

Report on the Development of the Energy Plan for Toronto



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INDECO 

This document was prepared for the Energy Efficiency Office (EEO), Facilities and Real Estate, Business and Strategic Innovation, of the City of Toronto by IndEco Strategic Consulting Inc.

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Executive summary

The Energy Efficiency Office (EEO), Facilities and Real Estate, Business and Strategic Innovation, of the City of Toronto commissioned IndEco Strategic Consulting Inc. to begin to work on the development of the Energy Plan for Toronto. This report reflects the progress that has been made to date. The report represents early and preliminary thoughts on the content of the Energy Plan which require both internal consultations within the Corporate City Divisions and agencies, boards and commissions (ABCs) and with external stakeholders.

The purpose of this report is to:

- Document the work that has been completed to date on the development of the Energy Plan for Toronto
- Provide a framework for further development of the Energy Plan
- Provide a basis for stimulating discussion on the development and content of the Energy Plan within the Corporate City Divisions and ABCs
- Assist in finalizing the terms of reference for the Energy Plan
- Provide a basis for extensive public consultation on the Energy Plan.

Further work will expand upon, modify and refine this initial work, leading to the completion of the Energy Plan.

Scope of the report

This report was prepared with a view of developing long-term, medium-term and short-term energy priorities for implementation. For the purposes of this report the short-term is defined as 2010, the medium-term as 2015 and the long-term as 2030. The work completed to date on the Energy Plan for Toronto has included a review and update of the EEO's 2002 Sustainable Energy Plan, limited consultation with key stakeholders, and initial development of the elements of the Energy Plan. In particular the work has involved:

- **Identifying the requirements** of Toronto's Strategic Plan, Environmental Plan, Official Plan and the Corporate City's

existing energy and environmental goals, objectives and targets that need to be taken into account when developing the Energy Plan.

- **Conducting a situation analysis** that involved the identification of a first-cut Corporate City vision for energy sustainability in Toronto ('Preferred State') for discussion, and the identification of an initial description of the current situation regarding energy ('Present State'). This enabled some gaps to be identified and bridges built.
- **Developing options** to take the City from the Present State to the Preferred State. This involved a detailed examination of current energy use and constraints within the Corporate City and Toronto. It also involved identifying some key energy players and an inventory of energy initiatives taking place in the Corporate City, ABCs and Toronto. These options consist of the goals, objectives, targets, actions and measures that are identified.
- **Setting priorities for implementation** of the options. At this early stage of the planning process all measures were considered important. Therefore, in order to distinguish between them to set initial priorities for discussion, the measures were rated based on their urgency and ease of implementation. These are an initial set of priorities and require additional analysis. With further iterations of the process, these priorities may be modified and additional priorities may be added.
- **Informal consultation with key stakeholders.** Consultation took place with some key stakeholders to obtain their feedback on the immediate electricity supply constraints that Toronto is expected to face by 2008 unless steps are taken to address these problems now. Specific consultations were held with Enwave, Toronto Hydro Energy Services Inc., Toronto Hydro-Electric System Ltd., the Ontario Power Authority, Toronto District School Board and the City of Toronto's Mayor's Office. As well, there was a meeting in early May 2006 with representatives of City Divisions to update them on the progress of the work on the Energy Plan, to request their feedback on the draft Terms of Reference for the Energy Plan and to indicate opportunities for further input and involvement in the development of the Energy Plan.
- **Broad consultation.** Formal written comments on the draft Terms of Reference for the Energy Plan for Toronto were solicited from a broad range of stakeholders. Further formal consultation on the draft Terms of Reference is expected to take place after completion of this report.

Elements of the Energy Plan

This report defines and presents a preliminary overview of the elements of the Energy Plan. This includes a description of the Preferred State (the desired energy situation) and Present State (current energy situation) of energy in Toronto. It also identifies goals, objectives, targets, actions and measures that will assist moving Toronto from the Present to the Preferred State.

The measures identified have been categorized to the following three categories: very urgent and easy to implement, urgent and easy to implement, but may require some additional effort, not as urgent and may not be as easy to implement.

The very urgent and easy to implement measures are considered “quick-start” measures that should be implemented by 2010 to meet the immediate energy demand constraints. The urgent and easy to implement, but may require some additional effort are measures that have a longer time-frame for implementation and are more difficult to implement; these measures should be implemented by 2015. The not as urgent and may not be as easy to implement measures are those that are not as a critical and may be more difficult to implement due greater coordination, lack of resources etc. and that should be implemented by the end of the 2030 planning period. Any coordinating strategy underway and expected to be completed before 2010 is also considered a “quick-start”.

Next steps

The immediate next steps in the development of the Energy Plan for Toronto are to:

- On June 6, 2006, a staff report on the development of the Energy Plan for Toronto will be presented to the Roundtable on the Environment and the “quick-starts” for 2010, identified to date, will be highlighted.
- On June 20, 2006, this staff report on the development of the Energy Plan for Toronto will be presented to the Policy and Finance Committee and the “quick-starts” for 2010, identified to date, will be highlighted. The specific process for future development of the Energy Plan will also be discussed. A preliminary timeline and plan for completion may include an 18-month timetable with key milestones and three consultation meetings with key stakeholders (30-50 stakeholders each).

- The work plan for the development of the Energy Plan for Toronto will be further discussed at a Council meeting on June 27, 2006. At this time there will also be a report on any consultation meetings that have been held up until that point.
- The structure, staffing, budget and other resources needed to complete Energy Plan will be discussed at the July 18, 2006 Policy and Finance Committee meeting.
- Approval of the structure, staffing, budget and other resources needed to complete Energy Plan will be presented for consideration by Council at the July 25, 2006 Council meeting.

1 Introduction

1.1 Background to the project

In 2002 the City of Toronto's Facilities and Real Estate, Business and Strategic Innovation, Energy Efficiency Office (EEO) developed a Sustainable Energy Business Plan (SEBP), to assist it in developing and implementing the necessary programs and priorities to meet the requirements of the City's Environmental Plan¹. The scope of the SEBP was limited to measures that could be implemented by the EEO in a leadership or partnership role.

To remain a useful and germane planning tool, the EEO felt it was necessary to periodically update the SEBP to better reflect the current and future energy efficiency/productivity needs and the emission reduction goals established by City Council. To that end, the EEO retained IndEco Strategic Consulting in February 2006 to assist the EEO in further developing, coordinating and revising the 2002 SEBP. The primary objective of the updated SEBP was to address present day issues pertaining to energy efficiency/productivity, economic development, job creation, the environment and other related recommendations of the Environmental Plan. The updated SEBP was set to focus on recommendations that the EEO could implement and that would lead to the development of energy efficiency/building renewal programs that incorporate both supply side (e.g. district energy systems, renewables) and demand side (e.g. energy efficiency and energy productivity) recommendations.

In parallel with the work on the update of the SEBP, the EEO was coordinating the development of draft Terms of Reference for an Energy Plan for Toronto. These draft Terms of Reference were intended to provide guidelines for the development of an Energy Plan for Toronto² (the Energy Plan). City Council at its meeting of January 31, February 1 and 2, 2006 requested the Deputy City Manager and Chief Financial Officer to report to the February 20, 2006 meeting of the Roundtable on the Environment on the draft Terms of Reference. At this meeting of the

¹ *The Environmental Plan: A Plan for an Environmentally Sustainable Toronto* (EP) calls for a Sustainable Energy Plan that goes beyond the City Corporation and includes the entire City and ensures that City divisions, as well as the City's relevant agencies, boards and commissions (ABCs) work together to optimize energy efficiency, economies of scale, and project economics.

² Toronto refers to the entire community of the City of Toronto that exists within its geographic boundaries. The Corporate City refers to the corporate City of Toronto and all its divisions, not including its Agencies, Boards and Commissions (ABCs).

Roundtable on the Environment, it became clear that there was a need for an Energy Plan for Toronto, and a desire to move forward with its development. The Roundtable recommended that the draft Terms of Reference be developed in consultation with Toronto Hydro Corporation, Enwave Energy Corporation, the Toronto Atmospheric Fund and the EEO.

The pressure to move forward quickly on the development of the Energy Plan began to increase with the news of impending rotating blackouts in Toronto in 2008 and the Minister of Energy's Directive related to the Port Lands Energy Centre. In response to this imperative and as a result of directions from the Policy and Finance Committee and the Roundtable on the Environment, it was requested that the project consultant, IndEco Strategic Consulting Inc., restructure the update of the Sustainable Energy Business Plan to refocus and emphasize the development of the Energy Plan for Toronto.

1.2 Report definitions

For the purposes of this report, Toronto refers to the entire community of the City of Toronto that exists within its geographic boundaries. The Corporate City refers to the corporate City of Toronto and all its Divisions, not including its agencies, boards and commissions (ABCs).

The term "energy" refers to the generation, transmission, distribution, storage and use of energy, including electricity, gas and green sources of energy. For the purposes of this report, the definition of conservation and demand management (CDM) is the one provided in the Minister of Energy's letter sent to local electricity distribution companies (for example, Toronto Hydro) on May 31st 2004³; this definition defines conservation and demand management as activities behind the customer's meter including efficiency improvements, distributed generation, demand management, and fuel switching.

The term "green energy" refers to technologies that use naturally occurring energy sources such as the wind and sun, and power sources that, with the proper controls, add little in the way of environmental burdens such as small run-of-river hydro and certain energy from biomass. This definition is based on Environmental Choice™ Program criteria. Throughout this report on the development of the Energy Plan the terms, "green energy" and "renewable energy", are used interchangeably.

³ The definition excludes smart meters as these are treated in a different manner by the Ontario Energy Board and distribution system improvements related to line losses do not have conservation and demand management as their prime purpose.

1.3 Purpose of the report

This report on the development of the Energy Plan reflects the progress that has been made on the development of the Energy Plan. The report represents early and preliminary thoughts on the content of the Energy Plan which require both internal consultation within the Corporate City Divisions and ABCs and with external stakeholders.

The purpose of this IndEco report is to:

- Document the work that has been completed to date on the development of the Energy Plan for Toronto
- Provide a framework for further development of the Energy Plan
- Provide a basis for stimulating discussion on the development and content of the Energy Plan within the Corporate City Divisions and ABCs
- Assist in finalizing the Terms of Reference for the Energy Plan
- Provide a basis for extensive public consultation on the Energy Plan.

The development process for the Energy Plan is designed to be an iterative process that will include extensive stakeholder and public consultation. The process will build upon the work initiated by the EEO and IndEco that is documented in this report. Further work will expand upon, modify and refine this initial work, leading to the completion of the Energy Plan.

Based on this IndEco report and additional consultation, the EEO will develop a work plan and timetable for further development and completion of the Energy Plan.

1.4 Scope of the report

This report on the development of the Energy Plan for Toronto documents the work that has been completed to date on the development of the Energy Plan and documents the results of this work. The report on the development of the Energy Plan for Toronto was prepared with a view of developing long-term, medium-term and short-term energy priorities for implementation. For the purposes of this report the short-term is defined as 2010, the medium-term as 2015 and the

long-term as 2030. The work completed to date on the Energy Plan for Toronto has included:

- **Review and update of the 2002 SEBP.** A review and update of the SEBP was conducted to determine which elements of the SEBP are still relevant today and could contribute to the content of the Energy Plan. This included a review and update of the following elements of the SEBP:
 - The planning model and process
 - The Preferred State
 - The Present State
 - The goals, targets, actions, measures and coordinating strategies
- **Informal consultation with key stakeholders.** Consultation took place with some key stakeholders to obtain their feedback on the immediate electricity supply constraints that Toronto is expected to face by 2008 unless steps are taken to address these problems now. Specific consultations were held with Enwave, Toronto Hydro Energy Services Inc., Toronto Hydro-Electric System Ltd., the Ontario Power Authority, Toronto District School Board and the City of Toronto's Mayor's Office. As well, there was a meeting in early May 2006 with representatives of City Divisions to update them on the progress of the work on the Energy Plan, to request their feedback on the draft Terms of Reference for the Energy Plan and to indicate opportunities for further input and involvement in the development of the Energy Plan.
- **Broad consultation.** Formal written comments on the draft Terms of Reference for the Energy Plan for Toronto were solicited from a broad range of stakeholders. Further formal consultation on the draft Terms of Reference is expected to take place after completion of this report.

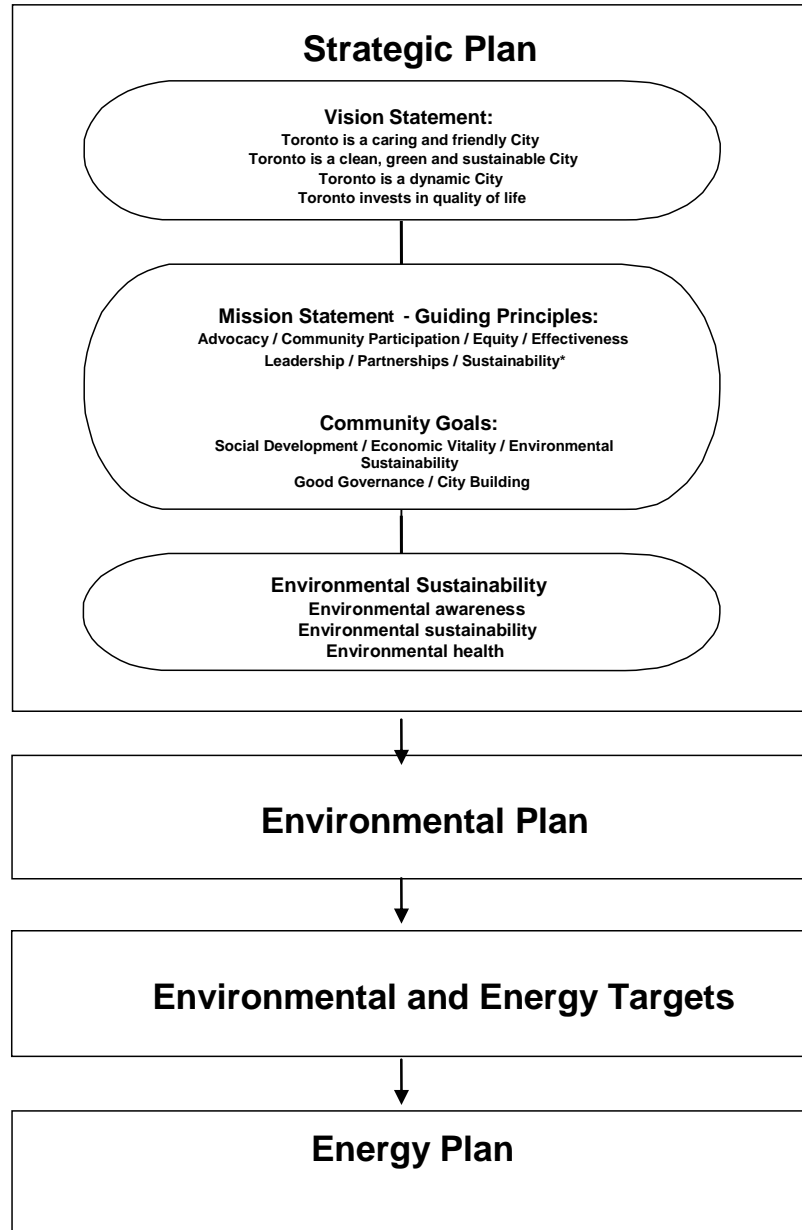
This report on the development of the Energy Plan will be released for extensive internal and external stakeholder input to further facilitate the development of the Energy Plan. A process and timetable for this consultation will be developed by the EEO.

1.5 *Planning framework*

The work completed to date on the development of the Energy Plan was produced using Toronto's existing policy and institutional setting as a framework. The suggested framework for the development of the Energy Plan is shown in Figure 1. This planning framework flows from Toronto's Strategic Plan, from approved energy and environmental targets, from the Environmental Plan⁴ and Official Plan. It respects the existing mandates, roles, and responsibilities of the Corporate City Divisions and ABCs.

⁴ Coordinated by Environmental Services, the Corporate City has embarked on a process to update the Environmental Plan which is expected to be completed by the end of 2006.

Figure 1 Existing planning framework for the Energy Plan⁵



⁵ The information in the figure related to Toronto's Strategic Plan is taken from Strategic & Corporate Policy Division, Chief Administrator's Office, "Toronto City Council's Strategic Planning: Part I", City of Toronto, 1999. The planning framework depicted in the figure flows from Toronto's existing Strategic Plan, from approved energy and environmental targets, from the Environmental Plan and Official Plan. A number of these plans are in the process of being updated.

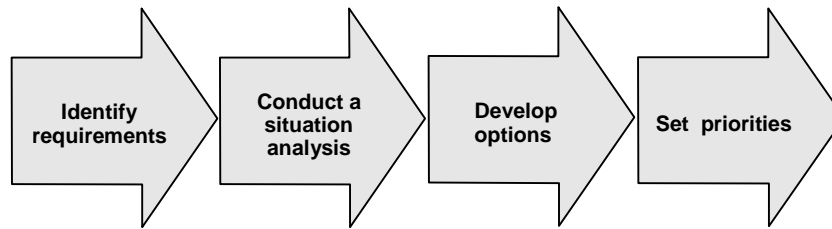
1.6 Process planning

Figure 2 depicts the major steps of the process plan that were used to facilitate the work done so far in developing the Energy Plan and may be used as a basis for the further development of the Energy Plan. The major steps in the process are as follows:

- **Identifying the requirements** of the Strategic Plan, Environmental Plan, Official Plan and the Corporate City's existing energy and environmental goals, objectives and targets that need to be taken into account when developing the Energy Plan. These elements are summarized in the Energy Plan Planning Framework (Figure 1).
- **Conducting a situation analysis** that involved the identification of a first-cut Corporate City vision for energy sustainability in Toronto ('Preferred State') for discussion, and the identification of an initial description of the current situation regarding energy ('Present State'). This enabled some gaps to be identified and bridges built.
- **Developing options** to take the City from the Present State to the Preferred State. This involved a detailed examination of current energy use and constraints within the Corporate City, its ABCs and Toronto. It also involved identifying some key energy players and an inventory⁶ of energy initiatives taking place in the Corporate City, ABCs and Toronto. These options consist of the goals, objectives, targets, actions and measures that are identified.
- **Setting priorities for implementation** of the options. At this early stage of the planning process all measures were considered important. Therefore, in order to distinguish between them to set initial priorities for discussion, the measures were rated based on their urgency and ease of implementation. These are an initial set of priorities and require additional analysis. With further iterations of the process, these priorities may be modified and additional priorities may be added.

⁶ This inventory will require further enhancement and refinement in subsequent iterations of the development of the Energy Plan.

Figure 2 Process Plan



1.7 Consultation

Limited consultation has taken place to date with some of the key internal (Corporate City Divisions and ABCs) and external stakeholders in the Energy Plan to obtain their feedback on the immediate electricity supply constraints that Toronto is expected to face by 2008. Specific consultations were held with Enwave, Toronto Hydro Energy Services, Toronto Hydro-Electric System Ltd, the Ontario Power Authority, Toronto District School Board and the City of Toronto's Mayor's Office. This report will be used to facilitate further internal discussion on Toronto's energy future and as a basis for extensive internal and public consultation on the Energy Plan.

Initial comments on the draft Terms of Reference for the Energy Plan were also solicited from a broad range of stakeholders. For a complete list of the stakeholders that have been contacted to date please see Appendix 1. Integration of the comments into this document has been completed to a limited extent, comments made by the stakeholders will be further integrated into the Energy Plan in future process planning iterations.

1.8 Process model

The model that was used to develop the Energy Plan as documented in this report consists of several elements – goals, objectives, targets, actions, measures, development steps and coordinating strategies. This process model may be used as a basis for the further development of the Energy Plan.

Based on current energy goals, objectives and targets found in the Strategic Plan, Environmental Plan, SEBP etc. as well as additional ones that have been proposed, a series of measures that lead to implementation of actions to achieve targets, objectives and goals are developed. Development steps are identified to help to implement the measures. Coordinating strategies help to link different development steps, measures, and/or actions together into a cohesive initiative. Figure

3 illustrates how the model components are connected throughout the development and implementation of a plan.

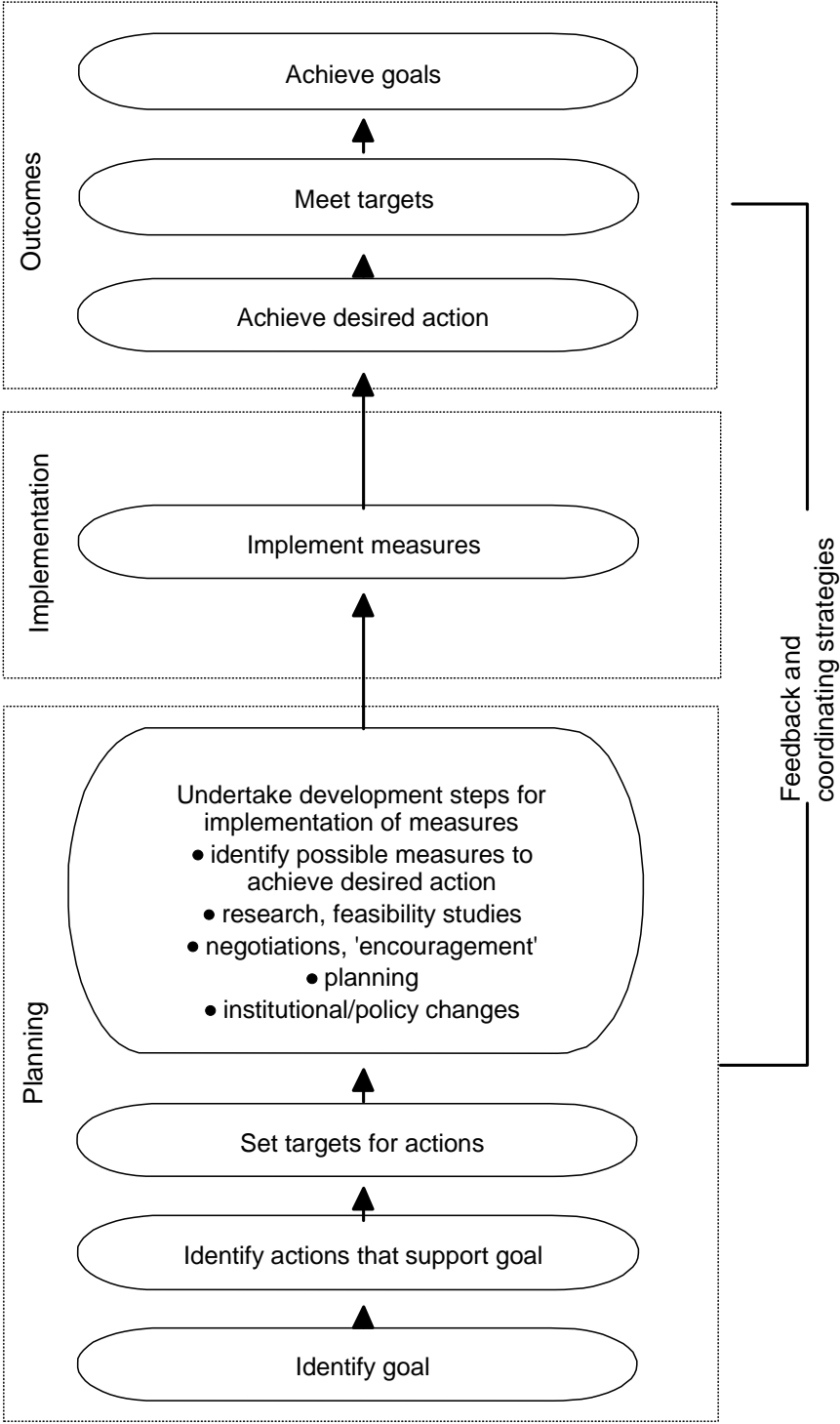


Figure 3 Process Planning Model

A brief description of each of the process planning terms follows:

Goal: Broad, policy-level statements concerning a Preferred State or process.

E.g. A Sustainable Energy Infrastructure for Toronto.

Objective: An over-arching quantitative aim that may result in multiple actions and targets.

E.g. Seek up to 300 MW of conservation and demand management in the Toronto area by 2010.

Action: A physical or behavioural change.

E.g. Use green energy, switch from automobile transport to public transport.

Target: A specific quantitative aim related to a particular action.

E.g. Meet 25% of the Corporate City's energy needs through green energy.

Measure: Information, regulations, economic incentives or other mechanisms that encourage actions.

E.g. A green energy purchasing policy, redirect gasoline taxes to public transit.

Development Step: Background work that is necessary to support the development and implementation of measures.

E.g. City of Toronto as a Whole reaffirms its commitment to purchase 25% green energy and reports to the Roundtable on the Environment on how it will meet this commitment.

Coordinating Strategy: An action that links or integrates two or more actions, measures or development steps.

E.g. Develop an Energy Plan for Toronto.

2 Preferred State of energy in Toronto

The Preferred State of energy in Toronto, as shown in Table 1 below, represents the Corporate City’s vision of energy sustainability in Toronto in 2030 (the long-term). The initial first cut at a Preferred State documented in this report is based on the following:

- A review of the SEBP to determine which elements of the Preferred State are still applicable and desirable
- A brainstorming and visioning session
- Limited background research and consultation with key stakeholders completed to date

The Preferred State is founded on the existing Corporate City goals, targets and objectives as identified in the planning framework (Figure 1).

Table 1 The Preferred State

Coordinated plans support and help achieve the Corporate City’s energy and sustainability goals
<ul style="list-style-type: none"> • Toronto’s Strategic Plan supports the Corporate City’s vision of becoming “a clean, green and sustainable City”, embraces sustainability as a community goal and considers environmental sustainability, including environmental health and awareness, a guiding principle for the Corporate City’s mission statement • The Energy Plan supports the Corporate City’s goal of having a sustainable energy infrastructure that assists the efficient generation, transmission, distribution and use of energy from renewable sources • The Energy Plan sets increasingly higher targets for meeting the Corporate City’s electricity needs through green sources and helps create opportunities for residents and businesses of Toronto to buy their electricity from green sources • The Corporate City has a Sustainable Urban Development Plan to address its goal of environmentally sustainable development and urban form • The Corporate City has a Clean Air Action Plan to support its goal for clean air that is free of harmful pollutants • The Corporate City has a Climate Change Plan that minimizes the City’s contribution to climate change and provides an effective adaptation strategy • The Corporate City has a Sustainable Energy Transportation Plan

Broad-based awareness and commitment to energy sustainability, “conservation first” and green energy

- Energy sustainability has both political support and senior Corporate City management commitment
- Energy sustainability has broad buy-in by Corporate City and ABC employees
- Energy sustainability garners widespread public support
- The Corporate City has financial tools to support energy sustainability
- The Better Buildings Partnership (BBP) is recognized internationally
- Sustainability leaders in Toronto are recognized for their excellence
- Corporate City employees, including ABCs, are recognized for their excellence in sustainability
- Conservation Culture is widespread and adopted by the Corporate City, ABCs and Toronto

There is an integrated and coordinated Corporate City and ABC structure to manage energy issues

- There is a recognized organizational structure within the Corporate City, reporting directly to Toronto City Council, that has central and overriding responsibility in the Corporate City organization to coordinate sustainable energy matters in the Corporate City and the ABCs
- City Council treats sustainable energy matters as a high priority
- The Energy Plan has clear links to all of the Corporate City’s other plans including for example, the Official Plan, Environmental Plan, the Clean Air Action Plan and the Renewable Energy Action Plan, the Green Development Standard and the plans of its ABCs (e.g. Exhibition Place Environmental Plan)
- The Energy Plan has clear links to all major Corporate City Divisions and ABCs and external advisory groups to the Corporate City (e.g. Roundtable on the Environment)
- The Energy Plan is recognized as the key energy planning tool for Toronto, is updated regularly (e.g. every 4 years) and adopted and implemented under Council direction
- The Energy Plan addresses all types of energy use and focuses on particular types in response to particular problems or opportunities, with a focus on fuel substitution to renewable energy use
- All Corporate City and ABC expenditures are approved based on a triple bottom line analysis

There is a coherent system within the Corporate City and ABCs for consistent messaging and tracking of energy sustainability
<ul style="list-style-type: none"> • The Corporate City and ABCs have a sustainable energy policy • The Energy Plan identifies, monitors and tracks specific actions to achieve the goals, objectives, and targets of the Plan • The Corporate City implements incentives to create sustainable energy development in Toronto • The Corporate City eliminates disincentives to improve energy performance within the Corporate City • The ABCs eliminate internal disincentives to improve energy performance within the ABCs
The Corporate City and ABCs foster strong partnerships in Toronto
<ul style="list-style-type: none"> • Energy sustainability actions are designed and delivered effectively through public-private partnerships • The Corporate City and ABCs act as delivery agents for both public and private energy initiatives • Most of the Corporate City and ABCs sustainable conservation and demand management programs are self-financed and self-sustaining
The Corporate City and ABCs continually improve environmental and energy performance
<ul style="list-style-type: none"> • The Corporate City and ABCs have a “Conserve First” policy • Toronto is unaffected by blackouts and brownouts experienced in other parts of the province • The Corporate City has plan for Toronto for energy emergencies (emergency preparedness) • The Corporate City meets or exceeds its net GHG emission reduction target • The Corporate City meets or exceeds its targets for green electricity (e.g. purchases 25% of its electricity through green energy by 2012) • The Corporate City Divisions achieve or exceed all targets to reduce energy use in operations • The Corporate City, through the Better Buildings Partnership, achieves or exceeds all its retrofit targets (e.g. retrofitted 40% of the buildings in the City’s Industrial, Commercial, Institutional sector by 2012) • The Corporate City, through the Better Transportation Partnership, achieves or exceeds all its targets • The Corporate City has a building energy standard that requires mandatory compliance to increasingly more stringent energy efficiency standards over time for retrofit and new

construction in Toronto (100% of new developments in Toronto will achieve 25% improvement over Model National Energy Building Code (MNEBC))

- The Corporate City and ABCs continually improve the energy efficiency of their fleets
- The Corporate City and ABCs only have green energy powered vehicles

This preliminary vision should be enhanced in future iterations of the Energy Plan to create a coherent and leading edge vision for energy in the City of Toronto, similar to the vision that has been created for Toronto's waterfront and in other leading edge cities such as Chicago, Seattle, and London.

In adopting aggressive options to increase the efficiency of energy use within the Corporate City, ABCs and Toronto, Toronto would not be acting alone. On the contrary, failure to do so is likely to mean that Toronto will be following behind other world cities.

For example, the European Climate Alliance of local authorities has more than 1300 member municipalities located in 17 European countries and representing close to 50 million European citizens. Its members include numerous major cities such as Barcelona, Berlin, Luxembourg, Munich, The Hague, Venice, Vienna and Zurich. Members seek to reduce greenhouse gas emissions within a framework set by a voluntary commitment, notably in the fields of energy and transportation. Members commit to reducing their greenhouse gas emissions continuously, and target a 10 percent reduction in CO₂ emissions every five years, with the important milestone of halving per-capita emissions (from the 1990 baseline) by 2030 at the latest. Over the long-term, Climate Alliance cities and municipalities aim to reduce their greenhouse gas emissions – by means of energy conservation, energy efficiency and the use of renewable energy sources – to a sustainable level of 2.5 tonnes CO₂ equivalent per capita per year.⁷

In the United States, 232 mayors from 41 states representing a total population of over 45 million citizens⁸ have agreed to participate in the US Mayors Climate Protection Agreement. Participating members agree to meet or exceed Kyoto Protocol targets for reducing global warming pollution by taking actions in their own operations and communities such as:

⁷ Climate Needs – Local Answers: European Climate Alliance of local authorities agrees long-term CO₂ reduction targets at Vienna meeting. 8 May 2006. <http://www.klimabuendnis.org/english/association/5510608en.htm>

⁸ Data current as of May 16, 2006. <http://www.ci.seattle.wa.us/mayor/climate/quotes.htm#mayors>

- Inventory global warming emissions in City operations and in the community, set reduction targets and create an action plan;
- Adopt and enforce land-use policies that reduce sprawl, preserve open space and create compact, walkable urban communities;
- Promote transportation options such as bicycle trails, commute trip reduction programs, incentives for car pooling and public transit;
- Increase the use of clean, alternative energy by, for example, investing in 'green tags', advocating for the development of renewable energy resources, recovering landfill methane for energy production, and supporting the use of waste to energy technology;
- Make energy efficiency a priority through building code improvements, retrofitting city facilities with energy efficient lighting and urging employees to conserve energy and save money;
- Purchase only ENERGY STAR® equipment and appliances for City use;
- Practice and promote sustainable building practices, for example, the U.S. Green Building Council's™ (Leadership in Energy and Environmental Design) Green Building Rating System® program, or a similar system;
- Increase the average fuel efficiency of municipal fleet vehicles; reduce the number of vehicles; launch an employee education program including anti-idling messages; convert diesel vehicles to bio-diesel; encourage the use of renewable fuels;
- Evaluate opportunities to increase pump efficiency in water and wastewater systems; recover wastewater treatment methane for energy production;
- Increase recycling rates in City operations and in the community;
- Maintain healthy urban forests; promote tree planting increase shading and to absorb CO₂; and

- Help educate the public, schools, other jurisdictions, professional associations, business and industry about reducing global warming pollution⁹.

Individual cities are taking even more aggressive actions. For example, in Seattle, the City's goal was to have no net emissions of GHG from the municipal utility by 2005, there is a green building program, and since 2000, all city projects must meet the green building criteria. They have a green fleet, and are reducing government emissions by 60%.

Chicago released an energy plan in 2001 that calls for meeting Chicago's projected increase in electricity demand through energy management (28%), renewables (25%), cogeneration (25%) and distributed generation (22%).¹⁰ The approach of the City has been to use environment as a resource, not as an expense, and among their many activities have been convincing two solar panel manufacturers to relocate to Chicago by committing to purchase at least five million dollars of their products, converting traffic lights to LEDs, traffic signal actuation, induction lighting initiatives to protect the night sky, building several LEED™ silver buildings, and committing to build all new public housing units (25,000) to green standards. All new municipal buildings will be LEED™ certified, 1.5 MW of solar is being installed, and four wind turbines are being installed on top of buildings.

One interesting initiative is that Chicago is encouraging the private sector with a green permit process for developments. The City promises approval in 30 days if the developer meets certain criteria (rather than the normal 100 days). The City has a 'green team' of reviewers, all LEED™ accredited, offers an appointment the same day (rather than three weeks), pays the permit fees, and provides one person who is dedicated to the project, and follows it through the approval process. In addition, if the City is providing money to encourage building, energy efficiency criteria must be met, and the City is ratcheting up expectations¹¹. In another initiative, the City offers free seminars at its

⁹ Endorsing the US Mayors' Climate Protection Agreement.
<http://www.ci.seattle.wa.us/mayor/climate/cpaText.htm>

¹⁰ City of Chicago. Department of the Environment. 2001. Energy Plan.
http://egov.cityofchicago.org/city/webportal/portalContentItemAction.do?contentOID=536910604&contentType=COC_EDITORIAL&topChannelName=Dept&channelId=0&programId=0&entityName=Environment&deptMainCategoryOID=-536887205

¹¹ Sadhu Johnston, Commissioner, Department of the Environment. 2006. Municipal Governance In Action: Making Daily Decisions in Line with Sustainable Goals. Globe 2006, Vancouver, B.C.

Green Tech U in seven areas. Persons completing the program are certified¹².

Globally, cities are becoming important vehicles for moving society towards sustainability. Development of sustainability strategies will be increasingly important both in realizing global and local goals (such as in the reduction of greenhouse gas emissions), but also in improving the quality of life for city residents and attracting economic development. Energy issues are fundamental to these sustainability strategies.

In the past, Toronto has been a leader in developing sustainable city strategies, but renewed effort will be required if this lead is to be maintained.

¹² For more information on Chicago Green Tech see http://egov.cityofchicago.org:80/city/webportal/portalContentItemAction.do?BV_SessionID=@@@0357714166.1147914339@@@&BV_EngineID=ccccaddhkflkklgcefecelldffhdfgm.0&contentOID=536913111&contentTypeName=COC_EDITORIAL&topChannelName=HomePage

3 Present State of energy in Toronto

The Present State is the current situation of the elements of the Preferred State and therefore gives an indication of how far away the present is from the desired future. The purpose of identifying the Present State is to understand where Toronto is now, what resources are available to move towards the Preferred State, and what obstacles may be encountered. The identification of the Present State enables actions and measures to be developed that will take Toronto towards the Preferred State of energy use. It also allows objectives and targets to be set based on the 'gap' between the Present State and Preferred State.

This section provides a description of the current state of energy use in Toronto. This section also provides a description of key energy players in Toronto. Legislation, policies and plans of the Corporate City and its ABCs are also listed as well as Corporate City and other programs that are currently used to manage energy use in Toronto.

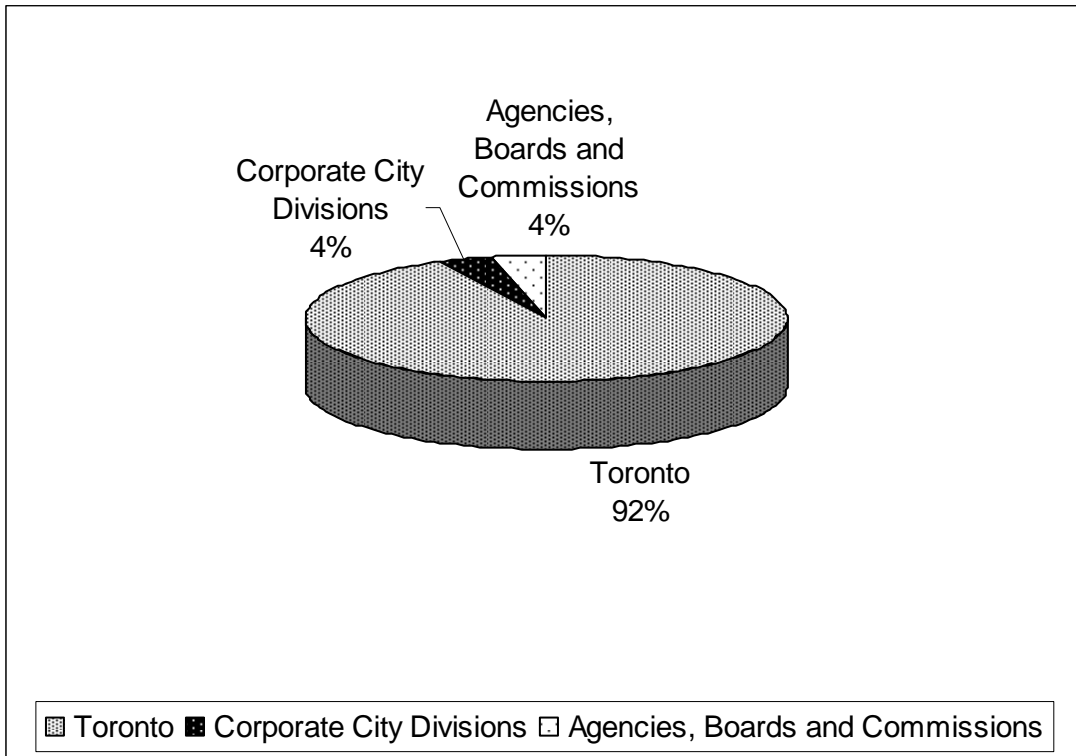
This description of the Present State is based on the research completed to date by IndEco and does not represent a comprehensive inventory of the Present State. A more comprehensive description of the Present State will be developed with future planning iterations as the Energy Plan is completed.

3.1 Energy use and constraints

Energy use in the Corporate City and ABCs

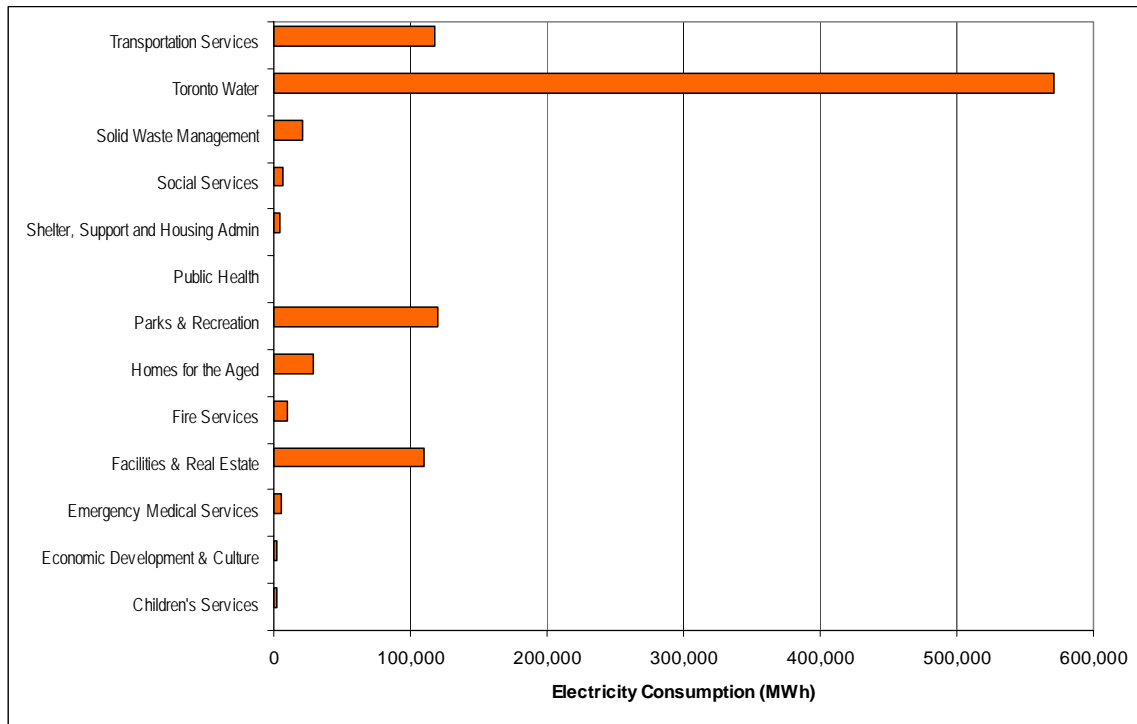
This section provides the electricity and natural gas energy use data for the Corporate City and the ABCs for 2005. Data obtained from the Facilities and Real Estate Division's Energy and Waste Management Office of the City of Toronto demonstrates that the total electricity consumption for 2005 by Corporate City Divisions and ABCs, as tracked on their energy consumption reporting system, was 2,043,519 Megawatt hours at a cost of \$177 million. This represents approximately eight per cent of the electricity consumption in Toronto. Corporate City Divisions consumed 999,860 Megawatt hours, at a cost of approximately \$86 million, representing approximately four per cent of the total actual electricity consumption in all areas, while ABCs consumed 1,043,659 Megawatt hours of electricity, at a cost of approximately \$91 million, representing approximately four per cent of the total actual electricity consumption in all areas. This breakdown of electricity consumption is shown in Figure 4 below.

Figure 4 2005 Electricity Consumption by Toronto, Corporate City Divisions, Agencies, Boards and Commissions as Percentage of the Total City of Toronto



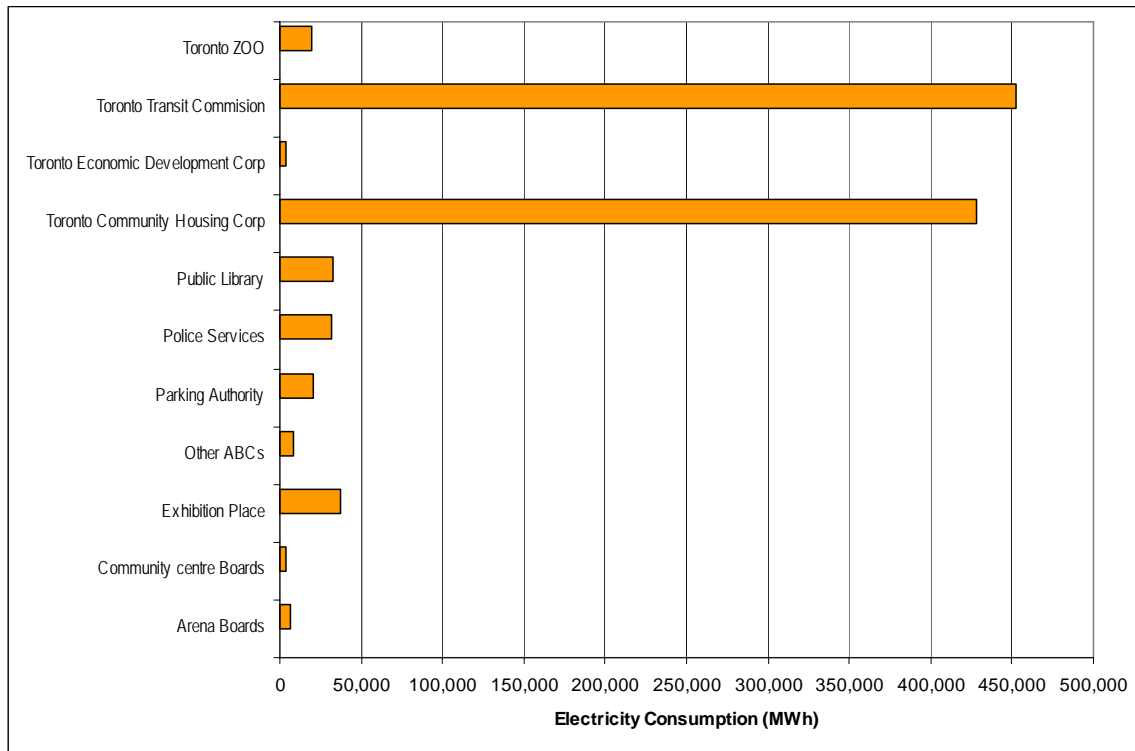
The highest electricity consumer within Corporate City Divisions is Toronto Water with 571,254 Megawatt hours or 57 per cent of the total electricity consumption for Corporate City Divisions followed by Parks and Recreation with 120,028 Megawatt hours or 12 per cent of the total electricity consumption for Corporate City Divisions. The electricity consumption of each of the Corporate City Divisions is shown in Figure 5 below.

Figure 5 2005 Electricity consumption by Corporate City Divisions



The highest electricity consumer within the ABCs is the Toronto Transit Commission (combined stationary and motive) with 452,669 Megawatt hours or 43 per cent of the total electricity consumption of ABCs, followed by the Toronto Community Housing Corporation with 427,746 Megawatt hours or 41 per cent of the total electricity consumption of ABCs. The electricity consumption of each of the Corporate City ABCs is shown in Figure 6 below.

Figure 6 2005 Electricity consumption by Agencies, Boards and Commissions



Data obtained from the Facilities and Real Estate Division's Energy and Waste Management Office of the City of Toronto show that the total natural gas consumption for 2005 by Corporate City Divisions and ABCs, as tracked on their energy consumption reporting system, was 138,378,879 m³ at a cost of approximately \$55.4 million of which:

- Corporate City Divisions consumed 42,504,148 m³, at a cost of approximately \$18.1 million; and
- ABCs consumed a total of 95,874,731 m³, at a cost of approximately \$37 million.

Table 2 below highlights the total natural gas consumption of the Corporate City and the ABCs and highest consumers within each category. The highest natural gas consumer within Corporate City Divisions is Parks & Recreation with an annual consumption in 2005 of 13,269,171m³. The highest natural gas consumer within ABCs is Toronto Community Housing Corporation with an annual consumption in 2005 of 62,940,158m³.

Table 2 2005 natural gas consumption by Corporate City Divisions and Agencies, Boards and Commissions

Corporate City Divisions	Consumption M³	Cost \$
Divisions		
Children's Services	241,845	114,712
Economic Development & Culture	426,911	186,322
Emergency Medical Services	695,645	311,545
Facilities & Real Estate	4,499,076	1,969,285
Fire Services	2,615,308	1,214,917
Homes for the Aged	4,008,631	1,697,802
Parks & Recreation	13,269,171	5,823,780
Public Health	448,085	198,594
Shelter, Support and Housing Admin	921,068	400,067
Social Services	284,345	132,980
Solid Waste Management	1,960,391	840,937
Toronto Water	12,371,707	4,891,772
Transportation Services	761,965	339,094
Total – Corporate City Divisions	42,504,148	18,121,807
Agencies, Boards, Commissions		
Arena Boards	411,293	179,770
Community centre Boards	603,318	268,075
Exhibition Place	3,085,792	1,304,529
Other ABCs	441,790	195,178
Parking Authority	141,669	63,451
Public Library	2,133,380	994,073
Police Services	2,915,164	1,351,886
Toronto Community Housing Corp	62,940,158	23,463,842
Toronto Economic Development Corp		
Toronto Transit Commission	19,387,126	7,941,331
Toronto ZOO	3,815,041	1,559,527
Total – ABCs	95,874,731	37,321,662
GRAND TOTAL	138,378,879	55,443,469

Energy use in Toronto

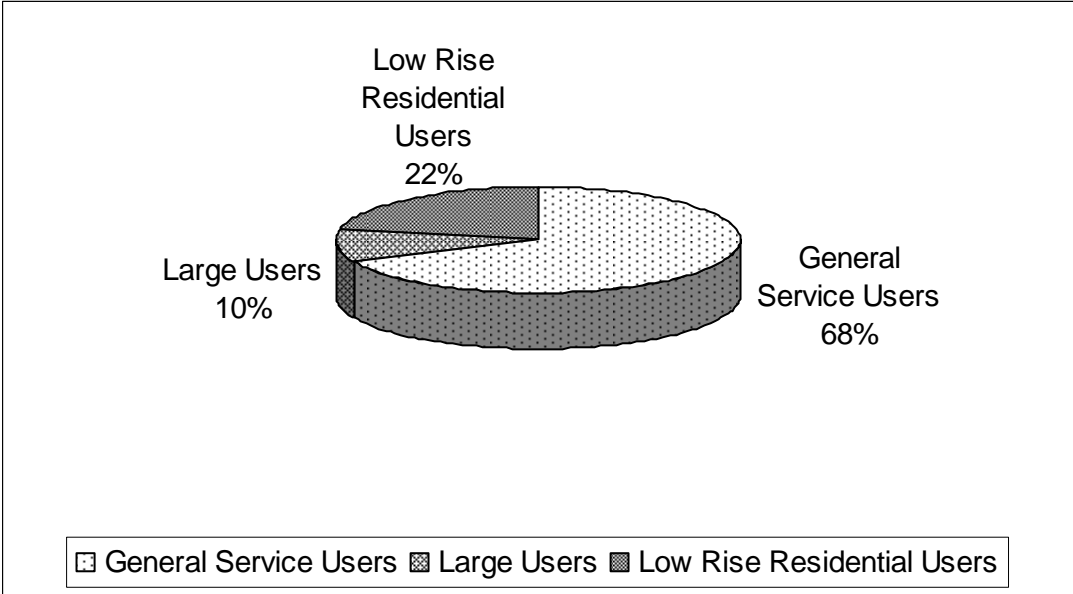
This section provides the electricity and natural gas energy use data for Toronto for 2005 and 2004 respectively. Data obtained from Toronto Hydro-Electric System Limited (THESL) indicates that in 2005, total

electricity peak demand for Toronto was 4,936 Megawatts¹³. The total electricity consumption for Toronto in 2005 was 26,372,169 Megawatt hours at a cost of \$2.69 billion.

Consumers of electricity are classified into three categories by THESL: residential users, large users and general service users. A description of these users and their share of the total electricity consumption are described below. A breakdown of electricity consumption in Toronto by consumer category is shown in Figure 7.

- 1. low-rise residential users, or households (i.e. single residences and multiple residences up to six units), account for 22 per cent of the total consumption;
- 2. large users, or customers with monthly peak demands of 5,000 kilowatts or greater, account for 10 per cent of total consumption; and
- 3. general service users, or consumers not classified as either residential or large users and are typically small businesses and “bulk-metered” multi-unit residential establishments, account for 68 per cent of total consumption.

Figure 7 2005 electricity consumption by Toronto

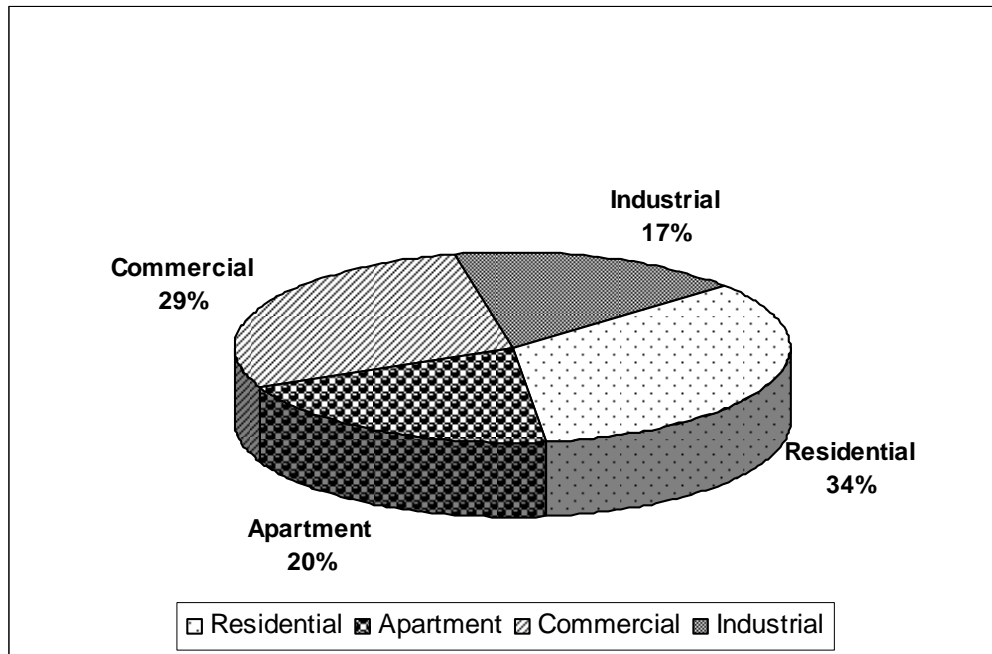


¹³ Peak demand is defined as the highest rate of consumption in a given time.

Enbridge Gas Distribution provided information to the City of Toronto Environmental Services showing that the natural gas consumption in Toronto, in 2004, was 4,323,001,973 m³. This data is classified in four categories and is shown graphically in Figure 8 below:

1. residential users, account for 34 per cent of total consumption;
2. apartment users, account for 20 per cent of total consumption;
3. commercial users, account for 29 per cent of total consumption;
and
4. industrial users, accounting for 17 per cent of total consumption.

Figure 8 2004 natural gas consumption for Toronto



Energy constraints

An assessment (dated December 22, 2005) of the reliability of the Ontario electricity system by the Independent Energy System Operator (IESO)¹⁴ has warned that the City of Toronto risks electricity shortages

¹⁴ The IESO operates Ontario's electricity grid, dispatching electricity across the transmission system from generators to distributors, and operates and regulates the wholesale electricity market. The IESO records and reports data that links usage with market price at 5-minute intervals and oversees settlement, billing and payment among market players. The IESO is an independent non-profit company, governed by an independent board whose budget must be approved by the Ontario Energy Board.

unless 250 Megawatts of new generation capacity is built by 2008, 500 Megawatts are built by 2010 and energy conservation is maximized. The IESO warned that the power lines bringing electricity into the City are almost at their capacity during peak periods. The IESO concluded that the City could begin to experience rotating blackouts in the summer of 2008 if no action is taken to address the demand-supply balance of Toronto.

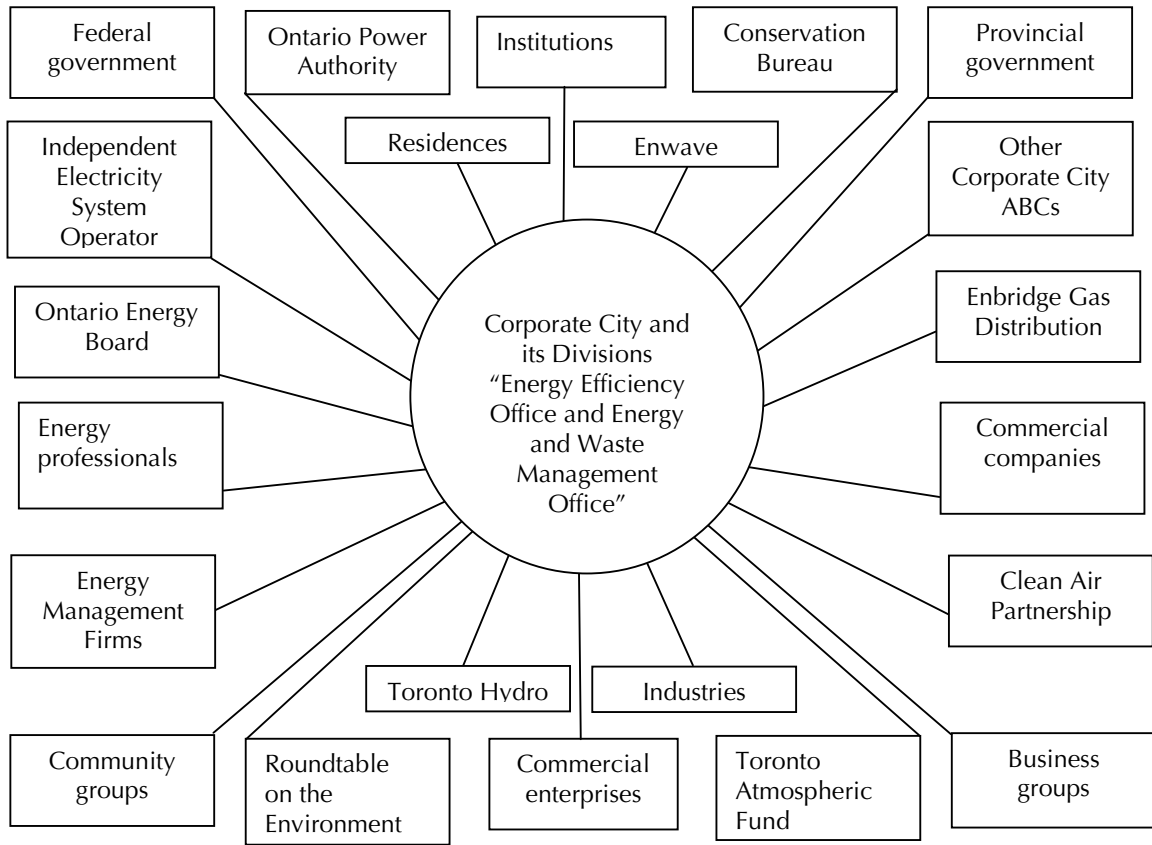
Hydro One estimates summer peak load growth at a rate of 1.62 per cent on average for each year over the next 12 years in Central Toronto, while THESL has projected total load growth of approximately 1 per cent annually for Toronto. Such demand growth factors, along with THESL's Leaside and Manby transformer facilities nearing their peak capacity, has resulted in a confirmation from THESL that there is a need for new generation within Toronto of approximately 250-350 Megawatts, in combination with the 250 MW of existing and planned conservation and demand management measures that THESL has committed to through 2007¹⁵.

3.2 Key energy players

There are many groups that play a role in energy in Toronto. The roles and activities of each of these key players will have to be taken into consideration when further developing the Energy Plan. Figure 9 illustrates some of the current key players in energy in Toronto. A description of the role of each of these key players is also provided. These key players are by no means independent of one another and linkages and partnerships currently exist between most of these players.

¹⁵ Minister of Energy Directive to the Ontario Power Authority regarding Toronto Reliability Supply and Conservation Initiative. February 10, 2006.

Figure 9 Key energy players in Toronto



Federal government – Several federal government departments (e.g. Natural Resources Canada (NRCan), Canada Housing and Mortgage Corporation (CMHC) and Environment Canada) provide funding and programs for energy conservation and energy retrofit activities to various members of the Toronto community. For example, NRCan¹⁶ through their Office of Energy Efficiency offers several programs for commercial and industrial companies including incentives for: energy audits, process integration, energy performance contracting, benchmarking, employee awareness and training.

Provincial government – The Government of Ontario passes legislation and develops policy related to energy. The Minister of Energy provides directives to the Ontario Power Authority regarding the supply, conservation and demand management of electricity.

¹⁶ The EnerGuide for Houses program and the Retrofit Incentive have been discontinued as of midnight May 12, 2006. Property owners who have had a pre-retrofit evaluation performed prior to this date can have a post-retrofit evaluation and still qualify for a grant until March 31, 2007, subject to the availability of funding.

Ontario Power Authority - The Ontario Power Authority (OPA) was established by The Electricity Restructuring Act, 2004 which set out the following objectives for the organization:

- To forecast electricity demand and the adequacy and reliability of electricity resources for Ontario for the medium and long-term.
- To conduct independent planning for electricity generation, demand management, conservation and transmission and develop integrated power system plans for Ontario.
- To engage in activities in support of the goal of ensuring adequate, reliable and secure electricity supply and resources in Ontario.
- To engage in activities to facilitate the diversification of sources of electricity supply by promoting the use of cleaner energy sources and technologies, including alternative energy sources and renewable energy sources.
- To establish system-wide goals for the amount of electricity to be produced from alternative energy sources and renewable energy sources.
- To engage in activities that facilitate load management.
- To engage in activities that promote electricity conservation and the efficient use of electricity.
- To assist the Ontario Energy Board by facilitating stability in rates for certain types of customers.
- To collect and provide to the public and the Ontario Energy Board information relating to medium and long term electricity needs of Ontario and the adequacy and reliability of the integrated power system to meet those needs.

To carry out its statutory objectives, the OPA has been organized under four key functions: Power System Planning, Generation Development, Conservation Bureau, and Electricity Sector Development¹⁷.

¹⁷ Ontario Power Authority website (<http://www.powerauthority.on.ca/>)

Conservation Bureau – The Conservation Bureau was created within the OPA to develop, coordinate and stimulate commitment to electricity conservation and demand management programs. The Conservation Bureau acts on direction from the Minister of Energy and designs and delivers programs to promote energy conservation in the residential, industrial and Municipal, Universities, Schools, Hospitals (MUSH) sectors¹⁸.

Independent Electricity System Operator (IESO) - The IESO operates Ontario's electricity grid, dispatching electricity across the transmission system from generators to distributors, and operates and regulates the wholesale electricity market. The IESO records and reports data that links usage with market price at 5-minute intervals and oversees settlement, billing and payment among market players¹⁹.

Ontario Energy Board (OEB) - The OEB is the independent regulator of Ontario's natural gas and electricity industries. The OEB operates as an adjudicative tribunal and carries out its regulatory functions through public hearings. The OEB creates and enforces rules for the electricity and natural gas sectors, and plays a role in regulatory policy development. The OEB sets distribution and transmission rates for electricity and natural gas. The OEB is also responsible for electricity market oversight and for ensuring that regulated natural gas and electricity monopoly utilities comply with OEB decisions and orders²⁰.

Toronto Hydro-Electric System Limited (THESL) – THESL is the local electric distribution company (LDC) in the City of Toronto. THESL is municipally owned by the Corporate City. THESL delivers electricity to more than 676,000 residential, commercial and industrial customers in Toronto. THESL also delivers electricity conservation and demand management programs to their customers. Some of these programs are delivered in partnership with other key players including Enbridge, and the Corporate City.

Enbridge Gas Distribution (Enbridge) – Enbridge distributes natural gas to residential, commercial, and industrial customers in Toronto. Enbridge also provides a broad set of rebates and programs for energy conservation to their residential, commercial and industrial customers in Toronto, some of these programs are offered in partnership with other key players.

¹⁸ Conservation Bureau website (<http://www.conservationbureau.on.ca/>)

¹⁹ Independent Electricity System Operator website (<http://www.theimo.com/>)

²⁰ Ontario Energy Board website (<http://www.oeb.gov.on.ca/index.html>)

Other Corporate City ABCs – Other Corporate ABCs are agencies, boards and commissions that are owned by the Corporate City. Examples of ABCs include arena boards, community centre boards, Exhibition Place, the Toronto Parking Authority, Toronto Police Services, Toronto Community Housing Corporation, Toronto Economic Development Corporation, Toronto Transit Commission and Toronto Zoo. Together these ABCs accounted for 4% of total electricity consumption in Toronto in 2005 and 2% of total natural gas consumption in Toronto in 2004.

Enwave Energy Corporation (Enwave)- Enwave is one of the largest district energy systems in North America, serving 36% of the potential heating market and providing heating and/or cooling services to over 130 institutional and commercial buildings in downtown Toronto. Buildings in downtown Toronto are cooled using the cold energy from Lake Ontario through Enwave's Deep Lake Water Cooling (DLWC) system. The Corporate City is a major shareholder in Enwave²¹.

Energy Management Firms (EMFs) - Energy Management Firms contract with customers (largely commercial and industrial customers) to install energy efficiency technologies on the customer's building or equipment, at the EMF's expense. The EMF is repaid through a share in the value of the energy savings that result from the technology installed. The energy services provided by EMFs include: high-efficiency lighting and appliances, computer controlled building operation systems, insulation, and high-performance windows and doors²².

Energy professionals – These include engineers, architects, consultants and HVAC contractors that provide a wide array of energy services.

Community groups – There are a number of community groups and organizations that make energy conservation programs available to residents and businesses in Toronto²³. For example, Green\$aver is a not-for-profit organization that, amongst other programs, delivers the EnerGuide for Houses program for NRCan²⁴. The Closed Door program is an education program developed by We Conserve that encourages neighbourhood stores and restaurants to keep their doors closed when their air conditioning is running. We Conserve is a program of the Conservation Council of Ontario.

²¹ Enwave website (www.enwave.com/enwave/)

²² Canadian Association of Energy Service Companies website (www.appro.org/caesco.html)

²³ Community groups include local energy, environmental, social assistance and other groups.

²⁴ The EnerGuide for Houses program and the Retrofit Incentive have been discontinued as of midnight May 12, 2006. Property owners who have had a pre-retrofit evaluation performed prior to this date can have a post-retrofit evaluation and still qualify for a grant until March 31, 2007, subject to the availability of funding.

Business groups – There are a number of business groups and organizations that represent businesses and business interests in Toronto and are concerned with energy and energy use, for example, the Toronto Board of Trade. There are other business groups that represent businesses that are directly involved in the energy industry including: the Canadian Gas Association (CGA), the Association of Power Producers of Ontario (APPRO), the Electricity Distributors Association (EDA) and the Ontario Energy Association (OEA).

Clean Air Partnership (CAP) - The Clean Air Partnership is a registered charity that works in partnership to promote and coordinate actions to improve local air quality and reduce greenhouse gases for healthy communities including conducting research and holding workshops on energy conservation and demand management²⁵.

Roundtable on the Environment – is an external advisory body, established in 2004 to advise the Mayor and Toronto City Council on current and emerging environment sustainability issues affecting the City of Toronto. In the 18 months since the Roundtable first met, energy sustainability issues have been at the forefront, including the discussion of the draft Terms of Reference for the Energy Plan for the City of Toronto²⁶.

Toronto Atmospheric Fund (TAF) – Toronto City Council established TAF in 1991 to finance Toronto-based initiatives that combat global climate change and improve air quality. TAF provides grants and loans and undertakes special projects to advance its mandate. Working with all sectors of the community, and with Corporate City Divisions and ABCs, TAF leverages its resources to develop innovative local action that leads to significant emission reduction results. On an annual basis, TAF has approximately \$1.2 million available for grants and special projects. TAF provides up to \$250,000 worth of grants to the Corporate City in part to fund energy projects²⁷.

Institutions – Institutions include universities, colleges, schools, hospitals and related facilities, within Toronto. Institutions tend to be large energy consumers and a large market for energy services.

²⁵ Clean Air Partnership website: <http://www.cleanairpartnership.org/>

²⁶ Other key energy issues discussed by the Roundtable have included: renewable energy projects and planning, energy-efficient traffic signal conversion using LED technology, carbon offsets trading and the Renewable Power Production incentive, energy conservation actions and policy initiatives to improve air quality in the city of Toronto, development of Green Roofs City policy to improve buildings' energy efficiency, assessment of sustainable management principles for the City and the promotion of sustainable energy consumption, energy retrofit program initiative for facilities and real estate, Partners for Climate Protection Program, Bill 21 and the OPA Supply Mix report.

²⁷ Toronto Atmospheric Fund website (www.toronto.ca/taf/index.htm)

Industries – Industries within Toronto are large consumers of energy and large market for energy services. Industries accounted for 17% of natural gas consumption in Toronto in 2004. Industries are considered General Service customers by THESL, which accounted for 68% of electricity consumption in Toronto in 2005.

Commercial enterprises – Commercial enterprises within Toronto are large consumers of energy and large market for energy services. Commercial customers accounted for 29% of natural gas consumption in Toronto in 2004. Like industries, commercial enterprises are considered General Service customers by THESL, which accounted for 68% of electricity consumption in Toronto in 2005.

Residences – According to the 2001 census there are 1,634,755 households in Toronto. These households accounted for 54% of total gas consumption in Toronto in 2004 and 22% of total electricity consumption in Toronto in 2005. Many of the energy programs currently developed are targeted at residential gas and electricity consumers.

3.3 *Energy initiatives*

This section provides a description of energy initiatives currently underway in Toronto. These initiatives are divided into the following categories:

- Legislation and policy
- Corporate City Division and ABCs plans and reports
- Corporate City Divisions and ABC programs
- Other energy programs

Legislation and policy

This section provides a description of relevant legislation and policy related to energy, the environment and sustainability. This is not an exhaustive list of all of the legislation and policy at the municipal, provincial and federal level. A more complete inventory should be developed in future iterations of the Energy Plan.

Bill 53, Stronger City of Toronto for a Stronger of Ontario Act, 2005 and Bill 51, Planning and Conservation Land Statute Law Amendment Act, 2005 - Once passed, these bills will present the City Corporation

with opportunities to affect the nature and development of energy use in Toronto. Bill 53 will revise the City of Toronto Acts, amend certain public Acts in relation to municipal powers and repeal certain private Acts relative to the City of Toronto. Bill 53 received its first reading in the Ontario legislature on December 14, 2005.

The Energy Conservation Responsibility Act, 2005 - The *Energy Conservation Responsibility Act, 2005* received Royal Assent in March 2006. This Act can require all public agencies in Ontario, such as municipalities, to prepare annual energy conservation plans that must include the following information: a description of the agency's significant energy-consuming technologies and operations, a summary of annual energy usage for each technology and operation, a description of current and proposed activities and measures to conserve energy by technology and operation and to otherwise reduce the amount of energy that the agency uses, a summary of progress and achievements in energy conservation since the previous plan. The Act provides a description of what information needs to be included in the energy plans, but does not provide a process for gathering the information or using it to increase energy conservation in municipalities. These requirements may be included in regulations under the Act which are expected to be prepared.

Minister's Directive to the Ontario Power Authority regarding reliability supply in Toronto - In an attempt to address Toronto's electricity supply constraints, the Minister of Energy has directed the Ontario Power Authority (OPA) to move forward with building the Port Lands Energy Centre (PEC) to provide 550 Megawatts of new generation capacity. The PEC has proposed that its facility be delivered in two phases: phase one will have 330 Megawatts in service no later than the summer of 2008, and phase two will have 220 Megawatts in 2009 along with cogeneration capabilities to supply thermal energy to district heating facilities or other customers²⁸.

Toronto Hydro, in collaboration with Constellation Energy, has submitted an alternative proposal to the Ontario Power Authority to provide the generation and conservation requested in the Minister's Directive. The Toronto Hydro proposal promises all the required power at significantly lower cost than the PEC bid and claims that the generation capacity can be built within the existing Hearn plant.

Minister's Directive to the Ontario Power Authority regarding conservation in Toronto - As part of the Toronto Directive, the Minister

²⁸ In the Directive, the Minister indicated that the PEC proposal has an approved environmental assessment, and that the project is the only sufficiently advanced option to meet these supply constraints. The Minister stated that in the event that the PEC and the OPA are unable to execute and deliver a definitive contract, the OPA may seek to recover costs, relating to the interim financial guarantees it or assistance it provides by using its statutory authority for cost recovery.

of Energy also directed the OPA to seek up to 300 Megawatts of conservation and demand management in the Toronto area by 2010. This conservation is in addition to the 250 Megawatts of existing and planned conservation initiatives that THESL has committed to through to September 2007.

Corporate City Divisions and ABCs plans and reports

This section provides a description of the Corporate City Division and ABC plans and reports that have direct linkages to energy and energy use. Many of the programs described in the following section flow directly from these plans and reports. This is not an exhaustive list of the plans and reports that have direct linkages to and impacts on energy and energy use. Future planning iterations in the development of the Energy Plan will provide a more comprehensive list.

Strategic Plan – The Strategic Plan is Toronto Council's leadership document for Toronto. It sets out Council's strategic agenda, and guides all other planning initiatives and service delivery activities within the organization. The Strategic Plan describes what Council wants to achieve for Toronto and how the Corporate City can contribute to this vision. The Strategic Plan contains Council's vision for Toronto, a mission statement for the City government and Council's goals for the community. The goals in the plan are presented around five theme areas: community, economy, environment, governance and city-building²⁹. All stages of the Strategic Plan were approved in 2001 and as indicated in section 1.5 of this report, the Strategic Plan was used as basis for the planning framework for the work done so far on developing the Energy Plan.

Environmental Plan - *Clean, Green and Healthy: A Plan for an Environmentally Sustainable Toronto* is a vision for how to get to a cleaner, greener, healthier and more sustainable future for Toronto as a Whole. The Environmental Plan is a strategic document that contains recommendations about goals, targets, policies, strategies, structures and processes that will lead Toronto in the direction of environmental sustainability. It sets direction in many (but not all) key areas and builds on the environmental protection and enhancement efforts being carried out by the Corporate City, other agencies, and hundreds of individuals and organizations in all sectors of society. The Environmental Plan was prepared in 2000 by the Environmental Task Force³⁰. The mandate for the Environmental Task Force was transferred to the Sustainability Roundtable and then to the Roundtable on the Environment. As indicated in section 1.5 of this report the Environmental Plan was used as

²⁹ City of Toronto website (www.toronto.ca/strategic_plan/index.htm)

³⁰ City of Toronto website (www.toronto.ca/council/environtf_clean_green.htm)

basis for the planning framework for the work done so far on developing the Energy Plan. The Corporate City is updating the Plan in 2006.

Official Plan – The Official Plan is a blueprint for a healthy future and a strategy for directing growth in the City of Toronto over 30 years. The Plan is a long-term policy document, strategic and high level in its approach to future development, but clear in its vision. As the document states, " The vision of the Plan is about creating an attractive and safe city that evokes pride, passion and a sense of belonging – a city where everybody cares about quality of life." The Official Plan was finalized in 1999 and is currently being updated³¹.

Renewable Energy Action Plan – The Corporate City is currently developing a Renewable Energy Action Plan that is to be implemented across Corporate City Divisions and in partnership with partners such as Toronto and Region Conservation and Toronto Hydro. This plan will help the Corporate City meet its commitment, made in 2000, to obtain a quarter of its energy needs from renewable energy by 2005³². A detailed description of the Renewable Energy Action Plan and a graphical representation of the potential energy savings achievable as a result of implementing some of the initiatives including in the Plan is provided in Appendix B. The detailed description and graph were produced by Energy profiles Limited.

Clean Air Action Plan - The Corporate City is working on a comprehensive strategy to improve air quality in Toronto. The strategy will set out actions that local government, residents and businesses need to take in order to do their parts to protect air quality. The strategy will also identify opportunities for the Corporate City to work with other governments in an attempt to reduce air pollution that reaches Toronto from other places, including the United States³³.

10 Point Green Plan for the Port Lands - A 10 Point Green Plan for the Port Lands was prepared by a citizen panel in February 2006. This plan summarizes a number of energy production and energy efficiency initiatives that can be used as the basis for Corporate City and community response to the Port Lands Energy Centre project. The initiatives included in this 10 Point Green Plan for the Port Lands are: cut energy use in existing governmental and non-governmental buildings, set higher efficiency standards for new buildings, invest in cutting household energy use, utilize "Cool Cities" program, invest in

³¹ City of Toronto website (www.toronto.ca/torontoplan/official_plan.htm)

³² City of Toronto website (www.toronto.ca/greenguide/cleaner_air.htm)

³³ City of Toronto website (www.toronto.ca/greenguide/cleaner_air.htm)

renewable energy projects, expand the use of the City's current district energy system to provide cogeneration, use gas burned at Ashbridges Bay Treatment Plant for drying sludge to make electricity, expand Toronto Hydro program to convert stand-by generators in large buildings from diesel to natural gas, set up a number of district heating energy grids, provide substantial investment in green energy and efficiency. A detailed description and graphical representation of the potential energy savings achievable of some of these initiatives are provided in Appendix B. The detailed description and graphical representation were produced by Energy Profiles Limited.

Our Toronto Waterfront! — The Wave of the Future - In 1999, then Prime Minister Jean Chrétien, Premier Mike Harris and Mayor Mel Lastman announced the formation of the Toronto Waterfront Revitalization Task Force. This Task Force prepared a report, *Our Toronto Waterfront! — The Wave of the Future*, which provided a vision for a new Toronto waterfront that would be opened up to all Toronto's citizens and visitors. The Toronto Waterfront Revitalization Corporation has carried on this work and in 2005 developed a 5-year business plan to achieve this vision. Part of this vision includes the design and construction of a district heating plant to promote environmental stewardship.

The Waterfront Scan & Environmental Improvement Strategy Study - *The Waterfront Scan & Environmental Improvement Strategy Study* was completed in 2003 by the Corporate City's Environmental Services, Technical Services Division, Works and Emergency Services. This scan includes a review of the energy sector and outlines a set of environmental opportunities collectively referred to as the Integrated Energy Concept. This Integrated Energy Concept involves utilizing very high energy efficiency standards for Waterfront buildings and implementing a suite of energy supply technologies that will reduce the environmental impacts of energy generation. The technologies recommended include deep lake water cooling, natural gas fired cogeneration of electricity and heat energy, district heating, green energy sources such as solar and wind power, and anaerobic digestion of source separated organic waste.

Exhibition Place Environmental Plan – In 2004, the Board of Governors of Exhibition Place adopted a Development Concept to provide an overall framework for new initiatives at Exhibition Place. A fundamental part of this Development Concept was the development of an Environmental Plan to promote sustainable development and environmental initiatives. Part of this Environmental Plan included a target to achieve energy self-sufficiency by 2010. A number of programs have been implemented to achieve this target and are described in the following section. These programs include: Exhibition Place Wind Turbine, Green Roof at the Horse Palace, Hydrogen Village, Tri-

generation System, Photovoltaic Power Generation Plant, Energy Efficiency Retrofits.

Toronto Hydro-Electric System Conservation and Demand Management Plan – In 2004 THESL developed a Conservation and Demand Management (CDM) Plan to deliver CDM programs through 2007 to their customers in the City as Whole. Some of the programs laid out in this plan include: a co-branded mass market program (PowerWISE), a refrigerator buy-back program, a social housing program, energy audits and feasibility studies for commercial, industrial and institutional customers. THESL is also implementing CDM programs in partnership with the Corporate City, these programs are outlined in the following section.

Corporate City Divisions and ABC programs

This section provides a description of programs related to energy and energy use that are administered by the Corporate City including the ABCs. This is not an exhaustive list of all Corporate City programs; a more complete inventory of the Corporate City Division and ABC programs will be developed as part of future iterations in the planning for the completion of the Energy Plan. Some of these Corporate City and ABC programs are offered in partnership with other key energy players in Toronto. The linkages between these programs, other energy programs, Corporate City plans and legislation and policy will be further developed and identified in the Energy Plan.

Better Buildings Partnership (BBP) – The Better Buildings Partnership is an innovative private/public sector partnership of the Corporate City, the Toronto Atmospheric Fund, energy service companies and the local utilities (THESL and Enbridge) working with building owners and managers. The purpose of this program is to make buildings more energy efficient and reduce carbon dioxide emissions. Some of the specific programs included under the BBP include: Residential Energy Awareness Program, Large Office Building Program, Small/Medium Commercial Buildings Program, Multi-Residential Non-Profit Buildings Program, In-House Energy Efficiency Program, BBP Loan Repayment Reserve Fund³⁴.

Better Buildings New Construction Program (BBNCP) – The Better Buildings New Construction Program was designed by the City's Energy Efficiency Office in co-operation with Toronto Hydro to support Natural Resources Canada's Commercial Building Incentive Program (CBIP). The goal of both programs is to have new buildings designed to be at least 25% more energy efficient than those designed to only meet the

³⁴ City of Toronto website (www.toronto.ca/bbp/programs.htm#programs)

minimum requirements of the Model National Energy Building Code (MNEBC). The BBNCP has two parts: the design assistance phase and the constructed savings phase³⁵. A detailed description of this program and an analysis of the potential energy savings achievable through the program are provided in Appendix B. These materials were produced by Energy Profiles Limited.

Better Transportation Partnership (BTP) – The Better Transportation Partnership, a public-private partnership, patterned after the success of the BBP. This BTP was created to promote the use of energy efficient, low emission vehicles. Participants in the program seek out new and emerging transportation technologies such as low and zero emission vehicles and other commercially viable opportunities. The purpose of the program is to accelerate the rate of replacement of old vehicles by about 25%. To date the BTP has assisted in the purchase of about 70 light-duty natural gas vehicles for the Corporate City's fleet³⁶.

Green Fleet Expo – The Cities of Toronto and Hamilton, along with Fleet Challenge Ontario, hosted the first Green Fleet Expo at the Exhibition Place on May 15, 2006. The Expo displayed green fleet technologies in use today and provided Fleet Managers with information on green fleet technology³⁷.

Energy Management and Energy Retrofit Program - The Energy Management and Energy Retrofit Program of the Corporate City's Energy and Waste Management Office calls for significant reduction in energy use by all Corporate City facilities and operations³⁸.

Traffic Signal Changing – Over the next eight years, Transportation Services of the Corporate City in partnership with THESL will convert all traffic and pedestrian signals to new energy efficient lighting. The installation of this new lighting will dramatically reduce energy consumption and potentially save the Corporate City almost \$2 million per year³⁹.

Exhibition Place Wind Turbine – The first urban wind turbine in Toronto and North America is a joint venture of Toronto Hydro Energy Services

³⁵ City of Toronto website (www.toronto.ca/energy/bbnpc.htm)

³⁶ City of Toronto website (www.toronto.ca/energy/transportation.htm)

³⁷ City of Toronto website (www.toronto.ca/fleet/expo.htm)

³⁸ The City of Toronto Green Guide 2006. The City of Toronto and the Roundtable on the Environment.

³⁹ The City of Toronto Green Guide 2006. The City of Toronto and the Roundtable on the Environment.

Inc. and WindShare (a community-based co-operative). The 750 Kilowatt wind turbine has been operational since 2003 and generates up to 1,400 Megawatts hours of electricity a year⁴⁰.

Green Roof at the Horse Palace – In 2004, Exhibition Place constructed a 2,500 square foot green roof on the Horse Palace building. This roof was constructed to help to reduce the urban heat island effect and encourage the development of other green roofs on Exhibition Place grounds⁴¹.

Hydrogen Village – In partnership with Hydrogenics Corporation (a Canadian leader in hydrogen fuel cell technology) and the Corporate City's Energy Efficiency Office and Fleet Services Division, Exhibition Place launched the Fuel Cell Demonstration Project in summer 2003. Since then the following technologies have been demonstrated: The GEM – a small urban vehicle, the hydrogen refuelling station, and a 50 kilowatt hour HySTAT fuel cell generator⁴².

Tri-generation System – In partnership with the Toronto Atmospheric Fund (TAF), the Corporate City and the Federation of Canadian Municipalities, Exhibition Place has installed a tri-generation system in the National Trade Centre Complex. This tri-generation system is the sole source of power, heat and cooling for the National Trade Centre Complex and will provide approximately 30% of the energy needs of Exhibition Place. The tri-generation system is one of the biggest in Canada and is the first to be municipally owned. This project is just the first phase of a district energy system for the entire Exhibition Place site⁴³.

Photovoltaic Power Generation Plant – Exhibition Place is constructing a 50-100 kilowatt Pilot Photovoltaic Power Generation Plant on the roof of the Horse Palace building. This initiative will install, test and evaluate at least two types of photovoltaic systems and based on the evaluation results, the project will inform the design of large 1-2 million kilowatt generation system for the Exhibition Place grounds⁴⁴.

Energy Efficiency Retrofits – To reduce energy demand at Exhibition Place energy efficiency retrofits are being conducted on 5 buildings: the

⁴⁰ The City of Toronto Green Guide 2006. The City of Toronto and the Roundtable on the Environment.

⁴¹ Exhibition Place Environmental Plan

⁴² Exhibition Place Environmental Plan

⁴³ Exhibition Place Environmental Plan

⁴⁴ Exhibition Place Environmental Plan

Press Building, Queen Elizabeth Building Horse Palace, the General Services Building and the National Trade Centre Complex. The following measures are expected to result in a 2.32 million kilowatt hour reduction in energy use: lighting improvements, heating, ventilation and cooling system improvements, water conservation measures, building envelope upgrades, and infrastructure upgrades⁴⁵.

Lighting in Transit Shelters – Transportation Services of the Corporate City has installed solar-powered lights in 350 of the 4100 transit shelters in Toronto⁴⁶.

Deep Lake Water Cooling (DLWC) – A partnership between Enwave and Toronto Hydro the Deep Lake Water Cooling system takes cold water from Lake Ontario, and through a heat transfer process uses the cold energy to cool buildings in downtown Toronto. Enwave is one of the largest district energy systems in North America, serving 36% of the potential heating market and providing heating and/or cooling services to over 130 institutional and commercial buildings in downtown Toronto⁴⁷.

Mayor's Megawatt Challenge – The Corporate City of Toronto participates in the Mayor's Megawatt Challenge – a program created to help mayor's in the Golden Horseshoe area endorse and promote efforts to support energy-efficient building retrofits⁴⁸.

Green Roofs Program – The Corporate City has a \$200,000 fund that provides \$10 per square foot for creating a green roof on a building in Toronto. Toronto Hydro has been asked to provide an additional one million dollars to the fund⁴⁹.

Greening Health Care – Greening Health Care is a collaborative program among hospitals across the Greater Toronto Area to achieve energy and cost savings while minimizing air pollutions. Partners in this program include PowerStream and the Ontario Minister of Energy⁵⁰.

⁴⁵ Exhibition Place Environmental Plan

⁴⁶ The City of Toronto Green Guide 2006. The City of Toronto and the Roundtable on the Environment.

⁴⁷ Enwave website (www.enwave.com/enwave/)

⁴⁸ The City of Toronto Green Guide 2006. The City of Toronto and the Roundtable on the Environment.

⁴⁹ Toronto Star, Sunday April 30 2006. Page D10

⁵⁰ The City of Toronto Green Guide 2006. The City of Toronto and the Roundtable on the Environment.

City of Toronto's Green Toronto Awards – The annual City of Toronto's Green Toronto Awards recognize environmental leadership in Toronto. The awards honour leading companies, organizations and individuals that contribute to the greening of Toronto. Awards are presented in categories such as leadership, community projects, green design, energy conservation, water efficiency, youth, environmental, awareness, health and market transformation. The latest awards were presented on May 2, 2006⁵¹.

Employee Energy Efficiency at Work Program (E3@Work) – E3@Work was piloted in the Corporate City through a joint effort with the Energy Efficiency Office, the Energy and Waste Management Office and Information and Technology Division. This program was designed to help the Corporate City save on energy costs and protect the environment.

Distributed Generation - In addition to the tri-generation system and photovoltaic installation at Exhibition Place, the Corporate City is also working with THESL on a number of distributed generation projects including: at the Humber Treatment Plant, the Ashbridges Bay Treatment Plant, the Thackeray Landfill Site, and the Highland Creek Treatment Plant. These projects are part of THESL 2005-2007 Conservation and Demand Management Plan.

Conservation Programs – In addition to the energy efficiency retrofits at Exhibition Place, the work completed under the Better Buildings New Construction Program, and the traffic signal conversions the Corporate City is also working with THESL on a number of conservation and demand management programs including: Corporate City facilities retrofits (12 buildings), transmission system optimization, Corporate City Arenas retrofits (99 arenas), and fire stations retrofits (77 fire stations). These programs are part of THESL 2005-2007 Conservation and Demand Management Plan.

Other energy programs

This section provides an overview of some of the energy programs offered in Toronto by other energy players outside of the Corporate City and its ABCs. Other programs that are delivered in Toronto are highlighted in the descriptions of the key energy players. This is not an exhaustive list, and a more detailed inventory of all energy programs available to commercial enterprises, industries, institutions and residents will be developed for the Energy Plan.

⁵¹ The City of Toronto Green Guide 2006. The City of Toronto and the Roundtable on the Environment.

Keep Cool – The Keep Cool program is a room air conditioner exchange program delivered by the Clean Air Foundation in partnership with Home Depot Canada and other participating retailers, Toronto Hydro, Hydro One, Hydro Ottawa, Newmarket Hydro, PowerStream, Veridian, the Ontario Ministry of Environment, and Environment Canada. Participants from across Ontario, including Toronto, receive an instant \$25 gift card to use at any Home Depot location in return for turning in their old energy inefficient air-conditioners⁵².

Cool Shops - Cool Shops is a market transformation program delivered by the Clean Air Foundation targeting street-facing retailers in neighbourhoods across Ontario, including Toronto. The purpose of the program is to identify and implement in-store energy management measures that encourage the small-business commercial sector to save on utility costs and reduce energy consumption⁵³.

Winter Warmth Fund- Enbridge, in partnership with Toronto Hydro and the United Way, has developed the Winter Warmth Fund. The Winter Warmth Fund is designed for low-income families and individuals who have exhausted all other sources of financial support. The Winter Warmth Fund is a one time financial payment designed to allow eligible households to bridge the budget gap caused by unforeseen circumstances and to regain control of their gas bill. In 2005 - 2006, in addition to providing financial aid, the Winter Warmth Fund expanded to ensure that eligible households in Toronto also receive help improving the energy efficiency of their residences. As part of the program for 2005 - 2006, fund recipients who are homeowners will also be offered the Enhanced TAPS Program, which includes a personal visit from an energy efficiency expert who can provide energy saving tools. These include a free programmable thermostat, low-flow showerheads, pipe wrap and aerators for kitchen and bathrooms from Enbridge, as well as compact fluorescent light bulbs from Toronto Hydro⁵⁴. Enbridge also offers a wide range of other conservation programs for all of their customer classes.

Cool Savings Rebate – The Cool Savings program is a Conservation Bureau program offered to all Ontario residents, including those in Toronto, with existing central Air Conditioning (AC) systems. The program encourages residents to improve the operating efficiency of their AC systems by providing maintenance and upgrade rebates⁵⁵.

⁵² The Clean Air Foundation website (www.cleanairfoundation.org/switch_out/index.asp)

⁵³ The Clean Air Foundation website (www.cleanairfoundation.org/cool_shops/index.asp)

⁵⁴ Toronto Hydro Corporation website. (<http://micro.newswire.ca/release.cgi?rkey=1312011773&view=46250-0&Start=0>).

⁵⁵ Conservation Bureau website (www.coolsavingsrebate.ca)

Every Kilowatt Counts – This Conservation Bureau program was created to give every Ontario resident the ability to make effective conservation decisions. Starting April 26, 2006 every home in Ontario will receive a booklet of energy saving tips and money saving coupons. These coupons include: \$5 off a two-pack (or more) of ENERGY STAR® qualified compact fluorescent light bulbs, \$15 off a programmable thermostat, \$5 off an electric timer, and \$25 off an ENERGY STAR qualified ceiling fan. The coupons are redeemable at over 20 different retailers representing 1,600 stores in over 400 communities including Toronto⁵⁶.

Energy Management Pilot Program - In early 2005, Social Housing Services Corporation (SHSC) launched a pilot to analyze potential energy savings, access to low-interest financing, and conduct retrofits in social housing units. Currently participants in the pilot can submit to SHSC the energy saving measures that they want to implement in their units and receive information about which programs and funding is available to assist them. This program is delivered in partnership with the Ontario Power Authority, Toronto Hydro, and NRCan.

Infrastructure Renewal Loan Program – The Infrastructure Renewal Loan Program provides low cost, longer term loans to municipalities and universities to help them to build and renew critical local infrastructure projects including projects related to energy efficiency and conservation. This is a program of the Ontario Strategic Infrastructure Financing Authority (OSIFA), a Government of Ontario agency⁵⁷.

Toronto Region Sustainability Program (TRSP) – The TRSP is a multi-year program which provides small to medium-sized manufacturing enterprises (SME) in the Greater Toronto Area with pollution prevention (P2) technical assistance, coupled with financial incentives to implement P2 planning and action. The Program is delivered by the Ontario Centre for Environmental Technology Advancement (OCETA), a private, not-for-profit organization, and addresses key sustainability initiatives, consistent with the environmental priorities of three orders of government including energy efficiency. Environment Canada, the Ontario Ministry of Environment (MOE), the City of Toronto and the Toronto and Region Conservation Authority (TRCA) are partners in this program⁵⁸.

⁵⁶ Conservation Bureau website (www.everykilowattcounts.ca/index_e.php)

⁵⁷ Ontario Strategic Infrastructure Financing Authority website (www.osifa.on.ca/default.asp)

⁵⁸ Toronto Region Sustainability Program website (www.oceta.on.ca/toronto.htm)

3.4 Summary of Present State

The Present State of energy in Toronto is summarized in Table 3 This summary of the Present State⁵⁹ is based on the proceeding information on the Present State and with a view of providing the current situation for the elements of the Preferred State developed in section 2.

Table 3 The Present State

<p>Some goals, objectives and targets have been set; additional coordination and development of plans and strategies is needed</p>
<ul style="list-style-type: none"> • The Environmental Plan, adopted by Toronto City Council, includes a number of ambitious energy and environmental goals, objectives and targets. An update of the Environmental Plan is underway and a new Environmental Plan is expected by the end of 2006. • The Corporate City is developing a Clean Air Action Plan • The Corporate City is developing a Renewable Energy Action Plan • Exhibition Place has developed the Exhibition Place Environmental Plan • The Corporate City is updating the Official Plan and the Environmental Plan • Toronto Hydro has a Conservation and Demand Management Plan for 2005-2007 • The Corporate City is developing a Green Development Standard • The Corporate City is developing specific greenhouse gas reduction targets as part of the Clean Air Action Plan
<p>Awareness and commitment to energy sustainability, “conservation first” and green energy is present, and should be strengthened</p>
<ul style="list-style-type: none"> • The Corporate City has embarked on the development of an Energy Plan. To date, the draft Terms of Reference for the Energy Plan were reviewed by the Roundtable on the Environment in February 2006. The EEO provided the draft Terms of Reference for comment to more than 50 stakeholders in April 2006. A report on the development of an Energy Plan for Toronto will be provided to Toronto City Council in June 2006. • Energy sustainability has some Corporate City employee buy-in with 2.5% of employees participating in the Employee Energy Efficiency@ Work Program

⁵⁹ The Present State is the current situation of the elements of the Preferred State and therefore gives an indication of how far away the present is from the desired future. The Present State generally contrasts the Preferred State. The purpose of identifying the Present State is to understand where Toronto is now, what resources are available to move towards the Preferred State, and what obstacles may be encountered. The identification of the Present State enables actions, measures and development steps to be developed that will take Toronto towards the Preferred State of energy use. It also allows targets for actions to be set based on the ‘gap’ between the Present and Preferred state.

- Energy sustainability has been an important issue at the Roundtable on the Environment
- Bill 53 - Stronger City of Toronto for a Stronger Ontario Act, 2005 and Bill 51- Planning and Conservation Land Statute Law Amendment Act, 2005, once passed, will present the Corporate City with opportunities to affect the nature and development of energy use in Toronto
- The Corporate City has provided support to the Greater Vancouver Regional District, Winnipeg, Kingston and Buffalo to develop and launch a program similar to the Better Buildings Partnership
- City of Toronto's Green Toronto Awards are presented to environmental leaders in Toronto
- Corporate City employees, including ABCs, need to obtain broader recognition for their excellence in sustainability

Some integration and coordination is present, and this should be enhanced

- Links of energy initiatives to the Corporate City and ABC other plans (e.g. Strategic Plan, Official Plan, Environmental Plan, Making Green Roofs Happen: Report on the Environmental Benefits and Costs of Green Roof Technology for the City of Toronto, and the Exhibition Place Environmental Plan, Clean Air Action Plan, Renewable Energy Action Plan, Green Development Standard, etc.).
- Energy links to all major Corporate City Divisions (Toronto Public Health, Affordable Housing, Homes for the Aged, Parks, Forestry & Recreation, Economic Development, Culture and Tourism, Technical Services, Building, City Planning, Municipal Licensing & Standards, Policy, Planning, Finance and Administration, Clean & Beautiful Secretariat, Toronto Water, Solid Waste Management, Transportation Services, Purchasing & Materials Management, Information & Technology, Fleet Services and Facilities & Real Estate) should be strengthened
- There is some coordination and partnership between Corporate City Divisions and ABCs in the design and delivery of energy programs
- The Corporate City has initiated the development of an Energy Plan for Toronto to improve integration of energy initiatives for Toronto
- The Executive Environmental Team (EET) has been created to provide strategic leadership and management oversight of Corporate City's environmental goals, policies and program implementation. This team's goal is to enhance cross-divisional communication and collaboration on the environmental front

Some components of a coherent energy system for Toronto are present

- The Corporate City is developing an Energy Plan for Toronto
- The Corporate City has some measurable energy and environmental targets. The EEO has some identification, monitoring and tracking of specific measures to achieve the Corporate City's energy and environmental targets
- There are some Corporate City and ABC programs that offer incentives for sustainable energy development in Toronto

- Not all disincentives to improve energy performance have been eliminated

Some successful partnerships have been achieved; these could be strengthened and expanded, and partnerships with new players should be formed

- There are sustainable energy initiatives in buildings and transportation that are designed and delivered effectively through public-private partnerships
- The Corporate City acts as a delivery agent for both public (non-Corporate City originated) and private energy initiatives. This role needs to be strengthened
- Some of the Corporate City sustainable conservation and demand management programs are self-financed and self-sustaining
- Private sector investment in energy conservation, demand management and green energy is growing, and should be accelerated
- The EEO has partnerships with THESL to provide conservation and demand management projects

The Corporate City has achieved success in improving environmental and energy performance. These efforts need to be increased

- The Corporate City has achieved their target of net carbon dioxide reduction by 20% relative to 1990 levels, by 2005. No new target has been set by the Corporate City
- There was a council resolution but no progress has been made by the Corporate City toward meeting the green energy target of supplying 25% of its electricity needs from green energy
- Corporate City Divisions have reduced energy usage. Bill 21 may require the Corporate City to prepare an energy plan and report on results
- 40% of ICI floor area in Toronto has committed to the BBP retrofit program
- The Corporate City is working on adopting a building standard that requires mandatory compliance to the efficiency of the Model National Energy Building Code plus 25%

4 Moving from the Present to the Preferred State

To move from the Present State to the Preferred State the goals, objectives and targets that need to be met are identified and actions and measures are developed to meet these goals, targets and objectives. The actions and measures are selected to transform the current energy situation to where we want it to be.

This section outlines the first cut at goals, objectives, targets, actions and measures that have been identified to move from the Present State of Energy in Toronto to the Preferred State of energy in Toronto⁶⁰. These elements were identified using the process and model identified in section 1. The first cut at developing these elements is based on the following:

- A review of the SEBP to determine which goals, targets, actions and measures of the Plan are still applicable and desirable
- A brainstorming and visioning session
- A preliminary analysis of the Present and Preferred States to determine which goals, targets, actions and measures already exist and which are desirable for Toronto's energy future

Goals

Table 4 below outlines the goals of the Energy Plan identified to date. These goals represent broad, policy-level statements concerning a Preferred State. These goals flow from the Corporate City's Strategic Plan and Environmental Plan and were developed in consultation with the Corporate City's Energy Efficiency Office. These goals, and the objectives, actions and targets etc. that flow from these goals, are represented schematically in Figure 10. Additional goals may be identified in future iterations of the Energy Plan.

⁶⁰ Development steps consist of background work that is necessary to support the development and implementation of measures. Development steps were identified as part of the 2002 SEBP, but have not been developed for this report on the development of the Energy Plan for Toronto due to the preliminary nature of the analysis. Specific development steps required for developing and implementing the measures should be developed in future iterations on the Energy Plan.

Table 4 Goals of the Energy Plan for Toronto identified to date

Goals
<ul style="list-style-type: none">• Toronto’s air is clear and free of harmful pollutants [EP-20a]⁶¹• A sustainable energy infrastructure for Toronto that supports the efficient production, transmission, distribution and use of energy from renewable sources [EP-27]• Environmental health for Toronto; protection from environmental risk [Strategic Plan]• Obtain a secure supply of energy to ensure economic stability• All Corporate City and ABC expenditures are approved based on triple bottom line analysis• “Conserve First”• Replace or reduce transportation energy needs [EP-25c]• Provide wide choice of sustainable transportation options that reduce negative impacts [EP-25]• Ensure environmentally sustainable development and urban form [EP-35]

Objectives

Table 5 below outlines the objectives of the Energy Plan identified to date. These objectives are over-arching quantitative aims that may result in multiple actions and targets. The objectives identified in the Energy Plan to date are very broad targets developed by the Ministry of Energy and Toronto Hydro to provide conservation and demand management and generation in Toronto. All of the targets, actions and measures that have been identified to date while developing the Energy Plan relate directly to meeting these objectives. These objectives, and the actions and targets that flow from them are represented schematically in Figure 10. The objectives are only shown on the first page of Figure 10, however, the targets, actions and measures on all three pages of Figure 10 flow from these three objectives. Additional objectives may be identified in future iterations of the Energy Plan.

⁶¹ The information contained in the square brackets refers to the document (e.g. the City of Toronto Strategic Plan, Environmental Plan, Official Plan) that the component of the Energy Plan was developed from

Table 5 Objectives of the Energy Plan for Toronto identified to date

Objectives
<ul style="list-style-type: none"> • To provide 550 MW of new generation capacity in Toronto by 2009 based on the Minister of Energy's Directive • To provide 300 MW of conservation and demand management in the Toronto Area by 2010 based on the Minister of Energy's Directive • As part of Toronto Hydro's Conservation and Demand Management plan, to provide 250 MW of conservation by 2007

Targets

The specific targets of the Energy Plan identified to date are shown in Table 6 below. These targets are specific quantitative aims that are related to a particular action. The targets identified in the plan to date are shown schematically in Figure 10. These targets flow from other plans developed by the Corporate City including the Environmental Plan and the Exhibition Place Environmental Plan. Some of these targets will need to be reconsidered in the near future to remain consistent with the Corporate City plans that are currently under review and development including the Environmental Plan, the Renewable Energy Action Plan, and the Clean Air Action Plan. New targets are expected to be identified as a result of the development of these plans and through further development of the Preferred and Present State in future iterations of the Energy Plan.

Table 6 Targets of the Energy Plan for Toronto identified to date

Targets
<ul style="list-style-type: none"> • The City and its ABCs purchase 25% of their energy needs through green energy [EP-30ab] consistent with Renewable Energy Action Plan • Toronto meets 25% of its energy needs through green energy by 2012, consistent with Renewable Energy Action Plan • THESL includes 1000 MW of green power in its Conservation and Demand Management Plan [EP-30d] • 100% of large new developments in Toronto will use district heating and cooling, especially deep lake water cooling where feasible, by 2015 [EP-32b] • 100% of new developments in Toronto will achieve a 25% improvement over MNEBC • Retrofit 40% of Industrial, Commercial and Institutional (ICI) buildings (400 million square feet if floor) area by 2012 [EP-28e]

- Decrease net CO₂ emissions in the Corporate City by 20% with respect to 1990 levels consistent with the Clean Air Action Plan
- All City Divisions and ABCs will reduce energy use in their operations and in their buildings by a minimum of 15% by 2005 [EP-29a], consistent with the updated Environmental Plan
- Acceleration of Corporate City fleet turnover by 25%. This will be updated by Corporate City Fleet Manager.
- Achieve energy self-sufficiency at Exhibition Place by 2010
- Install solar powered lights in 50% of transit shelters by 2010 and in 100% of transit shelters by 2030

Actions

Actions are physical or behavioural changes. The actions identified to date to be part of the Energy Plan are listed in Table 7 below. These actions are also represented schematically in Figure 10, which shows the inter-relationships between the various goals, objectives, targets, actions measures and coordinating strategies. Some of these preliminary actions will need to be updated based other work that is being completed at the Corporate City including the development of the new Green Development Standard.

Table 7 Actions of the Energy Plan for Toronto identified to date

Actions
<ul style="list-style-type: none"> • Establish green industries including industries that produce wind turbines, photovoltaic cells, soil remediation technologies, recycling technologies etc. [EP-38a] • Use green energy consistent with Renewable Energy Action Plan • Use district heating and cooling • Build all new buildings in Toronto to achieve a 25% improvement over MNEBC – Corporate Planning Division is developing new Green Development Standard • Retrofit Industrial, Commercial and Institutional (ICI) buildings • Create emission credits for the Corporate City • Improve energy design of residential buildings • Retrofit City Corporate and ABC buildings • Reduce shipping of goods [EP-25c] • Reduce travel by employees, suppliers and customers [EP-25c]

- Use low-capital/low cost modes of travel (e.g. walking, cycling, flexible transit)
- Replace fleets with low emission/fuel efficient vehicles
- Purchase cleaner fuel for fleets
- Integrate energy, transportation and land use planning air quality targets
- Improve building design e.g. by using recycled grey water & rainwater, recycled materials in construction, CDM and renewable technologies [EP-31f]
- Use stormwater management in new developments to reduce embedded energy requirements for storm sewers and pumping requirements for watering [EP-35e]
- Maximize use of existing energy infrastructure before building new infrastructure [EP-35c].
- Design and implement Conservation and Demand Management (CDM) programs
- Implement energy self sufficiency at Exhibition Place
- Install solar powered lights in transit shelters
- Recognize sustainability leaders in Toronto for their excellence

Measures

Measures are information, regulations, economic incentives or other mechanisms that encourage actions. These measures were developed by reviewing the measures contained in the SEBP, through consultation with the EEO and stakeholders and by identifying measures that will move the actions that have been identified to date forward.

At this early stage of the planning process all the measures that have been identified to date are considered important. Therefore, in order to distinguish between them to set initial priorities for discussion, the measures were rated based on their urgency (help to address Toronto's imminent energy shortfall) and ease of implementation (degree to which the measure can be implemented quickly and with adequate resources). These are an initial set of priorities and require additional analysis. With further iterations of the planning process, these priorities may be modified and additional priorities may be added.

The measures identified to date have been classified into the following three categories:

- Very urgent and easy to implement

- Urgent and easy to implement, but may require some additional effort
- Not as urgent and may not be as easy to implement

The very urgent and easy to implement measures are considered “quick-start” measures that should be implemented by 2010 to meet the immediate energy demand constraints (Table 8). The urgent and easy to implement, but may require some additional effort are measures that have a longer time-frame for implementation and are more difficult to implement, these measures should be implemented by 2015 (Table 9). The not as urgent and may not be as easy to implement measures are those that are not as a critical and may be more difficult to implement due greater coordination, lack of resources etc. and that should be implemented by the end of the 2030 planning period (Table 10).

Measures that are categorized as not as urgent and not as easy to implement should still be viewed as an integral piece of the Energy Plan for Toronto. Measures in this category are simply more difficult to implement and may require a longer time period or lead time to be implemented.

“Quick-start” measures should begin to be undertaken immediately to ensure implementation by 2010. Measures that should be undertaken by 2015 or by 2030 can begin implementation in the next six months or can be started at a later date, depending on resource constraints and the time required for implementation.

This system of categorizing the measures was developed in consultation with the Energy Efficiency Office of the Corporate City. This classification is viewed as a preliminary first cut to assist in and to stimulate further discussion on setting priorities. Refinements to classifying and categorizing priorities for the measures should be made in future iterations of the Energy Plan.

These measures and their classifications are shown schematically in Figure 10. In this schematic the measures are grouped according to how they relate to the actions and targets identified to date in the Energy Plan.

Table 8 Measures identified to date during the development of the Energy Plan for Toronto that are very urgent and very easy to implement

Very urgent and easy to implement (2010)
<ul style="list-style-type: none"> • Re-invest the savings from Corporate City Conservation and Demand Management (CDM) and renewable energy projects to contribute to the capital and operational costs of green power for the Corporate City’s use [EP-34d]⁶², consistent with Renewable Energy Action Plan • Host renewable and Conservation and Demand Management (CDM) demonstration projects (e.g. Exhibition Place) • Implement Green Roofs Program • Implement Better Buildings New Construction Program • Give priority to proposals that meet Conservation and Demand Management (CDM) targets [EP-31d] • Use Toronto Hydro rates/incentives to aid Conservation and Demand Management (CDM) [EP-34b] • Collect and track energy use proposed for new construction and retrofits in Toronto • Expand BBP retail/hospitality program • Expand BBP to the Municipal, Universities, Schools, Hospitals (MUSH) sector • Implement Conservation and Demand Management (CDM) campaigns with industry stakeholders; CDM self assessment, residential website resource centre, residential energy awareness, low-income programs, employee energy efficiency program, ABC program, Mayor’s Megawatt Challenge • Encourage all ABC and Division building projects to be done through the Energy Retrofit Program (ERP) and BBP • Implement procurement policy for lower emission fuel alternatives, consistent with Green Fleet Transition Plan • Create Green Development Standard [EP-31f] • Designate new development areas as model communities to display innovative Conservation and Demand Management (CDM) and renewable technologies [EP-33] • Implement THESL Programs; co-branded mass market program (PowerWISE), refrigerator buy-back program, social housing program, energy audits and feasibility studies for commercial, industrial and institutional customers, expand BBP Partnership Loan Program with TAF, expand CDM to go beyond 5% peak load reduction target

⁶² EP-34d refers to the specific recommendation contained in the Environmental Plan

- Implement Exhibition Place Programs; Exhibition Place Wind Turbine, Green Roof at the Horse Palace, Hydrogen Village, Tri-generation System, Photovoltaic Power Generation Plant, Energy Efficiency Retrofits
- Set up a number of district energy grids - to provide electricity, heating and cooling systems with high distribution and utilization efficiencies⁶³
- Implement the economic conversion of diesel standby generators to dispatchable cleaner generation⁶⁴

Table 9 Measures identified to date during the development of the Energy Plan for Toronto that are urgent and easy to implement with some additional effort

Urgent and easy to implement, but may require some additional effort measures (2015)

- Provide access to appropriate space, favourable leases, and low-cost financing to “green energy generators and users” [EP-38b], consistent with Renewable Energy Action Plan
- Promote the benefits of the green energy economy to the public and private sectors [EP-38f], consistent with Renewable Energy Action Plan
- Use full life cycle analysis for energy related capital goods, to ensure that new capital investment reflects a commitment to sustainability [EP-38h]
- Develop green energy procurement policy, consistent with Renewable Energy Action Plan
- Develop submission to Council to propose expansion of green power target to Toronto
- Implement building design challenge [EP-31b] (e.g. create energy efficiency condominium competition)
- Impose mandatory requirement that new development meet at least MNECB+25%. Pending Green Development Standard
- Create policy to require all new large developments in Toronto, ABCs and Divisions to use district heating & cooling where feasible [EP-32ab]. Pending Green Development Standard
- Increase understanding and awareness of green energy buildings in communities in Toronto
- Develop innovative ways to fund green energy buildings

⁶³ A detailed description of this project and the energy saving achievable are found in Appendix B. These materials were prepared by Energy Profiles Limited.

⁶⁴ A detailed description of this project and the energy saving achievable are found in Appendix B. These materials were prepared by Energy Profiles Limited.

- Implement BBP ICI and multi-residential programs; feasibility study assistance and technology transfer
- Provide industrial energy assessment services and consultants partnership [EP-37c]
- Provide marketing and technical support services
- Provide Divisions and ABCs with information on the costs of energy use [EP-29c]
- Implement Better Transportation Partnership (BTP), consistent with Green Fleet Transition Plan
- Take transportation energy impacts into account when making decisions about new investments [EP-35d]
- Consider energy-related air quality in transportation and land use planning [EP-20d], consistent with Clean Air Action Plan
- Use life cycle analysis when evaluating energy infrastructure and services [EP-36e]
- Present City of Toronto's Green Toronto Awards on an annual basis
- Provide energy efficiency training & technical support [EP-37c]

Table 10 Measures identified to date during the development of the Energy Plan for Toronto that are not as urgent and not as easy to implement

Not as urgent and may not be as easy to implement measures (2030)
<ul style="list-style-type: none"> • Create markets for Conservation and Demand Management (CDM) and renewable energy products [EP-38d], consistent, with Renewable Energy Action Plan • Use sliding scale building permit fee based on energy efficiency [EP-31d] • Advocate increased training on Conservation and Demand Management (CDM) for energy professionals, contractors, architects & engineers [EP-37c] • Create a policy to designate certain new developments as net energy producers based on green energy • Implement strategy for emissions trading • Implement BBP ICI and multi-residential programs; sustainability awards program, promotional program with key stakeholders • Implement BBP home services Conservation and Demand Management (CDM) program with local contractors • Promote use of information & communication technology to reduce travel needs [EP-36b]

- Give priority in transportation & land use planning to use of sustainable energy in transportation [EP-25d, Official Plan]
- Use solar powered lights in all transit shelters

Coordinating strategies

Coordinating strategies are actions that link two or more actions or measures together. A complete list of the coordinating strategies identified to date to be part of the Energy Plan is shown in Table 11 below. These coordinating strategies are plans, strategies and structures that are needed to help coordinate the other plan elements and link them together. Many of these coordinating strategies, including: the Clean Air Action Plan, Renewable Energy Action Plan, the Official Plan, and the Environmental Plan are currently in the process of being updated or developed.

Those coordinating strategies that are considered to be very urgent and very easy to implement have been categorized as “quick-starts” and displayed as such in Figure 10. Where possible in Figure 10 these coordinating strategies are placed next to the measures to which they are most closely associated. However due to the broad and overlapping nature of many of these coordinating strategies some of the coordinating strategies are placed in the schematic in no particular order.

Table 11 Coordinating Strategies for the Energy Plan for Toronto identified to date

Coordinating strategies
<ul style="list-style-type: none"> • Identify the Corporate City and ABC roles and responsibilities for energy • Strengthen EEO partnerships • Develop CO₂ Reduction Plan • Develop a Waterfront Energy Plan • Develop Sustainable Energy Transportation Plan [EP-26] • Develop Clean Air Action Plan • Develop Renewable Energy Action Plan • Update the Official Plan • Update the Environmental Plan • Develop a green energy economic development strategy

- Develop an Energy Plan for Toronto [EP-28b]
- Implement the Exhibition Place Environmental Plan
- Create a visionary approach on long term sustainability for Toronto
- Create a coordinated approach to energy in the Corporate City and its ABCs
- Develop a Climate Change Plan
- Develop a plan for energy emergencies (emergency preparedness)
- Implement Green Fleet Transition Plan
- Develop and implement Green Development Standard

Any coordinating strategy underway and expected to be completed before 2010 is a “quick-start”. As well, there are additional coordinating strategies that can get underway immediately that have also been deemed to be “quick-starts” and these are:

- *Create a coordinated approach to energy within the Corporate City and its ABCs.* Clear and consistent energy policy direction must be developed and implemented across these organizations. The Corporate City does not have an existing organizational structure within it that has the authority to provide this type of direction. The Chief Administrators Officer’s office could provide this type of direction to the Corporate City if given this mandate, but does not have the authority to provide this type of binding energy policy direction to the ABCs.

Therefore, it is recommended that a new structure within the Corporate City be developed that reports directly to Council and serves as the 'one window', central directing and coordinating body for the Corporate City and its ABCs on energy policy. This new structure will have the authority to direct Corporate City Divisions and ABCs exclusively on energy matters. This new structure should have the power to negotiate on behalf of the Corporate City with external organizations (such as the Ontario Power Authority) and provide a 'one window' entry point to the Corporate City for these external organizations.

- *Develop a plan for energy emergencies (emergency preparedness).* In light of the potential for rotating blackouts in Toronto related to the current energy constraints within the City

and to protect citizens from a blackout caused outside the City boundaries, the Corporate City needs to develop a plan for energy emergencies for Toronto.

- *Create a visionary approach on long term sustainability for Toronto.* There is also a need for the City of Toronto to look beyond this short term emergency situation and renew a long term sustainability vision for the City. Globally, cities are becoming important vehicles for moving society towards sustainability. Development of sustainability strategies will be increasingly important both in realizing global and local goals (such as in the reduction of greenhouse gas emissions), but also in improving the quality of life for city residents and attracting economic development. Energy issues are fundamental to these sustainability strategies. In the past, Toronto has been a leader in developing sustainable city strategies, but renewed effort will be required if this lead is to be maintained.

The renewed vision can be developed using the vision and projects currently being implemented on the waterfront as a showcase for sustainable development. There is also a need for the City of Toronto to maintain its leadership position on environmental and energy matters related to the Corporate City.

5 Conclusions and next steps

This report on the development of the Energy Plan reflects the progress that the Energy Efficiency Office and IndEco have made on the development of the Energy Plan. The report represents early and preliminary thoughts on the content of the Energy Plan which require both internal consultation within the Corporate City Divisions and ABCs and with the external stakeholders.

The purpose of this report on the development of the Energy Plan for Toronto was to: document the work that has been completed to date on the development of the Energy Plan, provide a framework for further development of the Energy Plan, provide a basis for stimulating discussion on the development and content of the Energy Plan within the Corporate City Divisions and ABCs, assist in finalizing the Terms of Reference for the Energy Plan, and provide a basis for extensive public consultation on the Energy Plan.

This report has defined and presented a preliminary overview of the Present State and Preferred State of energy in Toronto. The report has also identified goals, objectives, targets, actions and measures that will assist moving Toronto from the Present to the Preferred State. The measures identified have also been categorized to identify which of these measures should be considered “quick-starts” that should be implemented by 2010 to address the immediate energy demand constraints. These “quick-start” measures that are considered very urgent and easy to implement are highlighted in Table 12 below.

Table 12 "Quick-start" measures identified to date that should be implemented to address immediate energy constraints

Very urgent and easy to implement measures (2010)
<ul style="list-style-type: none">• Re-invest the savings from Corporate City Conservation and Demand Management (CDM) and renewable energy projects to contribute to the capital and operational costs of green power for the Corporate City's use [EP-34d], consistent with Renewable Energy Action Plan• Host renewable and CDM demonstration projects (e.g. Exhibition Place)• Implement Green Roofs Program• Implement Better Buildings New Construction Program• Give priority to proposals that meet Conservation and Demand Management (CDM) targets [EP-31d]

Figure 10 Energy Plan Components

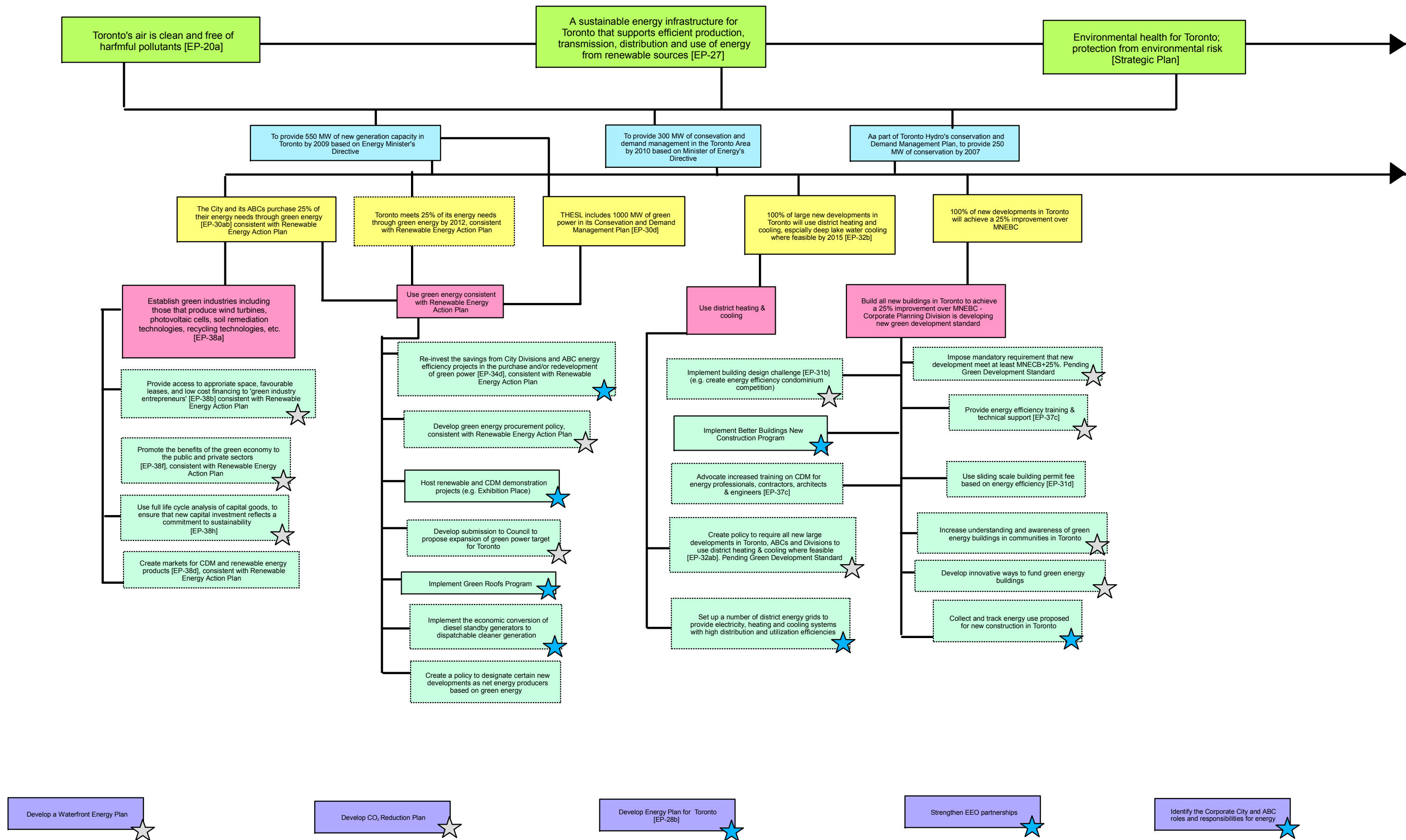


Figure 10 Energy Plan Components

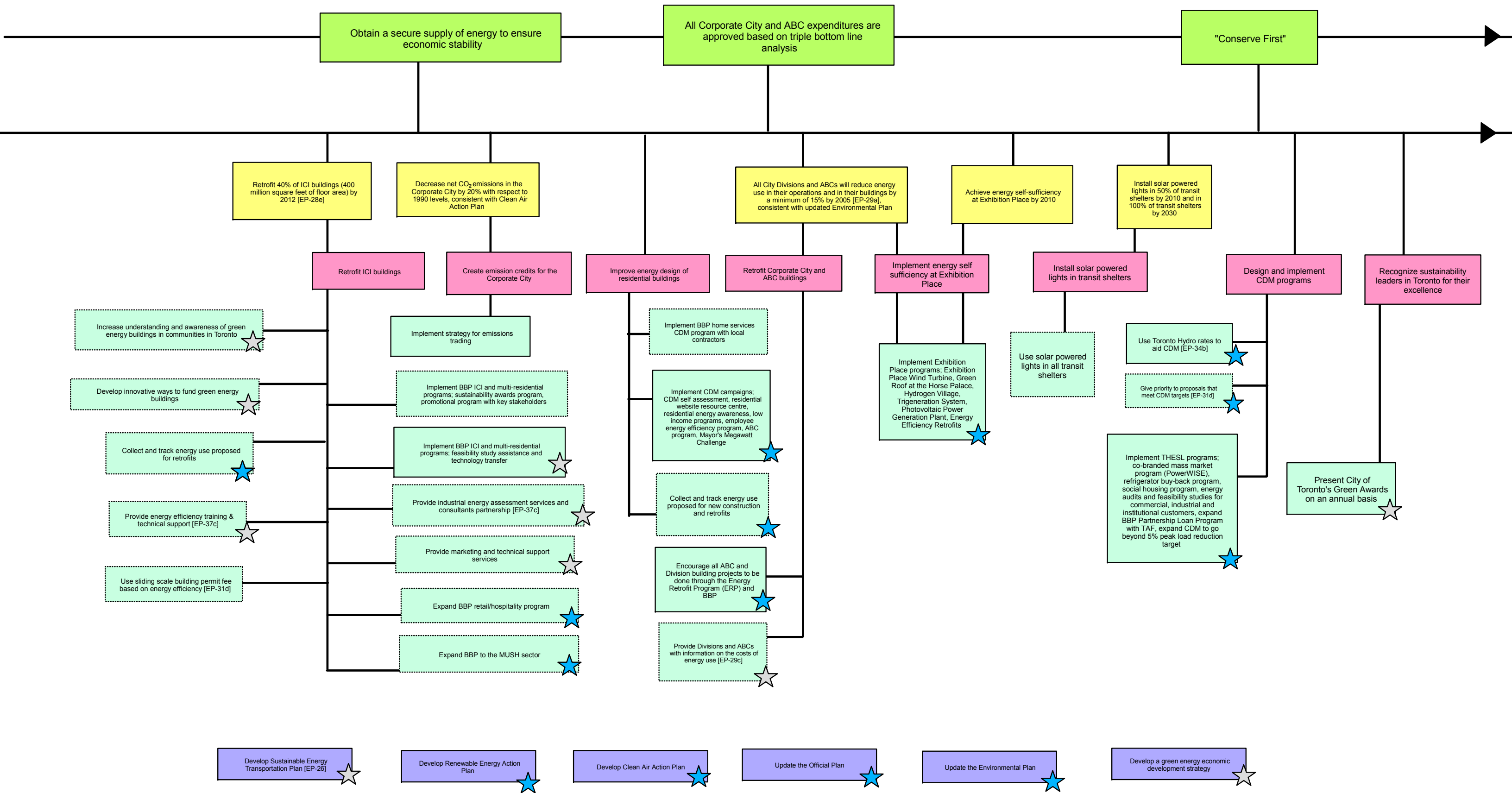
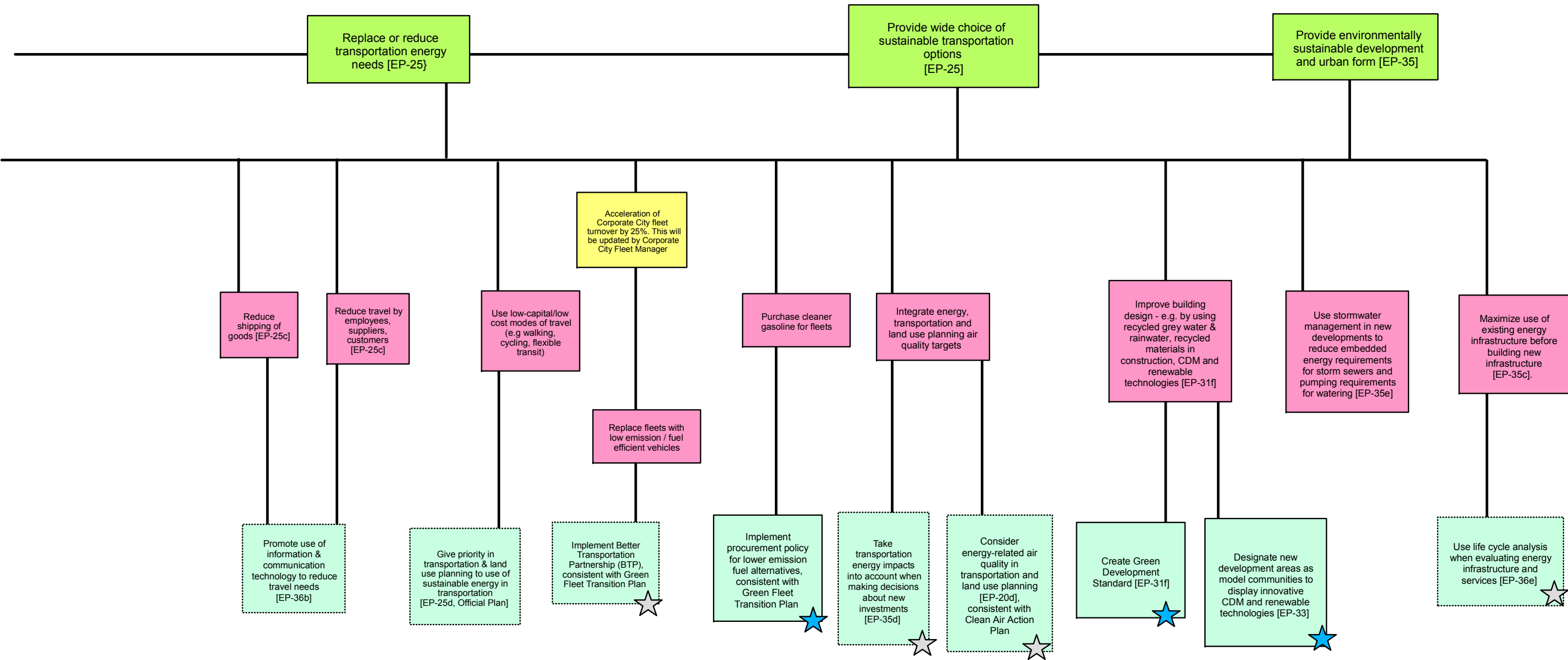


Figure 10 Energy Plan Components



Legend:

- Goals**
- Targets**
- Proposed Targets**
- Actions**
- Existing Measures**
- Proposed Measures**
- Coordinating Strategies**
- ★ **(20/0) Very Urgent & easy to Implement**
- ☆ **(20/5) Urgent & easy to Implement**

- Implement the Exhibition Place Environmental Plan ★
- Create a coordinated approach to energy in the Corporate City and its ABCs ★
- Develop a plan for energy emergencies (emergency preparedness) ★
- Develop and implement Green Development Standard ★
- Create a visionary approach on long term energy sustainability for Toronto ★
- Implement Green Fleet Transition Plan ★
- Develop a Climate Change Plan ☆

- Use Toronto Hydro rates/incentives to aid Conservation and Demand Management (CDM) [EP-34b]
- Collect and track energy use proposed for new construction and retrofits in Toronto
- Expand BBP retail/hospitality program
- Expand BBP to the Municipality, Universities, Schools, Hospitals (MUSH) sector
- Implement Conservation and Demand Management (CDM) campaigns with industry stakeholders; CDM self assessment, residential website resource centre, residential energy awareness, employee energy efficiency program, ABC program, Mayor's Megawatt Challenge
- Encourage all ABC and Division building projects to be done through the Energy Retrofit Program (ERP) and BBP
- Implement procurement policy for lower emission fuel alternatives, consistent with Green Fleet Transition Plan
- Create Green Development Standard [EP-31f]
- Designate new development areas as model communities to display innovative CDM and renewable technologies [EP-33]
- Implement THESL Programs; co-branded mass market program (PowerWISE), refrigerator buy-back program, social housing program, energy audits and feasibility studies for commercial, industrial and institutional customers.
- Implement Exhibition Place Programs; Exhibition Place Wind Turbine, Green Roof at the Horse Palace, Hydrogen Village, Tri-generation System, Photovoltaic Power Generation Plant, Energy Efficiency Retrofits.
- Set up a number of district energy grids - to provide electricity, heating and cooling systems with high distribution and utilization efficiencies
- Implement the economic conversion of diesel standby generators to dispatchable cleaner generation

Any coordinating strategy underway and expected to be completed before 2010 is a "quick-start".. As well, there are additional coordinating strategies that can get underway immediately that have been deemed to be a "quick-starts" and these are:

- Develop a coordinated approach to energy within the Corporate City and its ABCs.
- Develop a plan for energy emergencies.

- Create a visionary approach on long term sustainability for Toronto.
- Develop an Energy Plan for Toronto.

A list of all the “quick-start” coordinating strategies is shown in Table 13 below.

Table 13 Coordinating strategies identified to date that are considered “quick-starts”

Coordinating strategies
<ul style="list-style-type: none"> • Identify the Corporate City and ABC roles and responsibilities for energy • Strengthen EEO partnerships • Develop an Energy Plan for Toronto[EP-28b] • Develop Clean Air Action Plan • Develop Renewable Energy Action Plan • Implement Green Fleet Transition Plan • Update the Official Plan • Update the Environmental Plan • Implement the Exhibition Place Environmental Plan • Create a visionary approach on long term sustainability for Toronto • Create a coordinated approach to energy in the Corporate City and its ABCs • Develop a plan for energy emergencies (emergency preparedness) • Develop and implement Green Development Standard

Next steps

The development process for the Energy Plan is designed to be an iterative process that will include extensive stakeholder and public consultation. The process will build upon the work initiated by the EEO and IndEco that is documented in this report. Further work will expand upon, modify and refine this initial work, leading to the completion of the Energy Plan.

Based on this IndEco report and additional consultation, the EEO will develop a work plan and timetable for further development and completion of the Energy Plan. The immediate next steps in the development of the Energy Plan for Toronto are as follows:

- On June 6, 2006, a staff report on the development of the Energy Plan for Toronto will be presented to the Roundtable on the Environment and the “quick-starts” for 2010, identified to date, will be highlighted.
- On June 20, 2006, this staff report on the development of the Energy Plan for Toronto will be presented to the Policy and Finance Committee and the “quick-starts” for 2010, identified to date, will be highlighted. The specific process for future development of the Energy Plan will also be discussed. A preliminary timeline and plan for completion may include an 18-month timetable with key milestones and three consultation meetings with key stakeholders (30-50 stakeholders each).
- The work plan for the development of the Energy Plan for Toronto will be further discussed at a Council meeting on June 27, 2006. At this time there will also be a report on any consultation meetings that have been held up until that point.
- The structure, staffing, budget and other resources needed to complete Energy Plan will be discussed at the July 18, 2006 Policy and Finance Committee meeting.
- Approval of the structure, staffing, budget and other resources needed to complete Energy Plan will be presented for consideration by Council at the July 25, 2006 Council meeting.

Appendix A. List of stakeholders consulted to date

All Corporate City of Toronto Divisions
Association of Power Producers of Ontario (APPrO)
Board of Trade (BOT)
Building Owners and Managers Association (BOMA)
Canadian Automobile Association
Canadian Institute for Environmental Law & Policy (CIELAP)
Canadian Standards Association (CSA)
Economic Development (City of Toronto)
Electrical Safety Authority (ESA)
Enbridge Gas Distribution
Energy Probe
Environmental Services - Air Policy (City of Toronto)
Enwave Energy Corporation
Exhibition Place
Facilities and Real Estate (Energy and Waste Management Office)
Federation of Canadian Municipalities (FCM)
For Rent By Owner (FRBO)
Greater Toronto Homebuilders Association (GTHA)
Greenpeace
GreenSaver
Hydro One
Independent Electric System Operator (IESO)
International Council for Local Environmental Initiatives (ICLEI)
Low Income Energy Network (LIEN)
Ministry of Energy
Ministry of the Environment
Ministry of Municipal Affairs and Housing
Natural Resources Canada (NRCan)
Office of Mayor David Miller
Ontario Chamber of Commerce
Ontario Energy Board (OEB)
Ontario Power Authority (OPA)
Ontario Power Generation (OPG)
Parks and Recreation (City of Toronto)
Planning (City of Toronto)
Pollution Probe
Prospectors and Developers Association of Canada
Ryerson University
Seneca College
Social Housing Services Corporation (SHSC)
Sustainable Development Technology Canada (SDTC)
Technical Standards and Safety Authority (TSSA)
The City of Toronto Economic Development Corporation (TEDCO)
Toronto Atmospheric Fund (TAF)
Toronto Catholic District School Board (TCDSB)

Toronto Community Housing Corporation (TCHC)
Toronto District School Board (TDSB)
Toronto Hydro Corporation
Toronto Hydro Energy Services Inc. (THESI)
Toronto Police Services Board
Toronto Public Health (TPH)
Toronto Public Library (TPL)
Toronto Regional Conservation Authority (TRCA)
Toronto Transit Commission (TTC)
Toronto Waterfront Revitalization Corporation (TWRC)
University of Toronto
World Wildlife Fund (WWF)
York University

Appendix B. Achievable energy savings of selected projects

This Appendix contains a detailed description of a number energy projects that can be implemented in Toronto and provides graphical representation of the potential energy savings achievable for each of these projects. These materials were prepared for the Energy Efficiency Office by Energy Profiles Limited. These projects are:

- Renewable Energy Action Plan
- Better Buildings New Construction Program
- District Energy Grids
- Distributed Energy Generating Facilities

Renewable Energy Action Plan

The Renewable Energy Action Plan will offer support encouragement, and incentives to participate in green power purchasing. The source of the green power is expected to a combination of wind power and solar photovoltaics (Solar PV). The City has set a goal of 10% of all electricity to be provided from renewable sources by 2030.

Background

Toronto has had a wind turbine installed at Exhibition Place since 2000, having a capacity of approximately 750 kilowatts. There is some Solar PV installed on the Toronto Hydro building at the east waterfront, Hydro Place, the Ontario Electrical Construction building in Scarborough, and a 100 kilowatt pilot installation will be installed at Exhibition Place during 2006.

In the spring of 2006, the provincial government announced the implementation of a Standard Offer Program for the purchase of green power from wind and solar sources through the Ontario Power Authority at enhanced rates of \$0.11 per kilowatt-hour plus a time related bonus for wind power, and \$0.42 per kilowatt-hour for Solar PV. This is expected to change the cost-benefit ratio sufficiently to bring many participants into the market.

Major Future Events

Exhibition Place and the City of Toronto are planning to install a one megawatt Solar PV installation once the pilot has demonstrated viability. Other wind turbines are planned for the Toronto waterfront and other locations around the City.

The sale of green power is being actively pursued by a few companies who are demonstrating the existence of a market that will pay a premium for green power.

The rising demand for electricity and the increase in cost in the province is motivating the major market stakeholders to look more closely at a variety of sources, and evaluate them on a total cost basis, including environmental impacts.

Wind power is playing a major role in supplying the power grids of countries such as Denmark, Germany, and United States, and unit costs

are now running at about \$3,000 per installed kilowatt. To date, there has been very little manufacturing undertaken in Canada.

Solar PV has not made the same inroads, due mainly to the higher cost per installed kilowatt, currently about \$10,000. Nevertheless, there is some manufacturing activity in Canada. Germany has encouraged more Solar PV by offering to pay about 4 times the price of electricity from conventional sources. The Ontario Standard Offer Program has been designed to match this premium, and this is likely to produce similar results.

The 2006 Ontario Building Code will contain some provisions to simplify the application for a permit to install either wind or Solar PV.

Impact on the Renewable Energy Action Plan

The City's plan to encourage and offer incentives for the installation of renewable energy sources will support and reinforce other programs.

Figure B1: Annual and Cumulative Renewable Power Additions

This chart shows the annual projected power generation additions from renewable sources by four sectors (residential, commercial, institutional and industrial). Growth is expected to be slow in the early period, and to accelerate as technologies improve and costs are reduced. The green line shows the total cumulative capacity added in megawatts on the right hand vertical axis – a total of 400 megawatts is projected.

Figure B2: Cumulative Electricity Generated from Renewable Sources

This chart shows the total amount electrical energy per year expected to be generated from renewable sources for each of the four sectors, and the total from all sectors (green line), and is derived from Figure 1 using a blended load factor for wind and Solar PV. The total electricity delivered by 2030 represents about 10% of the current amount delivered annually by Toronto Hydro.

District Energy Grids

The City of Toronto proposes to set up a number of district energy grids to provide electricity, heating and cooling systems with high distribution and utilization efficiencies. The content of a program has not been defined, but is likely to include information, technical assistance, and possibly incentives.

Background

The City has some district energy grids in place. In the late 1960s, Toronto Hydro started a downtown heating grid to distribute steam to a number of commercial and institutional buildings. This eventually became the Enwave system, and has been expanded to include district cooling using water from Lake Ontario, augmented by chillers to reduce the temperature delivered to their building clients to 39°F (4°C). The current system is limited to about 50,000 tons, but Enwave has a plan to expand this by about 50% using additional chilling capacity. Both the University of Toronto and York University have campus-wide district energy systems with gas turbine co-generation units and waste heat recovery boilers. Regent Park uses a central steam-based district heating system for the current campus.

In many other jurisdictions, particularly in Europe, district heating and cooling is much more common in cities. Modern district energy systems have several features, including:

- Cogeneration to provide electricity and heat. In some cases, tri-generation is used to provide cooling as well. Overall efficiency can reach 80% when all of the electricity and thermal output is fully utilized.
- High pressure hot and cold water for efficient and flexible distribution.
- Pre-insulated piping systems to reduce thermal losses.
- Multiple heating sources, including natural gas, bio-mass, and process waste heat recovery.
- Multiple cooling sources, including engine driven compressors and absorption chillers.

- Earth energy systems, integrated to reduce the amount of energy required for both heating and cooling

Local district energy system incremental capacity addition using co-generation is based on the output of the engine-generator. Each module is generally rated at about 5 megawatts. This allows a customer base to be developed and capacity additions to be made as customers are acquired over time, while offering flexibility, redundancy and reliability for the system.

District energy systems supply electricity to the local power grid, thereby reducing transmission and distribution system loads. System additions can come from private sector investment, energy cooperatives, or the public sector at the municipal or provincial level.

The federal government through NRCan has a program to promote district energy with technical and other assistance. Incentives can be sourced from other federally funded programs.

Major Future Events

The Enwave system is considering the installation of a co-generation unit to enhance system efficiency and to contribute to the electricity load of the City. The addition to the cooling capacity is noted above. The total cooling load in buildings using chilled water distribution in the area bounded by Bloor St. to the north, Church St. to the east, the waterfront, and Spadina Ave. to the west, has been estimated at approximately 250,000 tons, equivalent to a peak summer electricity demand of 250 megawatts.

The Regent Park redevelopment is planning to use a district energy system to provide both heat and electricity. Other possible sites are the Waterfront Lands, and the Downsview Airport site. Other possibilities could include any community defined by geographical boundaries such as rivers and ravines, or campuses of single or mixed sectoral makeup.

District Energy Grids Program

The details of the program to be offered by the City have not been fully defined, but are expected to include information, coordination with Toronto Hydro, Enbridge and Enwave, community planning, and some incentive funding. The projections assume a series of stepped additions to the capacity of the overall Toronto power grid, either through new district energy systems, or additions to existing district energy plants. The City program penetration is expected to increase as the City and other provincial and federal support is added.

Figure B5: Cumulative District Energy Additions by Sector and Total Additions

This chart shows the cumulative projected additions to the power grid in the City from new district energy grids from each of three sectors. The green line shows the total cumulative additions by all sectors, and is read on the right-hand vertical

Distributed Energy Generating Facilities

The City of Toronto proposes to facilitate the economic conversion of diesel standby generators to dispatchable cleaner generation in industrial, commercial, institutional and multi-unit residential buildings across the City, in conjunction with Toronto Hydro Energy Services Inc. A key to this initiative is the conversion of the diesel engines drivers to either dual-fuel (approximately 80% natural gas/20% diesel fuel) or the installation of new 100% natural gas engines to replace the existing diesels, thereby reducing some of the emissions resulting from the operation of the engine-generators.

Background

Under requirements provided in the Ontario Building Code and the Ontario Fire Code, large commercial buildings are required to have an emergency standby engine driven generator (generator) that is a backup to the external electric power supplied by the Local Distribution Companies (LDC), in order to operate emergency lighting, elevators and fire pumps, in the event of a power failure or a fire, which interrupts the normal grid-provided electricity supply. They range in capacity from 350 kilowatts to as much as 2,500 kilowatts, usually with multiple units for larger systems. This represents a very large amount of new generation capacity that could easily be used as distributed generation for peak shaving.

In order to ensure the operation of this generator when the building is isolated from any and all external energy sources, there must be sufficient fuel storage onsite to ensure generator operation for a minimum of period of two hours. This requirement has resulted in the fuel of choice being No. 2 diesel fuel, due to the low cost of diesel engine driven generators and the relatively simple storage requirements for this fuel. The advantages include both the small size of the storage tank and the safety requirements set by the Ontario Ministry of Labour, Technical Standards and Safety Authority(TSSA), and the Ontario Fire Marshal's Office.

On the electrical side, a transfer switch is installed to transfer the emergency buss from the normal external power supply to the generator supply when the building is no longer receiving power from the grid-based electricity supply system. As installed, the generator is not capable of operation in parallel with the external power supply, but only to supply the emergency buss when it is isolated from the remainder of the distribution system. The existence of the transfer switch constitutes the principle definition of a standby generator.

From an emissions perspective, operation of these generators is permitted under a Certificate of Approval (C of A) issued by the Ministry of the Environment. Under this certificate, a standby generator is permitted to generate emissions which would result in a person located a defined distance from the emissions source inhaling not more than a permissible amount of defined pollutants. For a regular generator, or for any generator operating in a school or hospital zone, the comparable requirement is reduced by 75%.

Major Future Events

CSA Standard C282-05, "Emergency electrical power supply for buildings" was recently issued with a change to the requirement for natural gas engines that removes the necessity for the onsite fuel storage under defined circumstances for this fuel. While not yet cited in the OBC, it is expected that CSA Standard C282-05 will be included as part of the building code when it is released later this year.

Toronto Hydro has been offering incentives to building owners under their Conservation and Demand Management (CDM) Plan to convert their standby generators to have the capability to synchronize with the electricity grid, a necessary step to permit a building owner to reduce their electrical demand through the operation of their generator during normal building operation.

The Ministry of the Environment has not announced any change to their certification requirements to permit building owners to operate their standby generators for peak shaving. This step will have to be considered in the near future if this program is to proceed.

Distributed Energy Generating Facilities Program

The details of the program to be offered by the City have not been fully defined, but are expected to include information and coordination with Toronto Hydro (both THESL and THESI) and Enbridge.

The projections assume a significant number of the available standby generator capacity in buildings and plants in the high-rise residential, commercial, institutional and industrial sectors will be encouraged to join the program over time.

Figure B6: Cumulative Distributed Energy Additions by Sector and Total Additions

This chart shows the cumulative projected additions to the power grid in the City from existing distributed energy sources from each of three sectors. The green line shows the total cumulative additions by all sectors, and is read on the right-hand vertical axis.

Better Buildings New Construction Program

The Better Buildings New Construction Program (BBNCP) leverages the Natural Resources Canada Commercial Building Incentive Program (CBIP) to achieve much higher levels of energy efficiency in the design of new buildings. The program offers design assistance to proponents to help them meet the requirements of the CBIP program.

Background

The current Ontario Building Code (OBC), released in 1997, requires that all new buildings be designed to be energy efficient, and cites the Canadian Model National Energy Code for Buildings 1997 (MNECB) as one of two optional methods of demonstrating that a new building design is energy efficient. This requirement applies to both high-rise buildings (defined as Part 3 buildings in the OBC), and low-rise buildings (Part 9) except those designed for residential or farm purposes.

The CBIP incentive program also references MNECB to establish the baseline energy performance of a new building. Provided the new building design can demonstrate that the total energy consumption from all sources is 25% less than the MNECB base case (defined as the hurdle rate), an incentive equal to twice the projected annual energy cost savings will be paid to the building owner. This funding is intended to defray additional design costs required to meet the hurdle rate, but not to cover excess construction costs – these will be covered by the energy cost savings during the first few years of operation.

The baseline for both CBIP and BBNCP is based on the MNECB.

Major Future Events

In 2005, the Ontario government directed the Ministry of Municipal Affairs and Housing (MAH) to ramp up the energy efficiency requirements for buildings in the OBC. MAH plans to issue a new OBC in 2006, and to incorporate these energy efficiency requirements.

The recommendations of the Building Code Advisory Committee to the Minister of MAH, specified that the MNECB be reinforced in the areas of Building Envelope, Lighting, Heating, Ventilation and Air Conditioning Systems, and Service Water Heating Systems. The overall impact will be an average of 14% reduction in the use of energy by new buildings designed to the 2006 OBC over the 1997 OBC. Note that this reduction

varies by building type and size. In addition, the committee recommended that the OBC adopt an updated MNECB when it becomes available, expected in 2010 for adoption in the 2011 OBC, which will impact buildings constructed in 2012. The updated MNECB is also expected to raise energy efficiency requirements to approach CBIP levels.

The OBC will likely maintain its regular 5 year cycle for updates, as will the MNECB. The projections presume that each OBC reissue for 2016, 2021, and 2026 will further raise the level of energy efficiency by 6%, 6% and 5%, respectively.

Impact on the BBNCP

Once the OBC raises the minimum level of energy efficiency, both CBIP and BBNCP will have to raise the target for their programs in order to justify offering incentive and other support. The projections assume a relatively fixed gap between the baseline and the program requirements. The program penetration, however, is expected to increase as the City and other provincial and federal support is added.

Figure B3: Annual Energy Conserved By New Buildings

This chart shows the projected energy savings to be achieved by the combination of the BBNCP, CBIP and the changes to the OBC. It is based on the assumption that there will be a constant annual floor space addition for each of the four Part 3 building sectors considered (multi-unit residential, commercial, institutional and industrial).

Figure B4: Cumulative Annual Energy Conserved and Impact on Peak Demand By New Buildings Participants in the BBNCP

This chart shows the cumulative energy conserved by all new Part 3 buildings, broken down by electricity, natural gas and total, through participation in the BBNCP. The total demand reduction is also presented by the orange curve and the right hand vertical axis.

City of Toronto Ten Point Plan to Reduce Peak Electricity Demand in the Southeast City Area

Cut commercial/Institutional energy use – in government and non-government buildings: LED exit lights, lighting retrofits, hooking into Deep Lake Water Cooling.

Implement more energy-efficient building codes – promoting ground-source heat pumps for new buildings.

Carry out large-scale low-income housing energy retrofits – using programs such as Toronto Hydro giving \$1.6 million in incentives to replace 23,000 old appliances with Energy Star models, and retrofit lighting systems.

Cool cities - Cut summer "heat island effect" through tree plantings, green roofs, light-coloured paving.

Invest in renewable energy – focusing on community-based solar energy, solar hot water and wind projects. Toronto Hydro is currently testing winds off the Scarborough Bluffs for a 60-MW wind project.

Expand Deep Lake Water Cooling – to provide cooling for all buildings in the Toronto core that use chilled water for their air conditioning system throughout the building

Use the natural gas burned to dry sewage sludge at Ashbridges Bay Treatment Plant to make electricity at the same time. Methane from sludge could also be captured for energy.

Expand Toronto Hydro program – to convert standby generators in big buildings to natural gas, and eventually co-gen. Converted generators can supply energy to grid in peak times.

District energy grids - turn existing district energy systems like Regent Park heating facility into co-gen (natural-gas-fired electricity with steam captured for heat). SAVINGS: 300 MW

Invest in cutting household energy use for the Beach and Riverdale neighbourhoods – develop a Toronto Hydro loan program for residents for renewable and high-efficiency home improvements.

Figure 1: Projected Impact of Toronto 10 Point D/R Plan On Summer Peak Demand, Annual Additions

Figure 2: Projected Impact of Toronto 10 Point D/R Plan On Summer Peak Demand, Cumulative Additions

Figure 3: Toronto 10 Point D/R Plan - Projected Overall Impact On Summer Peak Demand

Figure B1 - Annual and Cumulative Renewable Power Additions

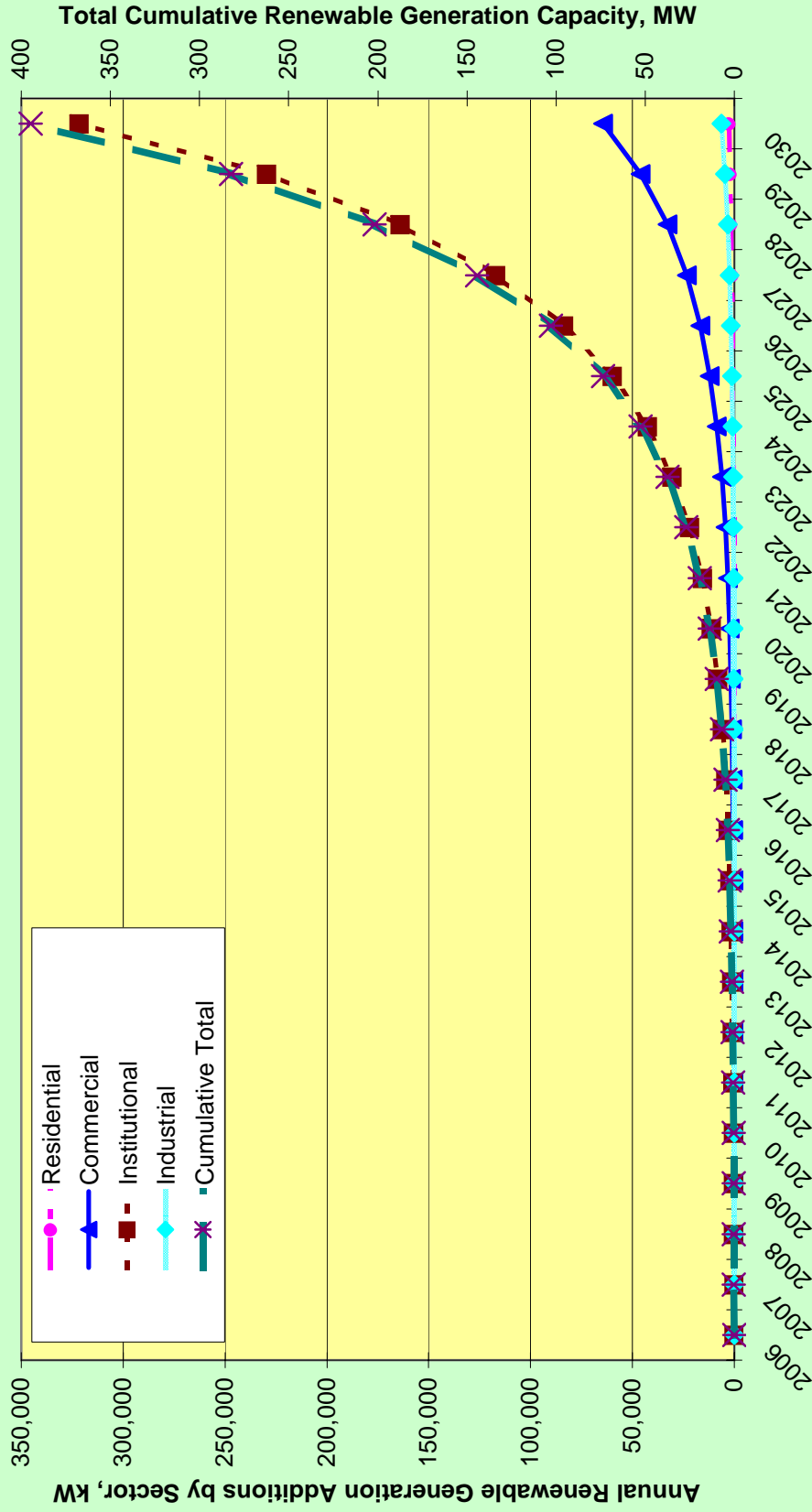


Figure B1: Annual and Cumulative Renewable Power Additions

This chart shows the annual projected power generation additions from renewable sources by four sectors (residential, commercial, institutional and industrial). Growth is expected to be slow in the early period, and to accelerate as technologies improve and costs are reduced. The green line shows the total cumulative capacity added in megawatts on the right hand vertical axis – a total of 400 megawatts is projected

Figure B2 - Cumulative Electricity Generated from Renewable Sources

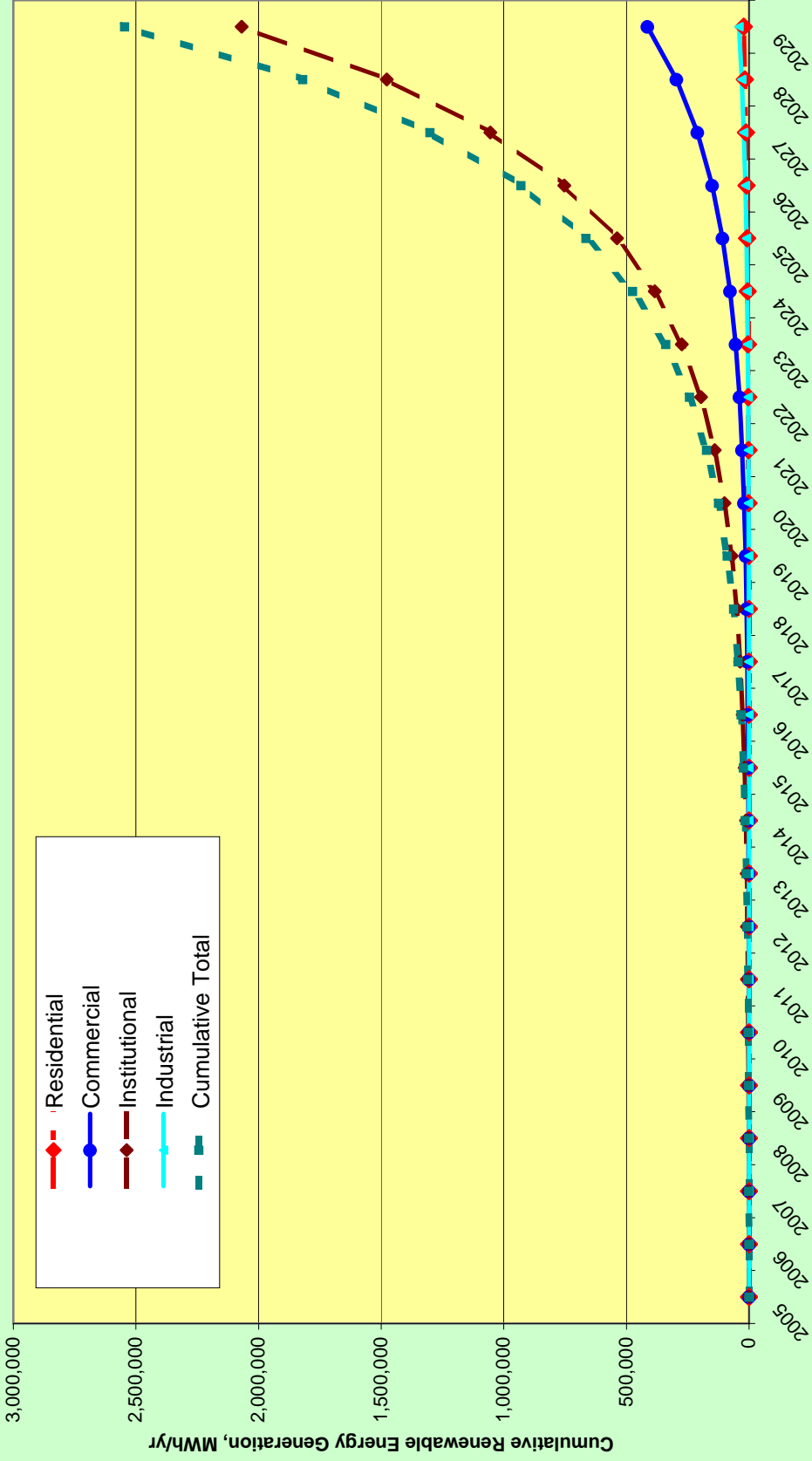


Figure B2: Cumulative Electricity Generated from Renewable Sources

This chart shows the total amount electrical energy per year expected to be generated from renewable sources for each of the four sectors, and the total from all sectors (green line), and is derived from Figure 1 using a blended load factor for wind and Solar PV. The total electricity delivered by 2030 represents about 10% of the current amount delivered annually by Toronto Hydro.

Figure B3 - Annual Energy Conserved By New Buildings

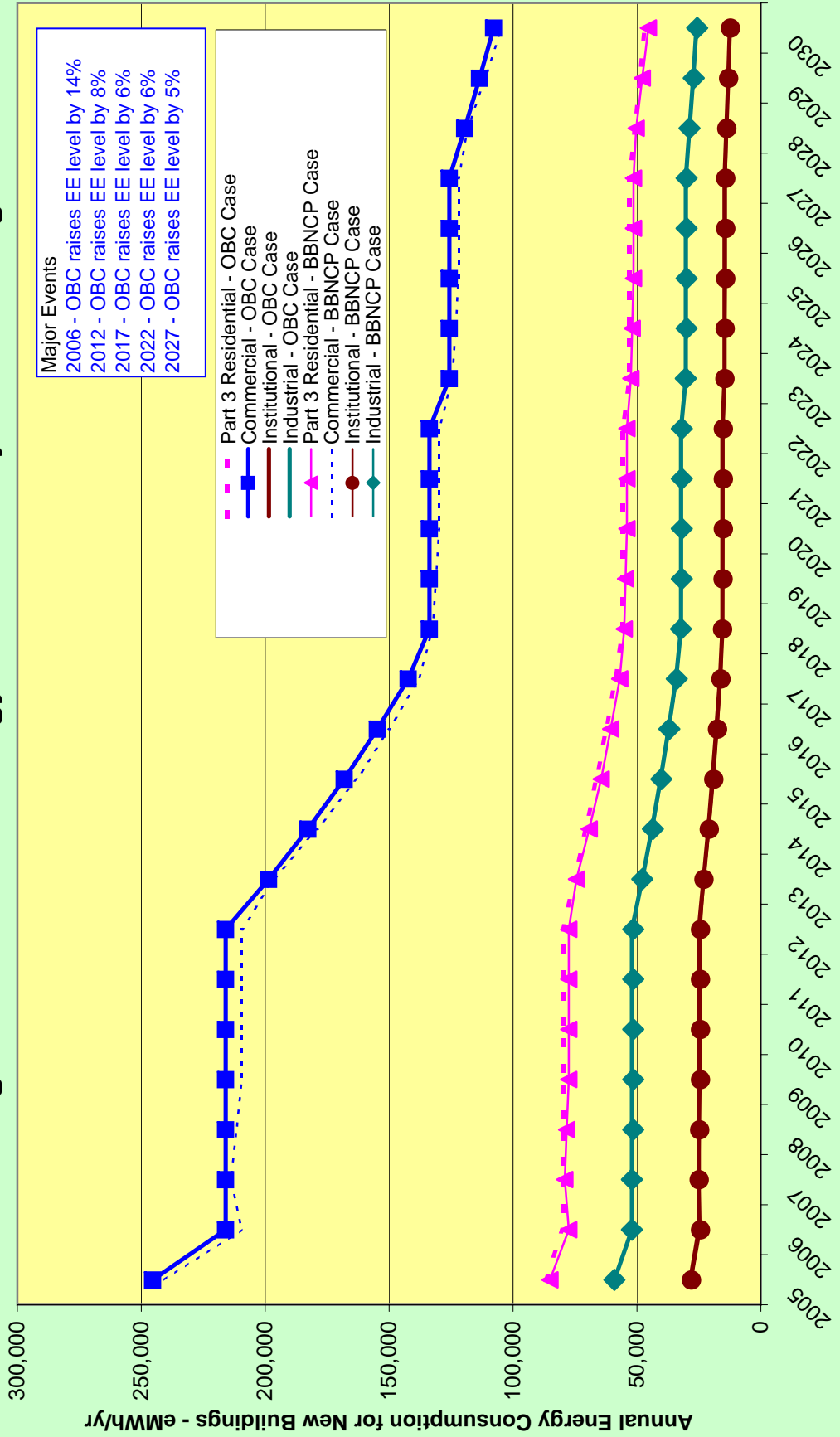


Figure B3: Annual Energy Conserved By New Buildings

This chart shows the projected energy savings to be achieved by the combination of the BBNCP, CBIP and the changes to the OBC. It is based on the assumption that there will be a constant annual floor space addition for each of the four Part 3 building sectors considered (multi-unit residential, commercial, institutional and industrial).

Figure B4 - Cumulative Annual Energy Conserved and Impact on Peak Demand By New Buildings Participants in the BBNCP

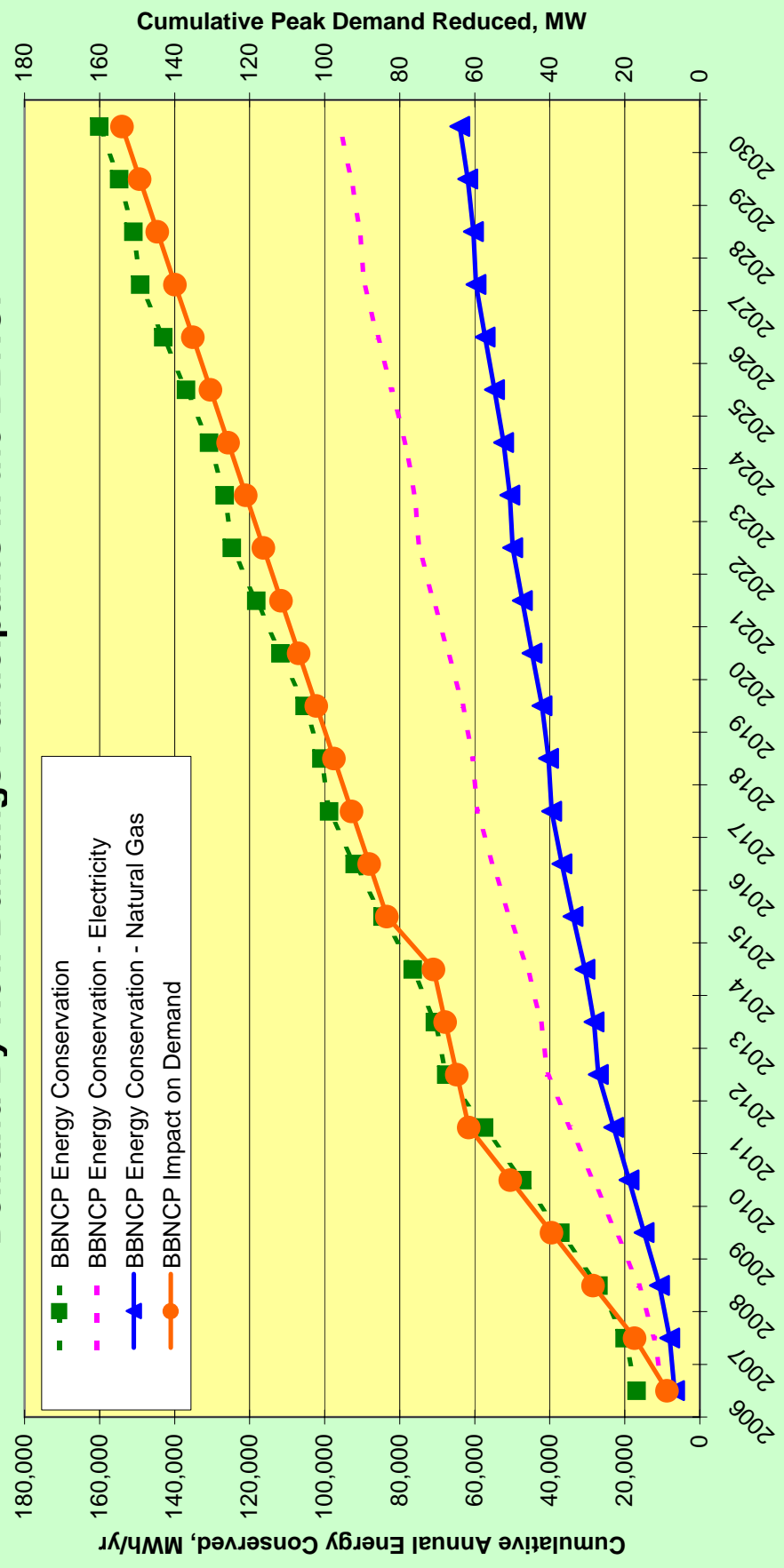


Figure B4: Cumulative Annual Energy Conserved and Impact on Peak Demand By New Buildings Participants in the BBNCP
 This chart shows the cumulative energy conserved by all new Part 3 buildings, broken down by electricity, natural gas and total, through participation in the BBNCP. The total demand reduction is also presented by the orange curve and the right hand vertical axis.

Figure B5 - Cumulative District Energy Additions by Sector and Total Additions

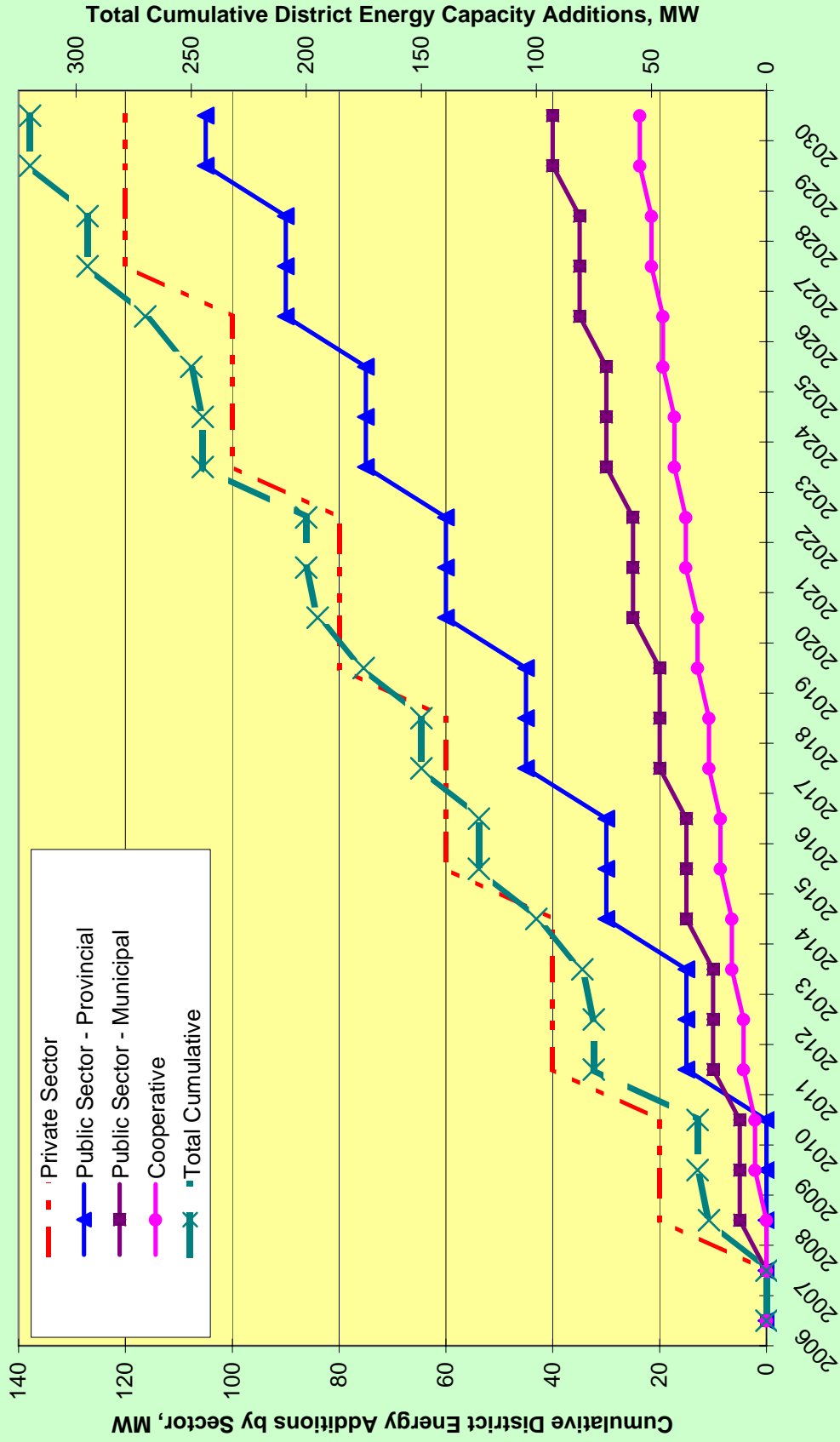


Figure B5: Cumulative District Energy Additions by Sector and Total Additions
 This chart shows the cumulative projected additions to the power grid in the City from new district energy grids from each of three sectors. The green line shows the total cumulative additions by all sectors, and is read on the right-hand vertical axis.

Figure B6 - Cumulative Distributed Energy Additions by Sector and Total Additions

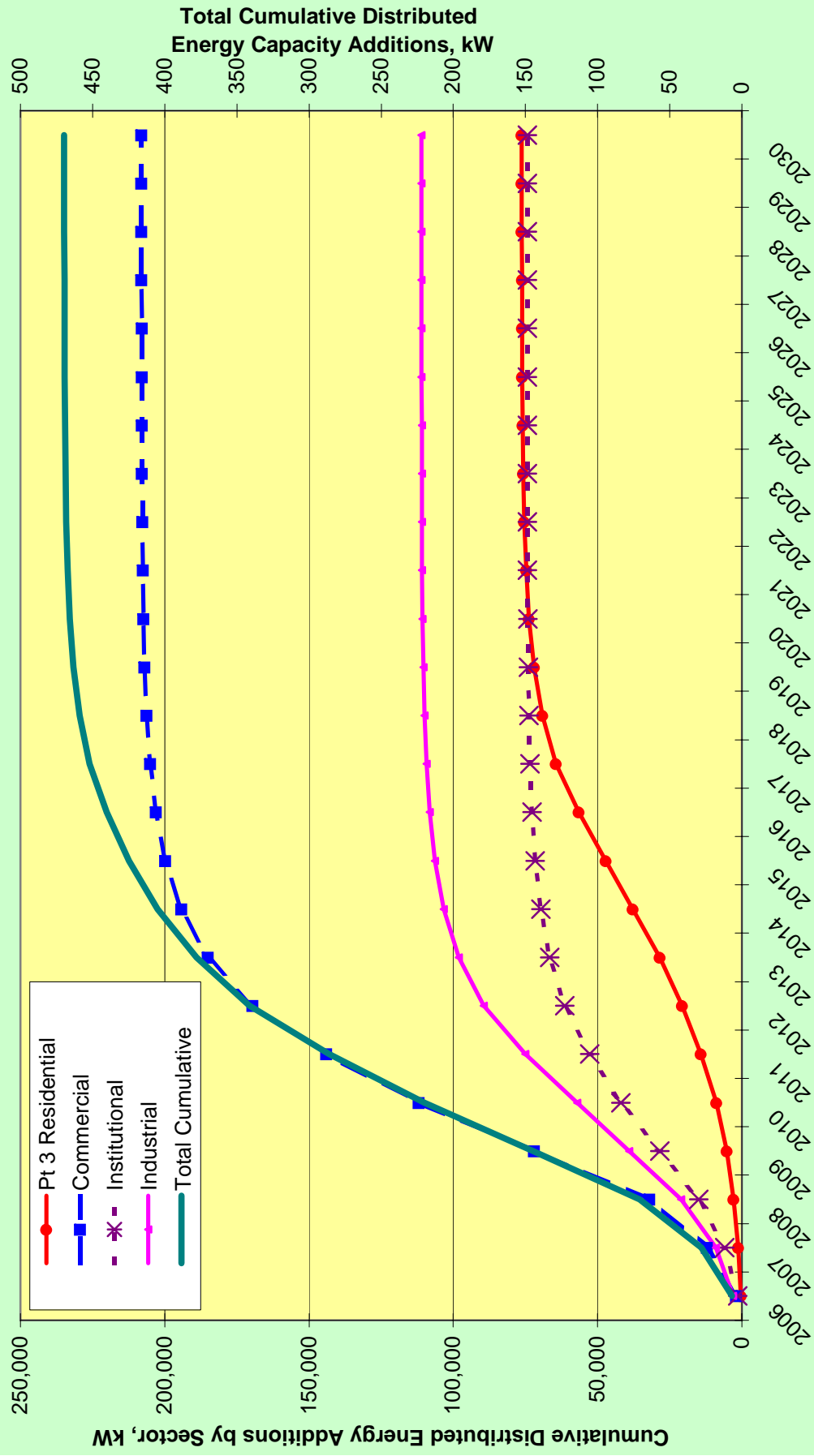
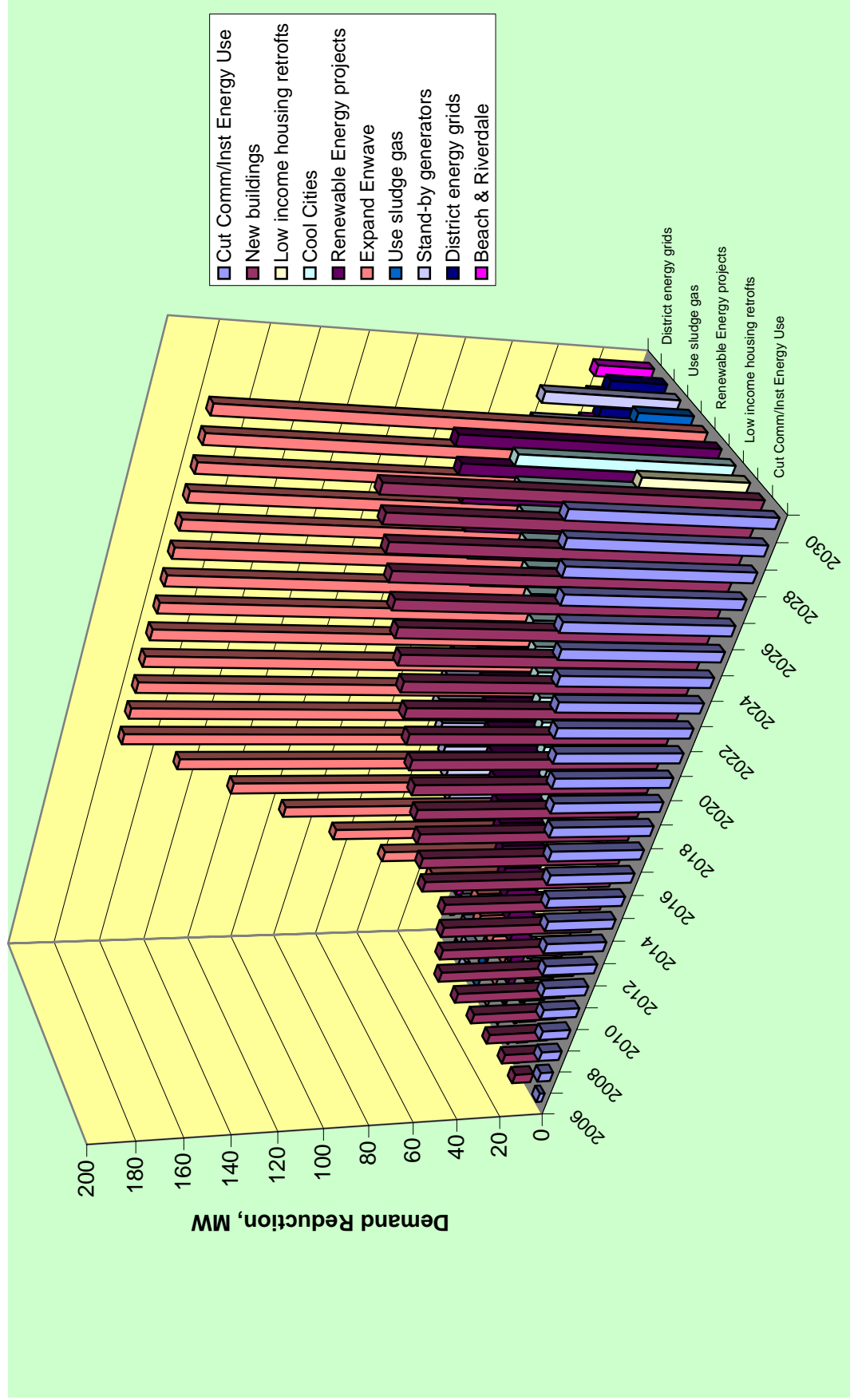


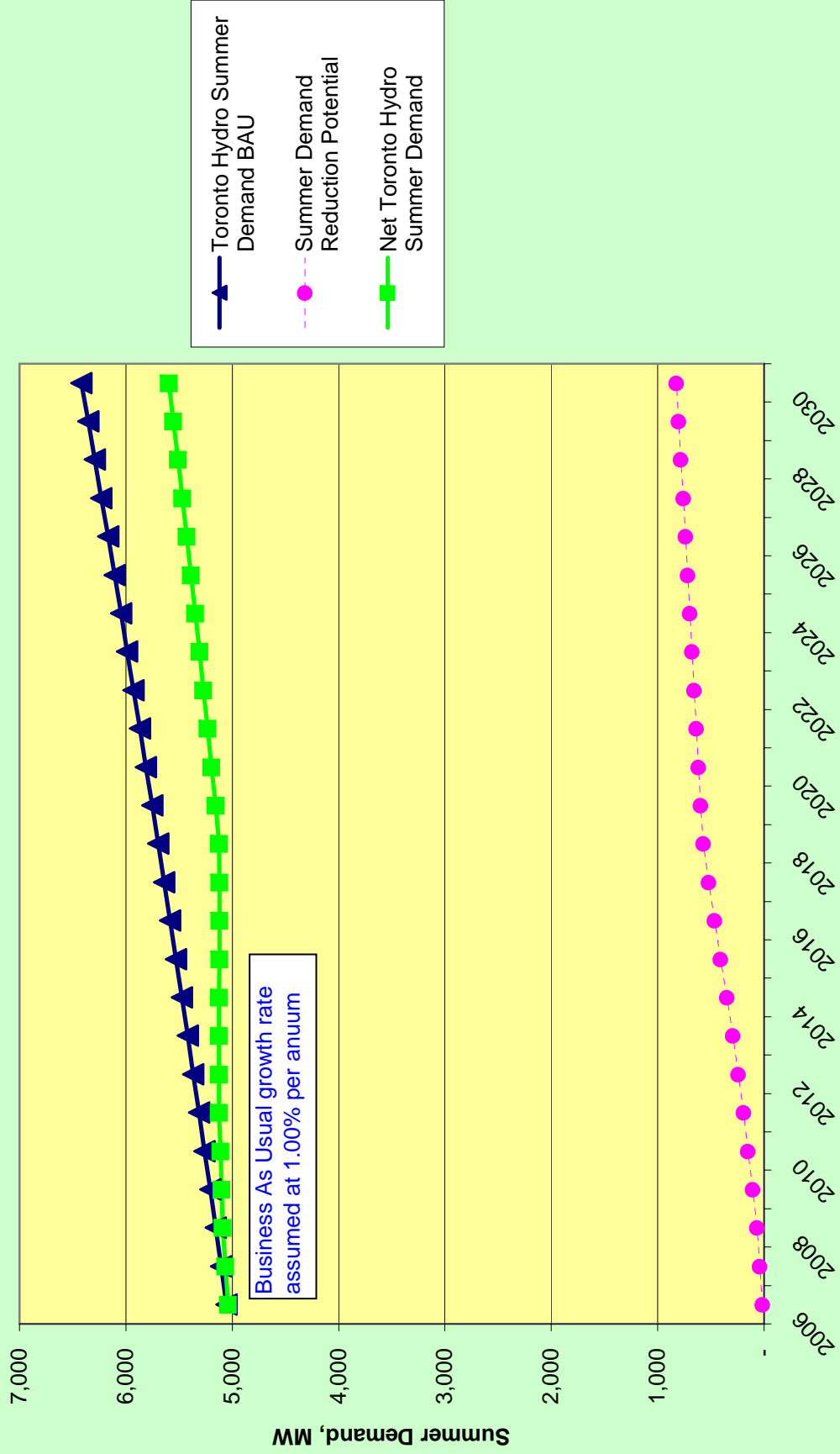
Figure B6: Cumulative Distributed Energy Additions by Sector and Total Additions

This chart shows the cumulative projected additions to the power grid in the City from existing distributed energy sources from each of three sectors. The green line shows the total cumulative additions by all sectors, and is read on the right-hand vertical axis.

Figure 2 - Projected Impact of Toronto 10 Point Demand Response Plan On Summer Peak Demand, Cumulative Additions



**Figure 3 - Toronto 10 Point Demand Response Plan - Projected
Overall Impact On Summer Demand**





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