The Early Days to 1995

- Ontario Hydro
  - Crown corporation responsible for electricity generation, transmission and some distribution
- 300+ municipal electric utilities
  - Accountable to a local Hydro-Electric Commission or Public Utilities Commission
  - Responsible for local distribution and selling of electricity
  - Regulated by Ontario Hydro

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The Early Days to 1995

- Ontario Hydro – ***Problems emerged***
  - Nuclear megaprojects created a ballooning and unsustainable debt
  - Massive and recurring cost overruns
  - Publicly financed debt of $38.1 billion by 1998 - $3,000 for every person in Ontario
  - 60% rise in electricity prices between 1985 and 1995
- Demands from large customers to choose suppliers
- Low-cost, smaller scale generation (50 MW to 1,000 MW) became commercially viable

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1995 - MacDonald Report

- Wholesale competition
  - Generators should compete to supply electricity
  - Dismantling of Ontario Hydro's generating assets - Monopoly
- Retail competition
- Creation of independent electricity system operator to coordinate dispatch of electricity in the province (IESO)
- Restructured distribution
  - Industry consolidation
  - Result: 300 utilities reduced to 90 (approx.)

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1997 - Energy Competition Act – Bill 35

- Divided Ontario Hydro into:
  - Ontario Power Generation – generation assets
  - Hydro One – transmission system
  - Ontario Electricity Financial Corporation – debt and stranded debt
  - Assigned existing debt to successors
- Required all municipalities to transfer assets of electric utilities to new Ontario Business Corporation Act companies
  - Board structure
  - For-profit or non-profit structures
  - 1998 - Local Distribution Companies (LDCs) transformed into commercial entities
- Ontario Energy Board regulator for, all including distribution utilities
  - Set rates for IESO, Hydro One, others...
  - Established how Local Distribution Companies (LDCs) would recover energy costs – full pass through, no hedging

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Guelph Hydro

2002 - Competitive Market

- May 1, 2002 – Market opened
- Perfect storm
  - Hottest summer in 50 years resulted in record demand for electricity
  - Lack of rain = reduced hydro power
  - Coal and nuclear plants – unplanned shutdowns
  - High demand and limited supply
  - Residential consumers exposed to widely fluctuating and skyrocketing spot prices
  - Hedging of electricity prices by LDCs too risky
- November 2002 – Bill 210 - electricity rates for consumers capped – wholesale market for generators and large buyers
  - Cost to debt of capping electric rates to consumers, over $1 billion
  - Energy prices were higher than the cap
  - Little to no consultation with industry
  - Contributed to downfall of Eves' Government

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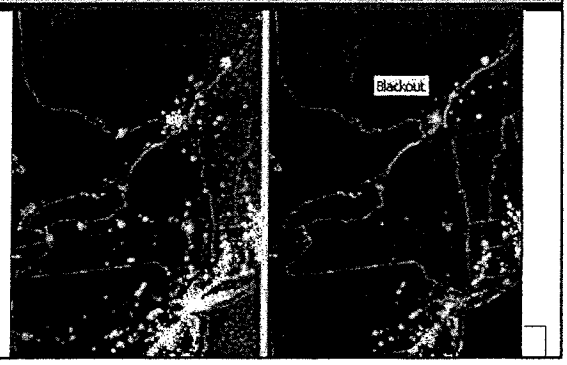
Guelph Hydro

2003 – Massive Northeast Blackout



2004 – Power Shortage Warnings

- Independent Electricity System Operator raises alarm about severe potential shortfall of electricity over next decade due to:
  - Coal plants scheduled to close by 2007
  - Uncertainties with refurbishment of nuclear stations
  - Lack of investment in new generation
  - No electricity plan
- Energy Minister Dwight Duncan calls for proposals to build 2,500 MW of new generating capacity by 2005 and 300 MW of renewable energy
- Electricity price cap raised to encourage conservation

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2004 – Electricity Restructuring Act

- Creation of Ontario Power Authority (OPA) to forecast and ensure an adequate, long-term supply of electricity through standard offer contracts
  - OPA had the adequacy obligation
- Creation of Conservation Bureau to increase energy conservation
  - Subsequently became part of the OPA
- Minister of Energy to set province-wide targets for conservation, renewable energy and supply mix
- Ontario Energy Board responsible for market surveillance

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1998/2008 – Mergers in the Utility Sector

- 1998 - Toronto Hydro merged with utilities of: Scarborough, North York, East York, City of York, Etobicoke
- 1999 - In the belief that a larger company would be better positioned to meet the challenges of a deregulated electricity market the municipalities of Ajax, Clarington and Pickering merged their utilities to create Veridian
- 2000 - Hydro Ottawa – Merged utilities in Ottawa, Nepean, Gloucester, Kanata and Goulbourn
- 2000 – 2005 - Veridian expanded by adding utilities: Uxbridge Hydro, Port Hope Hydro, Brock Hydro, Belleville Utilities, Gravenhurst Hydro and Scugog Hydro
- 2005 – St. Catharines Hydro merged with Hamilton Utilities to form Horizon Utilities
- 2006 – Newmarket Hydro and Tay Hydro merged
- 2008 - PowerStream and Barrie Hydro merged
- 2008 – Guelph Hydro and Horizon Utilities merger discussions failed

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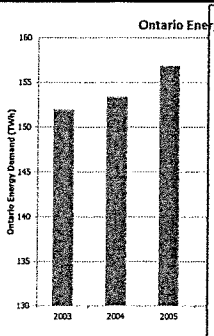
2005 - Steadily Increasing Demand



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Since 2005 - LDCs and Energy Conservation

2005
- LDCs positioned to take the lead role in rolling out conservation initiatives - Programs funded by rates

2006
- Brutally hot weather – New record set for summer peak – 27,000 MW
- Provincial energy conservation targets doubled to 6,300 MW by 2025

2007
- LDCs market OPA province-wide energy conservation programs funded by rates

2011
- Conservation targets a condition of license – Conservation programs funded by rates

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Since 2005 - Consumer Pricing

- 2005 – Regulated Price Plan (RPP) established
- 2006 – Smart meters - Government mandate
- 2007 – Time-of-Use rates established
- 2011 – 1.5 million customers on Time-of-Use rates
- 2011 – Guelph customers to be migrated to Time-of-Use rates this summer/fall

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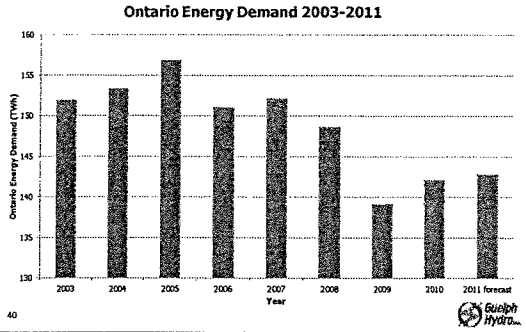
2009 – Economic Downturn=Lower Demand



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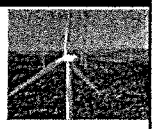
2009 – Our World Changed Again



- Green Energy and Economy Act
  - Energy conservation
  - Renewable energy
    - Feed-in-Tariff programs (FIT, microFIT)
      - Encourage investment in renewable generation
      - Coal-fired generation that will be eliminated by 2014
      - Canada's single biggest climate change initiative
    - LDCs required to connect renewable energy
    - LDCs responsible for infrastructure upgrades
    - Utilities (and municipalities) permitted to build, own and operate renewable energy projects (not previously allowed under the regulated banner)
  - Smart grid development
    - Many elements of this already in place

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2011 – Where We Are Today

- Energy Conservation
  - LDC conservation and peak demand targets are now a condition of license
  - Guelph Hydro's 4-year target is 16.7 MW – 79.53 GWh
    - Significant - Equivalent to taking the University off the grid
  - LDCs required to promote OPA province-wide conservation programs funded through rates
- Ontario's Long-Term Energy Plan
  - Calls for a significant increase in the amount of renewable power in Ontario to 10,700 MW by 2018
  - Renewable energy integration is already occurring and during the next 24 months will average just under 200 MW a month

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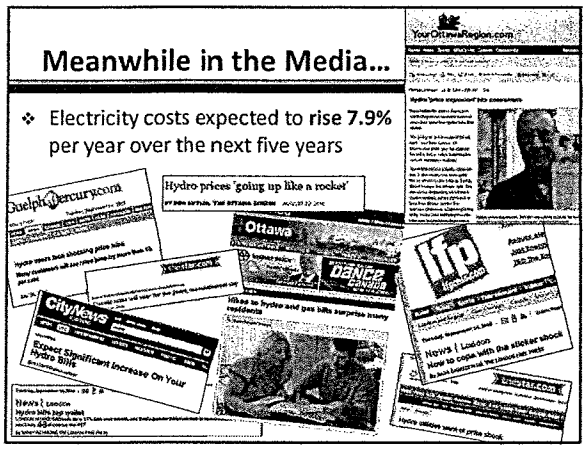
Meanwhile in the Media...

- Electricity costs expected to **rise 7.9%** per year over the next five years



Concern re: Rising Electricity Prices

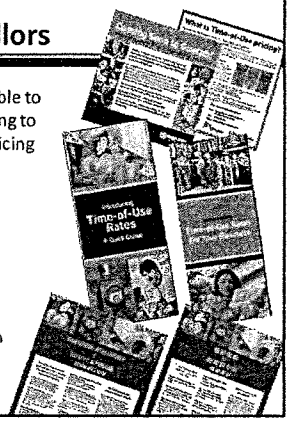
- The Opposition, the media and the public are all focused on rising electricity prices due to:
  - HST applied to electricity bills
  - Shut down of coal units
  - Cost of renewable energy – FIT / microFIT contracts
  - Transmission upgrades
  - Cost of smart meters
  - Time-of-Use rates

Efforts to Mitigate Increasing Prices

- Ontario government - Ontario Clean Energy Benefit (-10% for 5 years)
- Rigorous rate-setting process protects consumers
- Energy conservation programs
  - Get people to use less
- Smart meters and Time-of-Use pricing
  - Shift usage off of peak times
  - Increased ability for consumers to manage costs

Support for Councillors

- Materials and support available to assist councillors in responding to constituents re: electricity pricing and Time-of-Use rates for electricity:
  - Electricity bill analysis
  - Time-of-Use
    - Educational sessions
    - Customer communications materials
    - Time-of-Use outreach team



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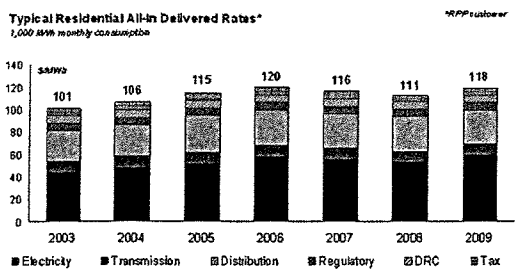
Guelph Hydro Inc.

So Why Are Electricity Prices Rising, Really?

2003 – 2009 Increases in Commodity Costs



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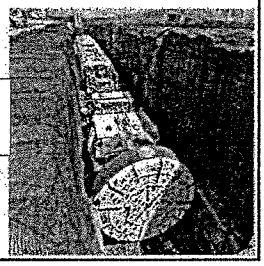
Guelph Hydro Inc.

Environment - Cleaner Energy Sources

- Investing in new, cleaner sources of energy to replace coal plants that are being shut down



Big Becky, a large tunnel-boring machine, is expanding the amount of hydroelectric power at Niagara Falls.

Wind turbines

2003 10 Now 700+

- What happens when the wind doesn't blow, or the sun doesn't shine?
- IESO needs firm, dispatchable capacity to back up these supplies

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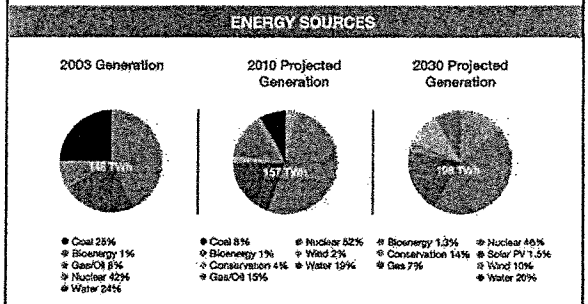
A Changing Supply Mix – Cleaner & Greener



50

Is Renewable Energy Driving Up Costs?

- Not yet
- Critics point out that the 80 cent per kwh rate for rooftop solar is 20 times higher than the current spot market price.
  - + Context: Applies to a very small percentage of Ontario's supply
- 17 MW worth of rooftop and ground-mounted solar contracts versus more than 35,000 MW capacity
- We have not yet begun to feel the impact of Feed-in-Tariff (FIT) and microFIT contracts

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Current Drivers of Price Increases

- Upgrading electricity infrastructure
  - Power plants – refurbishing nuclear and hydro
  - Transmission lines
    - Money needed to build new transmission (high-voltage wires and transmission towers) to bring more power to areas it is needed and connect to new generation sources
    - OPA estimates that Ontario needs to spend $4 billion on new high-voltage transmission lines by 2025.
    - Example - Currently spending $695 million to string a new line to carry power from the refurbished Bruce A nuclear generating station near Kincardine on Lake Huron to Milton
    - Hydro One is requesting a rate increase of 15.7% in 2011 and 9.8% in 2012

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Current Drivers of Price Increases

- Investing in energy conservation
- Investing in smart meters = $1 billion
  - Cost of smart meters and back office systems – local and provincial
- Investing in smart grid technology

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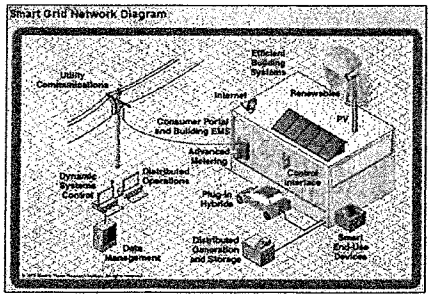
What is a Smart Grid?

Smart Grid Benefits
- Improved reliability
- Faster response times
- Capacity for distributed generation
- Improved security



From Electric Power Research Institute (EPRI).

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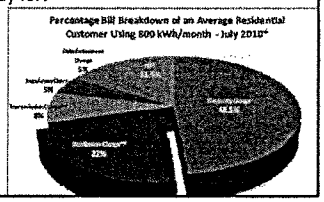
Guelph Hydro Electric Systems Inc.
Distribution Rate Increases

Electricity Bill Breakdown

- Average residential monthly electricity bill - 800 kWh
- Average bill = $104 month
- Average local distribution company charges = $26/month (22%)
- Local distribution companies responsible for collecting the other 78% that goes to pay for:
  - Electricity generation
  - Transmission costs
  - Regulatory charges
  - Debt retirement charges
  - Harmonized Sales Tax (HST)



56 Source: Electricity Distributors Association

Guelph Hydro Electric System Services

- For an average cost of **$26** a month:
  - Building, operating and maintaining the infrastructure required to safely and reliably deliver electricity to the communities of Guelph and Rockwood.
    - Infrastructure consists of: poles, overhead wires, underground cables, service wires to all homes and businesses, meters, transformers, substations, etc.
  - Operational costs associated with running Guelph Hydro.
    - Normal business overhead costs associated with running our office building and a vehicle fleet of specialized equipment
    - Wages, salaries and benefits for our field crews to provide day-to-day and 24/7 emergency service and an office staff to handle customer service, billing and other administrative tasks

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Distribution System Rate Increases

- Guelph Hydro Electric Systems Inc. requires rate increases for:
  - Capital projects
    - To expand network serve our expanding population
  - Green Energy Act Plan – smart grid, connecting renewables
  - Conservation and Demand Management plan

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Capital Projects – Upgrading Guelph Network

- Distribution network was built to accept one-way flow of power in chunks of approximately 1,000 MW
- Network not designed to operate two-way, feeding smaller chunks of generation from small scale solar generators, etc. into the grid
- Obligated to connect distributed generation to distribution network
- Substantial price tags associated with upgrading distribution networks to adapt to distributed generation

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Other Utilities - Distribution Rate Increases

- Distribution networks in some communities have not been maintained
- Infrastructure upgrades will be expensive
- Toronto Hydro has applied for an 18% rate increase
  - Many reliability issues
  - Many feeders overloaded
- Since Hydro One can't keep up with transformer station needs, many LDCs building transformer stations as well
  - Guelph Hydro, Oakville Hydro and many others

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Looking Forward

Managing During a Time of Transformation

Our Prime Objectives

1. Ensure the safety, security and reliability of supply
2. Support for the Community Energy Initiative
3. Ensure the economic viability of the company

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Risk Factors

- Price of electricity is a key election issue
- Possible policy changes
- Consolidation of utility sector
  - Do you really lose control?

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Recap

- Variety of issues facing Ontario's electricity industry
- Costs are going up because of:
  - System upgrades and improvements
  - Changing fundamental purpose of system
  - Load growth
  - Moving to a renewable portfolio - more sustainable
- Complex issues with no "silver bullet"
- Community Energy Initiative is setting Guelph apart – Guelph Hydro is playing a major role
  - Win-win situation - Right for environment and right for economic development of our community

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Questions

Guelph Hydro Team

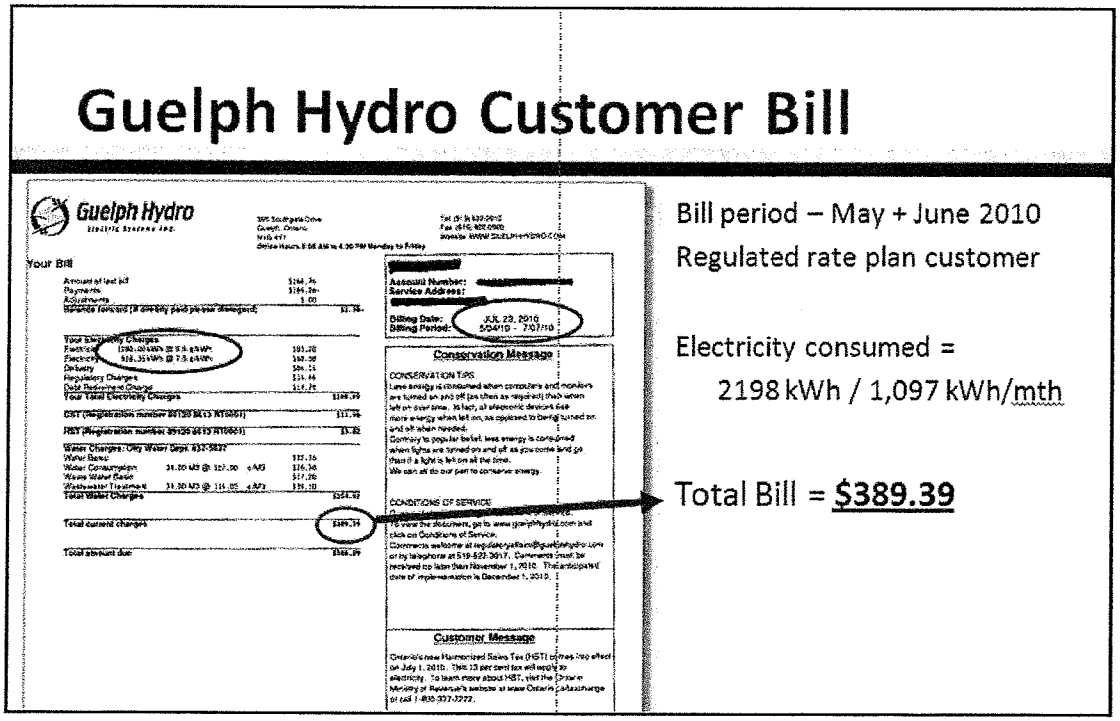
Guelph Hydro
Electric Systems Inc.

Breakdown of Charges on a Typical Guelph Hydro Electric Systems Inc. Customer Bill

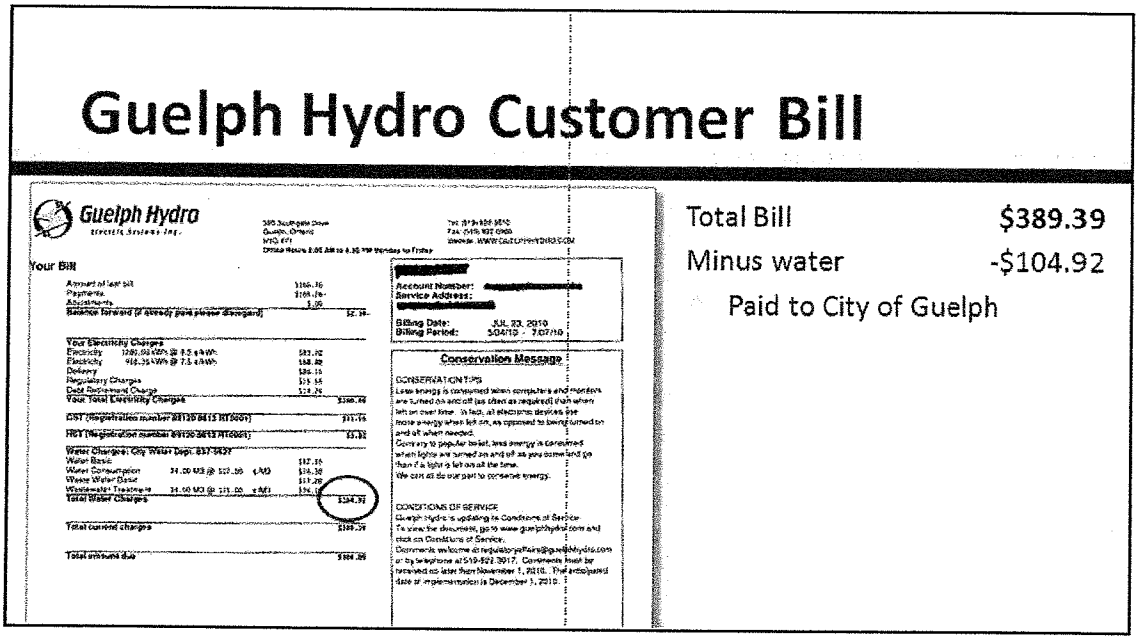
- Provincial average residential electricity consumption = 800 kWh / month
- Provincial average local electricity distribution company charges = $26 / month (22% of the total bill)
- Local distribution companies like Guelph Hydro are responsible for collecting the other 78% that goes to pay for the following. These charges are a pass-through to various government agencies.
    - Electricity generation (to generate power – nuclear, hydro, oil or natural gas, coal, wind)
    - Transmission costs – to transmit electricity from the generator across high-voltage transmission lines and towers
    - Regulatory charges – to fund the Ontario Energy Board and other government agencies
    - Debt retirement charges
    - Goods and Services Tax (GST) and Harmonized Sales Tax (HST)

Example using an actual Guelph Hydro customer bill

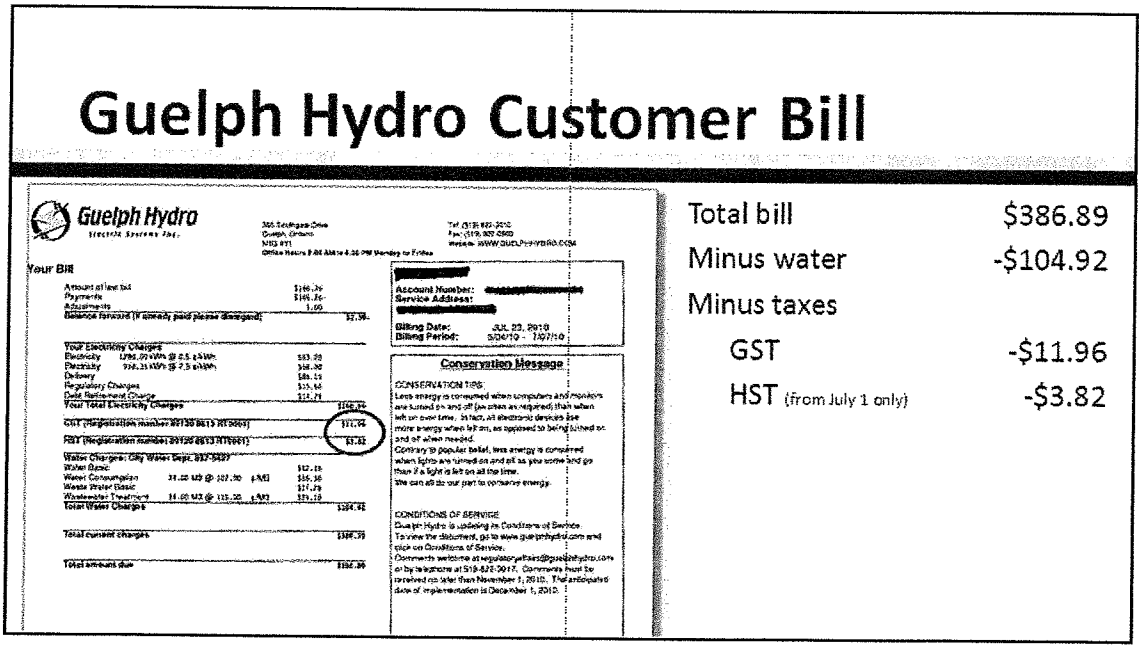
Actual customer bill for two-month period from the end of May to the beginning of July 2010.This customer used, 1,097 kWh per month, which is about 35% more than the amount of electricity used by the average customer per month on a provincial basis.



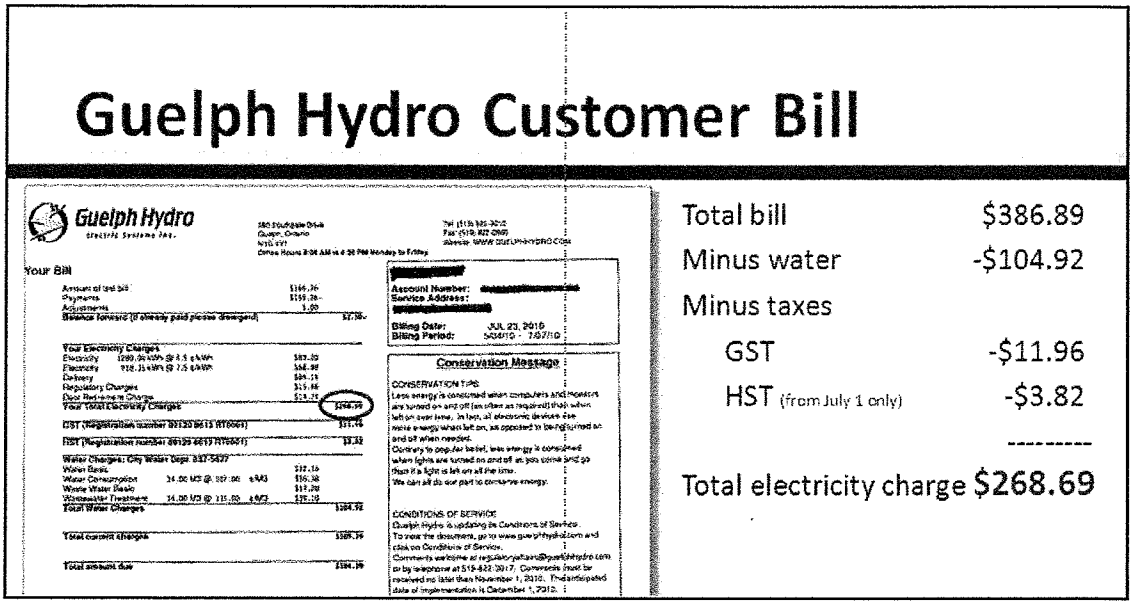
Water is billed on behalf of the City of Guelph. The City of Guelph sets the rates.



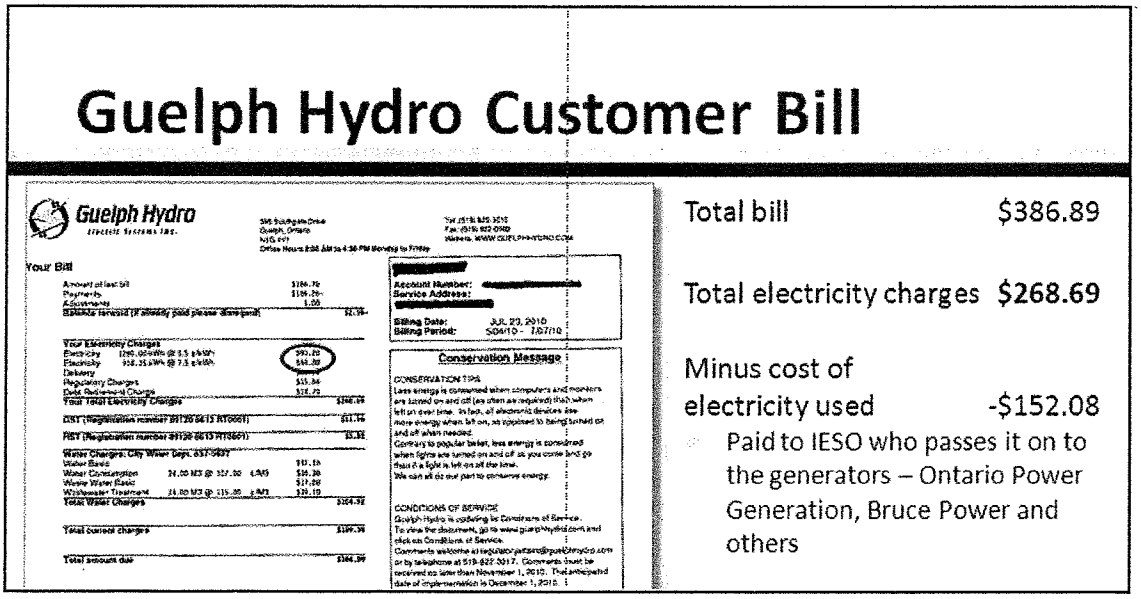
Taxes are collected on behalf of the Ontario government and remitted to the Ontario Ministry of Revenue.



This customer is paying $268.69 for electricity charges for the two-month period.



Of the $268.69 for electricity, $152.08 is paid to the generators for the actual electricity this customer used during this two-month period. Some generators are government owned, some aren't.



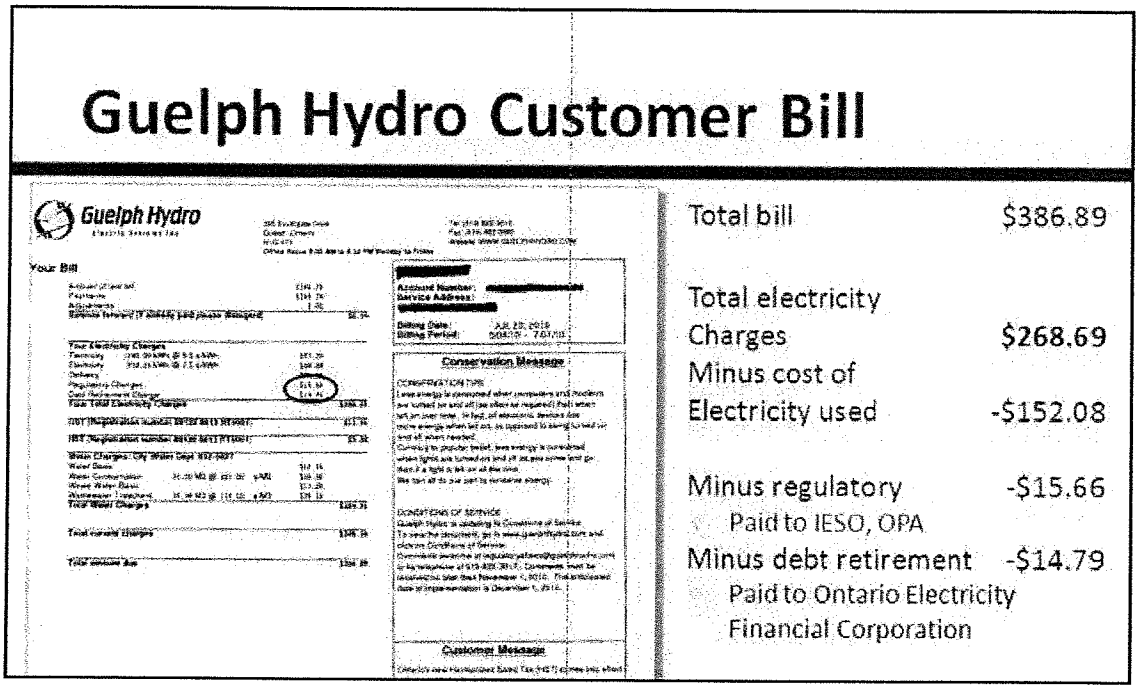
This particular customer is on the Regulated Price Plan. If he/she had signed a contract with an electricity retailer, he/she would be paying whatever price agreed to in the contract. For more information or to compare rates between the Regulated Rate Plan and those offered by electricity retailers using an on-line calculator, please visit:
http://www.oeb.gov.on.ca/OEB/Consumers/Energy+Contracts
http://www.oeb.gov.on.ca/OEB/Consumers/Electricity/Your+Electricity+Utility
Guelph Hydro must bill Regulatory Charges on behalf of various government agencies.

Guelph Hydro
Electric Systems Inc.

Regulatory charges cover the costs to administer the wholesale provincial electricity system and to maintain the reliability of the entire provincial grid. These charges are billed on behalf of the Independent Electricity System Operator for Ontario.

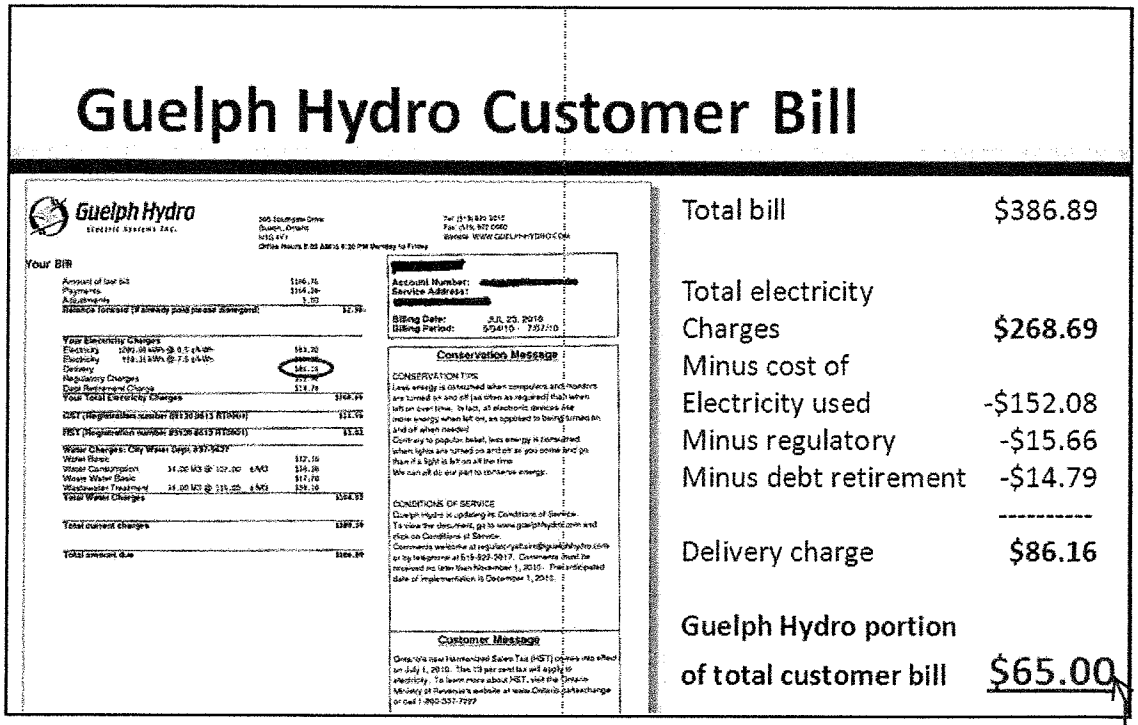
Charges are also included to pay for the Ontario Power Authority and a special levy this year to pay for conservation and demand management programs. These are remitted to the Ontario government.

The Debt Retirement Charge is billed on behalf of the Ontario Electricity Financial Corporation and pays down the stranded debt from when the Province disbanded Ontario Hydro in 1998 and created Ontario Power Generation and Hydro One. Further information about the Debt Retirement Charge is posted at: http://www.oefc.on.ca/debtmanage.html.



This leaves a Delivery charge of $86.16. Some of this is remitted to Hydro One to pay for the transmission of electricity across high-voltage transmission lines and towers to the City of Guelph.

Of the $86.16 Delivery charge, about $65 **($32.50 per month)** belongs to Guelph Hydro and is used to maintain the electricity grid in Guelph and run our operations.



For $32.50 per month, customers receive the following services:

- Building, operating and maintaining the infrastructure required to safely and reliably deliver electricity to the communities of Guelph and Rockwood.
    - Infrastructure consists of: poles, overhead wires, underground cables, service wires to all homes and businesses, meters, transformers, substations, etc.
- Operational costs associated with running Guelph Hydro. These include normal business overhead costs associated with running our office building and a vehicle fleet of specialized equipment. Also included in operational costs are wages, salaries and benefits for our field crews to provide day-to-day and 24/7 emergency service and an office staff to handle customer service, billing and other administrative tasks.

"Profits" are paid in the form of dividends to our shareholder, the City of Guelph. The following dividends were paid out over the last five years:
2009 - $2.2 million 2008 - $1.5 million 2007 - $1.5 million $2006 - $1.5 million 2005 - $1.5 million

This dividend appears on the City of Guelph Financial Statements. Questions regarding how these funds are used by the City would need to be referred to the City of Guelph.

For further information about your Guelph Hydro Electric Systems Inc. bill:
Contact our Customer Service Department during normal business hour at: 519-822-3017
Visit our website at: www.guelphhydro.com