June 4, 2012

Honourable Kathleen Wynne, Minister
Municipal Affairs and Housing
777 Bay Street, 17th Floor
Toronto, ON M5G 2E5

RE: Provincial Policy Statement 2005 Review
Comments from the Canadian District Energy Association (CDEA), in partnership with the Toronto and Region Conservation Authority (TRCA), Quality Urban Energy Systems of Tomorrow (QUEST), and the Canadian Green Buildings Council (CaGBC) Greater Toronto Chapter

Dear Ms. Wynne,

On behalf of the CDEA, TRCA, QUEST and the CaGBC Greater Toronto Chapter, we would like to thank you for inviting us to participate in the review of the Provincial Policy Statement (PPS), and specifically for your invitation during our meeting in early 2012 to provide recommendations on how the PPS can better support the uptake of District Energy in municipalities across the province, as a necessary and sustainable infrastructure strategy, and a foundational backbone of Integrated Community Energy Systems (ICES).

The CDEA is an industry association representing member utilities, municipalities, government agencies, building owners, consulting engineers, suppliers, developers, bankers, and investors who share a common interest in promoting the growth of district energy in Canada. CDEA recognizes that action requires a practical implementation plan, and the mobilization of resources, informed by operating and commercial expertise. Often this action is catalyzed by enabling legislation, supported by outreach and education. The CDEA supports the creation of a shared understanding of District Energy systems, increased community receptivity, and expanded industry capacity based upon years of practical operating and commercial experience , so that District Energy project implementation will be accelerated across Canada.

TRCA's mandate, in simple terms, is to manage the natural resources within its jurisdiction. Today, management of natural resources and associated ecosystem services, provided by these resources, includes adaptation to and mitigation of climate change. To this end, TRCA works closely with business, academia, government and non-government organizations and the public, to find, promote and implement integrated solutions, including energy production and conservation that help our communities deal with climate change and become more sustainable.

QUEST is a collaborative network of stakeholders who are actively working to make Canada a world leader in the design, development and application of Integrated Community Energy Solutions. Integrating our energy systems requires collaboration at all levels - from energy, technology and infrastructure industries, gas and electric utilities, all levels of government, civil society groups and community leaders, researchers and the consulting community.

Established in 2003, the Canada Green Building Council (CaGBC) is a non-profit national organization dedicated to working with government and the private sector to accelerate the "mainstream adoption of green building

principles, policies, practices, standards and tools." In collaboration with the national organization, the Greater Toronto Chapter acts as a catalyst for green building development across the Greater Golden Horseshoe region of Ontario. The Greater Toronto Chapter of the Canada Green Building Council (CaGBC-GTC) is Southern Ontario's leading authority on green building best practices. The Chapter mission is to lead and accelerate the transformation to high-performing, healthy and sustainable buildings and communities and transforming the built environment leading to a sustainable future.

After spending some time to consult with key stakeholders we are now ready to put forth a common understanding of the opportunity and recommendations to reference District Energy in the PPS. We hope that our comments are useful, and we are happy to discuss them with staff or the Minister as soon as necessary.

This submission is supported by the following organizations:

Canadian District Energy Association
Toronto and Region Conservation Authority
QUEST, Quality Urban Energy Systems of Tomorrow
Canada Green Building Council, Greater Toronto Chapter
Town of East Gwillimbury
World Alliance for Decentralized Energy (WADE Canada)

Additional organizations will provide separate letters of support following their council's or executive's approval.

Context

Provincial Support for ICES

The Province has undertaken a number of initiatives in support of ICES as part of its broader effort to achieve long-term prosperity and social well-being, which it recognizes "depend on maintaining strong communities, a clean and healthy environment and a strong economy" (PPS, Part IV). A key part of ensuring long-term prosperity, a clean environment and a healthy population is a secure energy supply and the reduction of greenhouse gas (GHG) emissions that contribute to climate change. On this front, the province has encouraged the development of more compact communities, energy efficient buildings, sustainable transportation options, and renewable energy through the Provincial Policy Statement (2005), Places to Grow (2006), The Big Move (2009), the Green Energy & Economy Act (2009) and updates to the Building Code (1992). The PPS in particular provides overarching policy direction for the planning and development of compact, transit-supportive communities, and policies that promote energy efficiency and the uptake of alternative and renewable energy sources that produce fewer GHGs than traditional fuels.

The Thermal Energy Policy Gap

The CDEA, TRCA and our partners recognize the significant steps that have been taken by the Province to secure a more sustainable and reliable energy future for Ontarians. Our analysis of Provincial policies and regulations revealed, however, that efforts to date have been largely focused on matters related to electricity, and silent on matters related to thermal energy policy. When we consider that thermal energy accounts for over 70% of community energy needs,[1] this emerges as a startling gap that we believe can begin to be redressed through the PPS. It is our position that District Energy has the potential to play a significant role in meeting the thermal energy needs of urban communities in a more efficient way, and that the PPS should reinforce this potential. District Energy must also be recognized in Provincial policy because of the foundational role it plays within ICES. Specifically, District Energy systems work well within compact, multi-use communities to provide the integrating framework for ICES, by facilitating energy efficiency and the uptake of alternative fuels, as described in the next section.

What is District Energy and what benefits does it deliver to communities?

District Energy refers to systems that generate and distribute thermal energy (heating and/or cooling) at a community scale. The infrastructure includes a localized centre where energy is generated, and a network of buried insulated pipes (the thermal grid) that distribute that energy to buildings within a defined geographic area. The medium for transmitting the thermal energy along the thermal grid is either steam (for legacy systems), or water (for modern systems). District Energy is a feasible infrastructure strategy for communities that have a mixture of medium and high density residential, industrial, commercial, office and institutional land uses.

[1] Office of Energy Efficiency. (nd). Table 2. Canada's Secondary Energy Use by Sector, End-Use and Subsector. Energy Use Handbook Tables (Canada). Natural Resources Canada. Accessed online May 10, 2012 at http://oee.nrcan.gc.ca/corporate/statistics/neud/dpa/tableshandbook2/aaa_ca_2_e_5.cfm?attr=65
Note: Refers to 2009 data; includes thermal energy use (space heating, space cooling, and water heating) for the residential and commercial/institutional sectors; excludes the industrial and agricultural sectors, and transportation-related energy use.

District Energy is often referred to as the "third" energy grid, alongside the grid of pipelines that distribute natural gas, and the grid of wires that transmit electricity. The primary benefit of District Energy systems is that they can be more efficient and more adaptable than conventional energy systems. Research for QUEST by Jaccard suggests a significant contribution (~35MT annually) to Canada's national GHG reduction targets is possible through market transformation that includes integrated energy generation and distribution at the community level.[2] This is in part because District Energy systems enable the use of heat recovery strategies (such as combined heat and power (CHP)), which capture waste heat from electricity generation and feeds it into the thermal grid. Community scale District Energy can also store thermal energy in the grid and in storage facilities, which further improves energy efficiency.

In terms of adaptability, District Energy systems can use a variety of input fuels that can be substituted over time, including biomass, biogas, other forms of renewable energy, natural gas, and cool water from adjacent water sources. This fuel flexibility offers communities the opportunity to introduce more renewable fuel types, such as wood biomass or urban-based forest biomass, and to achieve commensurate GHG emission reductions while stimulating local economic development related to the fuel supply. Fuel flexibility also provides communities with greater price protection and security of supply over time than if they relied on any one fuel source or technology. Such 'future proofing' is an attractive feature for many Ontario municipalities.

Finally, communities can reap economic benefits from District Energy system implementation. Not only can it offer fuel flexibility and reduced risk from exposure to uni-fuel price shocks, it can also provide local investment, jobs, and utilize local fuel resources. Research undertaken by Natural Resources Canada into the quantification of socio-economic benefits associated with investment into District Energy in several Canadian communities has indicated that there are positive economic multiplier effects for the dollars invested in terms of jobs and commercial activity. A recent Toronto-based study has also documented the potential economic benefits of district energy.[3]

For your convenience, we are attaching an information sheet to this submission that provides a more detailed description of Integrated Community Energy Systems, District Energy and combined heat and power, along with the benefits of building a thermal grid.

Thermal Energy and Urban Planning

District Energy systems are akin to other linear municipal, utility and telecommunications infrastructure. Ideally, they are factored into community-scaled plans and designs at the initial phases of development to ensure that implementation is timely, avoids duplication of infrastructure and services, and most basically, ensures that a place for pipes and the energy centre is accommodated in plans as they are submitted for approval.

[2] MK Jaccard and Associates Inc. (2010). Final Technical Report: The Capacity for Integrated Community Energy Solutions (ICES) Policies to Reduce Urban Greenhouse Gas Emissions. Quality Urban Energy Systems of Tomorrow (QUEST). Accessed online April 6, 2012 at http://www.questcanada.org/QUESTStudyReport.php

[3] Beck, T. et al. (2012). The Power to Grow: The Economic and Fiscal Benefits of Urban Development Facilitated by Local Generation, District Energy, and Conservation in an Electrically Constrained Scenario. University of Toronto Masters paper, prepared for the City of Toronto, Energy Efficiency Office and Department of Economic Development & Culture. Toronto.

Currently, one of the core challenges associated with District Energy is that it is a non-conventional approach to community energy delivery in Ontario, although it is a common (and even mandatory) approach for other jurisdictions, particularly certain parts of British Columbia and Europe. The lack of familiarity with District Energy in Ontario means that building District Energy systems requires the education of key stakeholders and comparatively higher levels of cooperation among developers, utilities, and municipalities. Without a legislative imperative or enabling framework for District Energy systems to be considered in community planning, developments tend to revert to conventional system approaches, thus eliminating the opportunity to realize the energy, environmental and economic benefits of building community-based thermal energy infrastructure for decades to come. Policies are needed to enable and encourage municipalities to work with their private sector partners to consider the implementation of District Energy throughout the planning process.

In addition to other obstacles, many municipalities lack the financial capacity to invest in this infrastructure. Some municipalities have benefitted from financial support from higher orders of government, while others are exploring partnership arrangements with utilities and the private sector to overcome financial hurdles. However, if financing cannot be coordinated, developments can default to more conventional forms of energy delivery systems (where long term energy contracts and/or regulatory regimes provide revenue certainty-thus making financing easier), resulting in lost economic and resource development opportunities in communities. Irrespective of the ownership and governance models, however, it is clear that – as with other forms of necessary infrastructure – a supporting policy framework is needed to provide better certainty that there will be a return on investment so that District Energy becomes more financially viable for both municipalities, investors, utilities and other developers of District Energy infrastructure.

Several Ontario municipalities are already working to identify planning mechanisms to ensure that ICES, including District Energy with small scale CHP, will be built to meet community growth requirements in the most cost and time efficient manner. While some municipalities have already succeeded in building District Energy systems (e.g. Hamilton and Markham) and are now looking to expand the use of this infrastructure, many more are in the initial stages of exploring this infrastructure strategy. Putting community-based District Energy systems clearly on the development radar through PPS policies will reinforce the validity of local efforts to improve energy efficiency through official plan policies and sustainable guidelines, and help support the efficient and coordinated provision of cleaner energy in suitable communities across Ontario.

Our Recommendations

The recommendations provided in this submission are intended to address some of the gaps in thermal energy planning across the Province, and to provide strong support and encouragement for municipalities to plan for and implement District Energy systems. In preparing this submission, the TRCA and CDEA initiated a stakeholder consultation process to develop the recommended amendments. The consultation process included a half-day workshop, electronic circulations and a web meeting with senior representatives of local municipalities (Vaughan, Toronto, Guelph, Barrie, Markham, Pickering, Burlington, York Region, Mississauga, East Gwillimbury) and other interested organizations and agencies (Ontario Sustainable Energy Association, QUEST, World Association of Distributed Energy (Canada), Canadian Urban Institute, ICLEI, Waterfront Toronto, Enbridge, Natural Resources Canada, Ryerson University, CaGBC). The participation of these key stakeholders reflects a significant amount of

interest from municipalities and energy providers to move forward with more sustainable, community-based energy solutions, and demonstrates demand for enabling policies at the Provincial level.

New Policies & Definitions

The purpose of these proposed new policies is to enable municipalities to pursue the implementation of District Energy, and to ensure that this infrastructure strategy is considered throughout the planning process. We recommend these policies be incorporated within Section 1.6 Infrastructure and Public Service Facilities.

1.6.9 District Energy

1.6.9.1. A land use pattern, density and mix of uses should be promoted that maximize the long-term security and flexibility of the energy supply and support the development of viable choices and plans for community-based District Energy.

1.6.9.2. Planning authorities shall establish policies to ensure new development is compatible with thermal energy networks, where the use of such networks is feasible.

1.6.9.3. The consideration of community-based thermal energy strategies shall be integrated at all stages of the planning process.

We recommend these definitions be incorporated within Section 6.0. The purpose of these new definitions is to ensure that District Energy and cogeneration are clearly understood, and that the profile of these infrastructure strategies is elevated throughout the planning process.

District Energy: means systems that generate and distribute thermal energy (heating and/or cooling) at a community scale. The infrastructure includes a localized centre where the thermal energy is generated, and a network of buried insulated pipes (the thermal grid) that distribute that energy to buildings within a defined geographic area. The medium for transmitting the thermal energy along the thermal grid is either steam (for legacy systems), or water (for modern systems). The thermal grid enables the application of heat recovery strategies (such as combined heat and power, waste heat capture), community-scale thermal storage, and the use of alternative and renewable fuel sources.

Combined heat and power (CHP or cogeneration): means a process that simultaneously produces electricity and useful heat. This process works by recovering waste heat from electricity generation, and distributing that heat through the thermal grid.

Amendments

<u>Policies</u>

The purpose of the proposed policy amendments is to elevate the profile of District Energy throughout the planning process. Orange indicates new text.

1.7 LONG-TERM ECONOMIC PROSPERITY

1.7.1 (h) providing opportunities for increased energy generation, supply and conservation, including alternative energy systems, ~~and~~ renewable energy systems, and District Energy systems.

1.8 ENERGY AND AIR QUALITY

1.8.1 e) promote infrastructure, design and orientation which maximize the use of alternative or renewable energy, such as solar, ~~and~~ wind and district energy, and the mitigating effects of vegetation.

1.8.2 Increased energy supply should be promoted by providing opportunities for energy generation facilities to accommodate current and projected needs, and the use of renewable energy systems, ~~and~~ alternative energy systems, and District Energy systems, where feasible.

1.8.3 Alternative energy systems, ~~and~~ renewable energy systems, and District Energy systems shall be permitted in settlement areas, rural areas and prime agricultural areas in accordance with provincial and federal requirements. In rural areas and prime agricultural areas, these systems should be designed and constructed to minimize impacts on agricultural operations.

Definitions

The purpose of these proposed amendments to Section 6.0 of the PPS is to ensure that references to "energy" specify both thermal and electric energy, and to ensure that District Energy is recognized as an *alternative energy system* and as *infrastructure*.

Alternative energy systems: means sources of energy, ~~or~~ energy conversion processes, energy recovery strategies, or energy distribution networks that significantly reduce the amount of harmful emissions to the environment (air, earth and water) when compared to conventional energy systems. *Alternative energy systems* include, but are not limited to, *District Energy* and *combined heat and power* (also known as cogeneration).

Infrastructure: means physical structures (facilities and corridors) that form the foundation for development. *Infrastructure* includes: sewage and water systems~~,~~; septage [sic] treatment systems~~,~~; waste management systems~~,~~; electrical and thermal energy ~~power~~ generation, ~~and~~ transmission, and distribution; communications/telecommunications~~,~~; transit and transportation facilities~~,~~; ~~oil and gas pipelines~~ gaseous and liquid fuel distribution; and associated facilities.

Renewable energy systems: means the production of electrical or thermal energy ~~power~~ from an energy source that is renewed by natural processes including, but not limited to, wind, water, a biomass resource or product, or solar and geothermal energy.

On behalf of the municipalities and other organizations who participated in preparing this submission, we would like to extend the invitation to work with you and your partners at the Province to develop additional strategies in support of implementing District Energy systems in Ontario.

We look forward to future opportunities to participate in the PPS review and to improve the sustainability of land use planning in Ontario. To schedule a meeting or for further information, please have your staff contact Mary Ellen Richardson, President, Canadian District Energy Association (416) 365-0816 ext. 290, or Bernie McIntyre, Manager Community Transformation, Toronto and Region Conservation Authority, (416) 661-6600 ext. 5326.

Yours Truly,

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Attachment:
District Energy Information Sheet

About District Energy & Integrated Community Energy Systems (ICES) in Ontario

What are Integrated Community Energy Systems?

Integrated Community Energy Systems (ICES) are, as their name implies, system-wide approaches to considering energy supply and distribution within a community. As such, the logical 'starting point' in evaluating community energy options is to consider existing and projected energy (electricity and thermal) needs relative to existing and projected energy resources (internal and external to the community) to then identify the best integrated solution to meet needs. They involve taking advantage of cross-sectoral opportunities in the areas of land use, infrastructure, building, water and sanitation, transportation and waste to curb energy demand and reduce greenhouse gas emissions at the local level, while increasing energy security, resiliency, and realizing economic development gains for residents.[4] ICES combines what planners call "smart growth" planning , more effective planning of transit and other alternatives to driving and systematically increasing energy efficiency. All of the elements of ICES are being done now; the difference is that ICES would integrate these elements.[5]

This approach has been endorsed by the Council of Energy Ministers through the *Integrated Community Energy Solutions: A Roadmap for Action* (2009) and the *Council of the Federation* (2010). The leading organization working on ICES in Canada, QUEST, has identified the following six guiding principles for any ICES:

1) Improve efficiency – first, reduce the energy input required for a given level of service;

2) Optimize "exergy" – avoid using high-quality energy in low-quality applications;

3) Manage heat – capture all feasible thermal energy and use it, rather than exhaust it;

4) Reduce waste – use all available resources, such as landfill gas and municipal, agricultural, industrial and forestry wastes;

5) Use renewable energy resources – tap into local opportunities for geoexchange systems, small scale hydro, biomass, solar and wind energy; and

6) Use grids strategically – optimize use of grid energy and as a resource to ensure reliability.[6]

ICES, incorporates numerous strategies for reducing energy demand and harmful emissions, including mixed-use higher density compact development patterns, transportation demand management, water and energy efficient buildings and public infrastructure, and the integration of distributed renewable sources of energy; District Energy and cogeneration (combined heat and power) facilities.

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[4] Paraphrased from: QUEST (Quality Urban Energy Systems of Tomorrow). (2010, September). ICES Municipal Policy Toolkit. Ottawa. p.5.
[5] "The capacity for integrated community energy solutions (ICES) policies to reduce urban greenhouse gas emissions", August 25th, 2010, Prepared for: Quality Urban Energy Systems of Tomorrow (QUEST), by M. K. Jaccard and Associates
[6] QUEST (2010, September). p.8.

This system approach was endorsed in the 2009 Report of the Standing Committee on Natural Resources, entitled "Combining our Energies: Integrated Energy Systems for Canadian Communities", who reported that:

> *"The integration of ... opportunities, in consideration of both energy supply and consumption, is the principal inquiry behind the Committee's study, based on the underlying concept that integrated energy planning is an effective approach to supporting efficient and resilient patterns of energy supply and demand; diversifying economic opportunities; generating employment; reducing greenhouse gas emissions; and establishing more sustainable communities with an improved overall quality of life." (p.1)*

The report goes on to say that an integrated energy system assimilates energy supply and consumption decisions across different community needs (such as heating, cooling, lighting and transport) and sectors (such as land-use, transportation, water, waste management, and industry), by supporting mixed-use development, local renewable energy sources, and smart District Energy grids for efficient energy management. (p. 4)

Finally, the Standing Committee report does a good job of indentifying jurisdictional powers and abilities that can enable ICES, noting the key roles of both the province and municipalities. They note that "Integrated energy planning lies within provincial and municipal jurisdiction, with particular requirement for provincial engagement given provincial constitutional powers.", and further that:

> *"Municipal (and sometimes regional) expertise is most qualified for setting targets and strategies to address the diverse planning situations ... This emphasizes a bottom-up approach to decision making with respect to community integrated energy planning. Municipalities are involved directly, by establishing energy services (e.g. district energy corporations, poles, wires), and indirectly, by promoting certain forms of development (e.g. high-density, transportation-oriented, etc.). Planners, builders and site designers assemble the built environment that shapes a community's energy-use patterns" (p. 7)*

Several Ontario municipalities have already applied or are currently working to identify mechanisms to ensure that ICES, including District Energy grids with small scale CHP, will be planned and built to meet community growth requirements, in the most cost and time efficient manner. This is part of an infrastructure strategy to reduce GHGs and meet Smart Growth objectives.

These approaches are largely based on visionary local leadership, and require diligence since they are attempting a non-conventional approach to the way energy is designed and used. Many of the elements of ICES have been enabled in Ontario policies and legislation enacted and adopted over the last several years. However, Ontario policies and legislation have been largely silent on community heating and cooling needs, and does not address District Energy or cogeneration. This has made it difficult for municipalities to move their DE plans into implementation, since District Energy is a foundational backbone to realize the full benefits of ICES, this is also hampering municipalities from accomplishing their economic, environmental and energy goals.

It is for this reason that stakeholders have put forward recommendations as to how the PPS might be modified to recognize the foundational enabling role that District Energy can contribute to the ICES vision.

What is District Energy?

District Energy refers to systems that generate and distribute thermal energy (heating and/or cooling) at a community scale. The infrastructure includes a localized centre where energy is generated, and a network of buried insulated pipes (the thermal grid) that distribute that energy to buildings within a defined geographic area. The medium for transmitting the thermal energy along the thermal grid is either steam (for legacy District Energy systems), or water for modern District Energy systems. This 'third' energy grid is analogous to the other two energy grids we are accustomed to in our communities, namely the grid of pipelines to transmit natural gas, and the grid of wires to transmit electricity. Unlike the natural gas grid, a DE grid can transmit thermal energy that is produced from a variety of fuel types. Unlike the electricity grid, a community scale District Energy grid can store thermal energy in the grid and in storage facilities.

District Energy is not new. It is not **a** technology. Rather, it deploys and integrates proven technology in community scale infrastructure to produce and distribute thermal energy. As an approach to community energy production and delivery, it is tried and tested, and widely deployed in many parts of Northern Europe, in particular. District Energy is being evaluated widely in British Columbia, driven largely by environmental legislation, and elsewhere in Canada-including in many urban and rural Ontario communities.

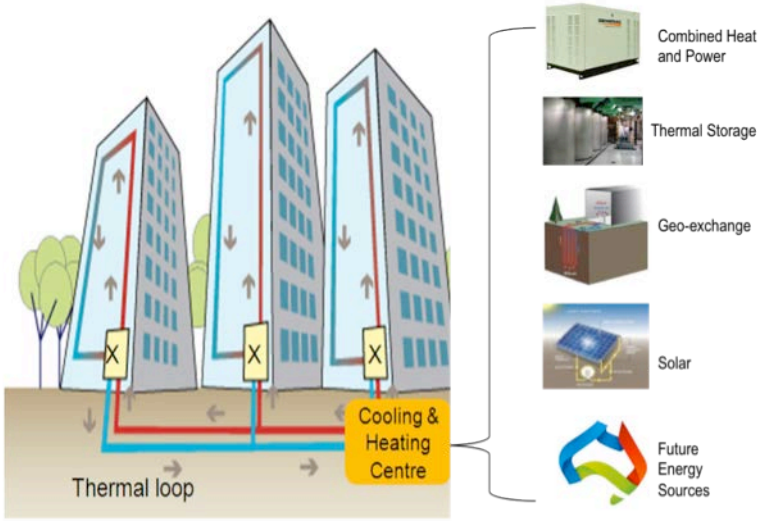

Figure 1. District Energy Scale for Efficiency and Flexibility

A variety of input fuels can be used to create the thermal energy transmitted in the District Energy grid, including biomass, biogas, renewable energy forms, natural gas and cool water from adjacent water sources (e.g. Enwave's uses cold water from deep in Lake Ontario). Natural gas is the most commonly used fuel source to generate hot water or steam in Canadian DE systems. Due to their community-scale, District Energy systems are more adaptable over time than traditional energy delivery systems, as alternative fuels can be substituted to generate the thermal energy. District Energy systems can also integrate the output of distributed generation plants, as the pipeline grid can be used as a 'thermal collection system" for the output of plants along the District Energy system (e.g. small scale solar thermal plants, industrial or commercial waste heat (e.g. power plants, data warehouses)). In so doing, the District Energy infrastructure enables several of the key tenets of ICES, namely the integration of distributed renewable sources of energy, managing surplus heat across applications and sectors and converting "waste" to energy.

Such fuel flexibility also offers the potential for communities to protect themselves from the impact, over time, of dependence on any one fuel or technology-and resultant exposure to supply and price uncertainty. This provides

both an element of price protection for communities and security of supply over time. Such 'future proofing' is an attractive feature for many Ontario municipalities. This also offers the opportunity to introduce more renewable fuel types, such as forest biomass or urban based forest biomass, with commensurate reductions in GHG emissions and local economic development opportunities for fuel supply. This opportunity is being considered in both urban and rural communities in Ontario. Community scale energy delivery systems also offer the opportunity to support investments in energy efficiency, such as thermal storage or CHP units (discussed below), again with commensurate reductions in GHG emissions.

District Energy systems are akin to other linear municipal, utility and telecommunications infrastructure. Ideally, they are factored into community land use plans and designs at the initial phases of development. Currently, one of the core challenges associated with District Energy is that-as a non conventional approach to community energy delivery systems **in Ontario**, it requires both education of key stakeholders and high levels of cooperation among developers, utilities, and municipalities. Absent any legislative imperative or enabling framework for District Energy systems to be considered in community planning, developments tend to revert to conventional system approaches, thus eliminating the opportunity to realize the benefits of building District Energy infrastructure for decades to come. Further, like other essential infrastructure, DE thermal grid investment is capital intensive with up-front capital expenditures yielding benefits over time as communities' grow and thermal energy demand yields returns on the investment. Absent any policy imperative to connect to systems, significant capital outlays may not yield economic returns for many years, thus deferring the economic benefits of such local investment =. Largely for this reason, as with other capital intensive municipal infrastructure, much of the existing District Energy infrastructure has been envisioned, built and operated by municipal entities. However, in recent years, municipalities have been seeking other forms of governance and ownership/operating models to attract private investment and accelerate District Energy development.

What is Combined Heat and Power (a.k.a. cogeneration)?

Combined heat and power (CHP or Cogeneration) is the use of a heat engine or a power station to simultaneously generate both electricity and useful heat. Small scale CHP units can be added to a DE system. In this case, the engine can use various types of fuel (e.g. natural gas, biomass) to generate electricity. The electricity generation process will cause a certain amount of heat to be emitted. In a CHP process, the by-product heat is captured in full or in part, and used to heat hot water for distribution in a district heating grid, with temperatures ranging from approximately 80 to 130 °C. These small CHP plants are an example of decentralized energy production that can be integrated into a community DE system.

Why should the Province support District Energy?

Community District Energy systems, particularly those that include small scale CHP units, can make a significant contribution to meeting community energy needs in an economic and energy efficient manner, including:

- Given that these are the most efficient means of producing thermal energy, they enable communities to meet energy efficiency and emission goals;

- Locally sourced fuel can be used to create the thermal energy (e.g. lake water, residual energy from industrial entities (e.g. waste heat from industrial processes, pulp & paper residue), surplus energy from commercial entities (e.g. data centres), urban based forest biomass (e.g. tree trimming, clean construction waste, etc.)

- Relieving local electricity delivery constraints, and supporting local community development (e.g. downtown Toronto is currently electricity supply constrained, yet re-densification goals mean that commercial and multi residential development continues to thrive. Community scale thermal and CHP units provide necessary energy to fuel these developments.)

- CHP generation uses synchronous generators that provide benefits to the local electricity distribution network. The generators do not normally create harmonic or voltage disturbance issues to the connecting utility that often results from the connection of certain renewable generation. Moreover, the positive aspects of the small synchronous generation include reduced system losses, local voltage support to a feeder or transformer station and can also be a source of reactive power for the supply utility.

- Providing back up supply security, islanding capacity and including such ancillary services as black start capability. In some cases, District Energy systems have been built so that they can be "isolated" from the main electricity grid—continuing to provide thermal and electrical services to critical loads.

- For economic reasons CHP installations associated with DE systems typically operate during peak and mid peak time periods and on a seasonal basis when building heating loads are at a maximum. However gas fired CHP installations are also available to operate on short notice. As such, they can be 'dispatched' and provide valuable peak electricity capacity to the electrical grid. They are unlike some other types of intermittent renewable generation.

- Relieving the need for additional distribution and transmission capacity building to bring generation produced outside the community into the community. This reduces the cost of energy production and delivery to communities.

- A local investment provides a local outlet for community resources (e.g. urban based forest biomass (e.g. tree trimmings; clean construction waste) and local jobs within the DE system or as a supplier thereto.

- Given trends in provincial urban population growth, it is likely that future electricity supply facilities will need to be built to meet this load pattern, to maintain electricity supply reliability (particularly at peak load times) and operability in targeted urban and electricity system constrained areas. Small CHP plants, located near load, can defer or eliminate the need for large scale electricity transmission and generation infrastructure in congested, difficult to retrofit urban areas and other electricity constrained areas (e.g. downtown Toronto, the GTA, Kitchener/Waterloo/Guelph/Cambridge, Ottawa, etc.)-thus providing an economic alternative, which may also meet with less community resistance. As such, we believe that these high efficiency distributed CHP plants, located in association with District Energy systems, will be an

important part of Ontario's energy supply portfolio, and as important as investments that maintain overall electricity demand.

The Province has undertaken a number of initiatives in support of ICES as part of its efforts to reduce greenhouse gas emissions that contribute to climate change. It has supported renewable energy, promoted energy conservation, outlined a plan for public transit and legislated more efficient development patterns through the Provincial Policy Statement, Places to Grow: Growth Plan for the Greater Golden Horseshoe, The Big Move, the Green Energy Act, and the Building Code. The opportunity of building small scale CHP systems to support community energy---electricity and thermal---needs has also been recognized and encouraged by the Ontario Power Authority's (OPA) Combined Heat and Power Standard Offer Program (CHPSOP). Some Ontario based DE system owners already have operating small scale generation facilities, and are looking to expand or add to these facilities to support growing thermal load requirements.

District Energy is an integral component of ICES that **has yet to be addressed** explicitly in provincial legislation. Given both the increased municipal interest in DE grids, and given the recognized energy, environmental and economic benefits of District Energy investment, we felt it was appropriate to raise the profile of this specific infrastructure strategy so that it could be incorporated into the PPS.

How is District Energy a planning issue?

The Provincial Policy Statement (PPS) provides the overarching policy direction for planning and development in Ontario, with a strong focus on promoting "long-term prosperity, environmental health and social well-being" (Part V, Section 1.0). To that end, the PPS includes a number of policies to promote the efficient use of energy as well as the uptake of alternative energy sources that produce fewer greenhouse gases than traditional fuels. The inclusion of these policies is an acknowledgement that energy can impact our economic prosperity, environmental health and social well-being, depending on how reliable the energy supply is and how much pollution and greenhouse gases it generates. Existing PPS policies refer to "alternative" and "renewable" energy systems. While there is explicit recognition of electrical energy, there is no explicit recognition of thermal energy, which accounts for up to 70% of community energy needs. There is room to introduce policies for District Energy, as part of the comprehensive approach for achieving the Province's ICES goals for new and existing communities.

A 2010 report[7] prepared by MKJA Associates, suggests that "...The first priority for policy makers should be the implementation of sustainable land-use policies since these create the framework within which all urban form, transportation, and energy-use decisions will be made to move toward ICES". The report identifies several policies, including the following ones related to enabling District Energy:

- Deeper penetration of combined heat and power (CHP) and District Energy systems, preferably fuelled by renewable local energy (e.g. biomass, geothermal exchange, sewer water heating, etc.)

- Fuel switching to lower emission energy sources where possible

[7] "The capacity for integrated community energy solutions (ICES) policies to reduce urban greenhouse gas emissions", August 25th, 2010, Prepared for: Quality Urban Energy Systems of Tomorrow (QUEST), by M. K. Jaccard and Associates, p.6.

- Utility structure financing for District Energy services, governed by utilities commissions responsible for rate setting and consumer protection.

The implementation of District Energy requires cooperation among developers, the municipality and utilities early on in the planning and development process. These partners must work together to develop a coordinated approach to implementation that is timely, avoids duplication of infrastructure and services, and most basically, ensures that a place for pipes and the energy centre is accommodated in plans as they are submitted for approval.

Putting District Energy clearly on the development radar through PPS policies will help support the efficient and coordinated provision of cleaner energy in suitable communities across Ontario. District Energy policies within the PPS would also reinforce the validity of local efforts to improve energy efficiency through energy mapping exercises, official plan policies, and sustainable guidelines.