



Town of
East Gwillimbury

June 9, 2009

Regional Municipality of York
Office of the Regional Clerk
17250 Yonge Street
Newmarket, Ontario
L3Y 6Z1

Attention: D. Kelly, Regional Clerk



1042125
Anna M. Knowles

Deputy Clerk
Corporate Services Department
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REGION OF YORK
CLERK'S OFFICE

FILE No. -

P07

Dear Mr. Kelly:

**Re: Town of East Gwillimbury Development and Legal Services Report P2009-43
re Community Energy Plan Update**

For your information and records, at its regular meeting held on June 1, 2009, the Municipal Council of the Town of East Gwillimbury enacted as follows:

“BE IT RESOLVED THAT Development and Legal Services, Planning Branch Report P2009-43, dated June 1, 2009, regarding the Community Energy Plan Update, be received; and

THAT Council authorize Staff to host a workshop and consultation session with representatives of the local community; and

THAT Report P2009-43 be forwarded to the Ministry of Energy and Infrastructure, the Minister of Municipal Affairs and Housing and the Regional Municipality of York.”

Attached please find a copy of the above-noted Town of East Gwillimbury Development and Legal Services Report P2009-43 and Resolution No. CWC2009-185DLS.

If you have any further questions with regard to the above matter, please do not hesitate to contact the undersigned.

Yours truly,

Anna M. Knowles
Deputy Clerk

Attachs.

c.c.: Hon. G. Smitherman, M.P.P., Minister of Energy and Infrastructure and Deputy Premier
Hon. J. Watson, M.P.P., Minister of Municipal Affairs and Housing
D. Sinclair, General Manager, Development and Legal Services

“Our town, Our future”

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DEVELOPMENT & LEGAL SERVICES REPORT P2009-43

To: Committee of the Whole Council
Date: June 1, 2009
Subject: Community Energy Plan Update
Origin: Development & Legal Services, Planning Branch

RECOMMENDATIONS

1. **THAT** Development & Legal Services, Planning Branch Report P2009-43, dated June 1, 2009, regarding the Community Energy Plan Update, be received;
2. **THAT** Council authorize staff to host a workshop and consultation session with representatives of Council-appointed Committees and the local community;
3. **THAT** Council direct staff to continue discussions with the development industry, key stakeholders and agencies further to Council's direction on March 23, 2009 with respect to establishing a community controlled Energy Service Company and designing a Request for Proposals for a district energy system, and provide further updates to Council;
4. **THAT** this report be forwarded to the Minister of the Energy and Infrastructure, the Minister of Municipal Affairs and Housing and the Regional Municipality of York.

PURPOSE

The purpose of this report is to provide Council with Garforth International's draft Community Energy Plan (CEP) Summary Report and outline some of the key proposals coming out of the CEP process.

BACKGROUND

As part of the Town's Official Plan Review and Update, staff identified the CEP process as an opportunity to bring energy into the growth management process as a consideration of development planning. Energy has been an element of Council's consideration of growth planning since the introduction of the draft Provincial Growth Plan in 2004 and has been demonstrated with Council's leading edge policy work in green building standards.

In August 2008, Garforth International was retained to undertake a CEP for the Town. On November 14, 2008, Peter Garforth gave an introductory presentation to Council outlining the project workplan.

On December 19, 2008, an initial meeting was held with key representatives from the local development community to begin discussions regarding the Town's CEP. A more detailed workshop was held on March 5, 2009 and was attended by approximately 40 individuals, including representatives from the Regional Municipality of York, Town staff, a number of Developer Groups, and Enbridge Gas Distribution.

The proposed Ontario Green Energy Act, released in February 2009, is calling for significant improvements in conservation, renewable and clean energy projects, community energy services structures and more green employment for the Province of Ontario. These goals within the proposed legislation will be supported by the Town's CEP.

DISCUSSION AND ANALYSIS

Since the fall of 2008, the CEP consulting team has been collecting data, including property, transportation, gas, electricity and water data, and reviewing local policies, building and development codes and growth management work. The CEP team has analyzed and modelled the data collected and outlined the preliminary findings of such analysis in the draft CEP Summary Report in addition to proposed recommendations as to how to achieve the Town's targets. Such proposed recommendations include some significant initiatives that will require Council's consideration and public and stakeholder consultation.

A summary of the key proposed recommendations in the CEP Summary Report include:

- Implement a district energy system immediately to serve the majority of growth in the Central Growth Area;
- Establish a community controlled Energy Service Company;
- Create efficiencies through higher density, mixed use neighbourhoods in 6 proposed scale project areas;
- Implement higher building standards expanding on the Town's current Energy Star and LEED policies;
- Adopt an energy performance labeling program;
- Promote alternative forms of energy supply, by installing a significant number of solar cells by 2031;
- Develop a large-scale passive village;
- Increase transportation efficiency through the promotion of alternative forms of transportation, improving vehicle efficiency and developing a live/work community.

Town staff recommend that Council receive the draft CEP Summary Report and authorize staff to circulate the document for review and comment. A comprehensive CEP document is expected to be brought back to Council in the fall of 2009 for further consideration.

NEED FOR PUBLIC AND STAKEHOLDER CONSULTATION

It is essential that the development community be involved throughout this process. Staff and the Town's consultants will continue to work with the development community throughout the CEP and RFP process.

In addition to consultation with the development community, the CEP workplan includes consultation with external agencies and workshops with the local community and as such, Town staff recommend that Council authorize staff to host a workshop with representatives of the Council-appointed Committees.

Staff apprise that there are significant challenges to implementing some of the main elements of the CEP that require further consideration and consultation with Council and key stakeholder groups.

FINANCIAL IMPLICATIONS

Fifty percent (50%) of the project costs associated with establishing a Community Energy Plan have been supported by funding through FCM's Green Municipal Fund, while the other fifty percent (50%) of the funding will be sourced through future Development Charges as growth related costs. \$265,000 has been budgeted for the CEP process and approximately \$170,000 has been spent to date.

There may be significant advantages in establishing a municipal utility that could be financially beneficial to the Town and may generate revenue in the future. The implementation of the CEP may also place the Town in a significant competitive advantage in comparison to other municipalities in the GTA.

ALIGNMENT TO STRATEGIC PLAN

This report is aligned with the first Strategic Pillar of the Strategic Plan, to Protect and Enhance the Environment. It specifically refers to promoting responsible environmental stewardship and innovative energy practices.

ATTACHMENTS

Appendix 1 – Community Energy Plan Summary Report (under separate cover)

This Report has been reviewed by the senior management team.

Prepared by:



Robin Skinner, BES
Environmental Planner

Reviewed and Recommended by:



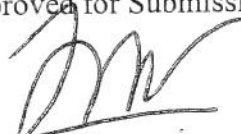
 Dan Stone, MCIP, RPP
Manager of Policy Planning

Reviewed and Recommended by:



Don Sinclair, General Manager
Development & Legal Services

Approved for Submission:



Thomas R. Webster
Chief Administrative Officer



Town of
East Gwillimbury

COMMUNITY ENERGY PLAN

Draft Report dated 27th May 2009



Sharon Temple, East Gwillimbury Picture: Terra Sol



Garforth International Inc
Energy Productivity Solutions



TERRA SOL



East Gwillimbury

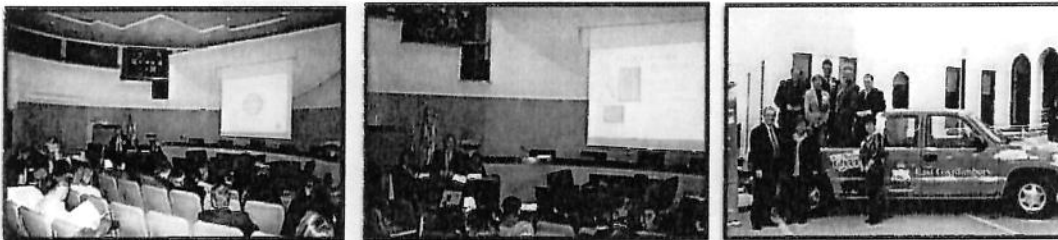
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Background

This Summary Report has been prepared prior to the delivery of the full Community Energy Plan (CEP) as a pre-read for the Town Council Workshop planned for 1st June 2009 and the subsequent Community Workshop.

In April 2007, the Town of East Gwillimbury hosted a workshop which included Provincial and Regional speakers, as well as Peter Garforth, Principal of Garforth International who led the Team that had just completed the Community Energy Plan (CEP) for the City of Guelph.



Sustainable Community Forum April 2007

Subsequent to this workshop, the Town decided to prepare a formal CEP with the support of the Federation of Canadian Municipalities (FCM). The CEP development was started in November 2008, using a team familiar with European, American and Canadian practices, and including representatives of the Town, Enbridge Gas Distribution, and Hydro One.

A major part of the CEP recommendations will have significant impact on builders and developers. In the preparation of the recommendations, there have been two meetings with this community; one in December 2008, and the other in March 2009.



Community Energy Planning Workshop March 2009

A detailed informal briefing with members of Town Council followed in April 2009.



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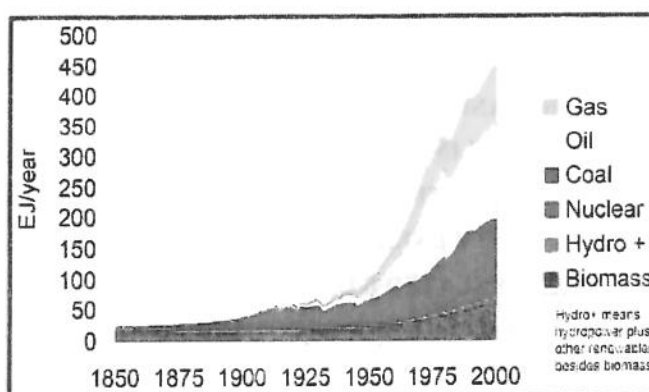


1 Energy and Climate Overview

Since the early 1800s, plentiful availability of low cost energy enabled Canada and the world's other industrialized countries to achieve high levels of well-being and prosperity.

Over the past fifty years, energy demand has increased fivefold (see Figure 1.1), with the expectation that it will double yet again within the next twenty years, driven in large part by the industrialization of China and India. In the last decade, there have been dramatic increases in energy costs, accompanied by very high levels of price volatility. Despite having plentiful energy resources, Canada is increasingly exposed to the full force of global energy market pressures with the likelihood that energy costs will continue to trade higher accompanied by very high levels of uncertainty.

Figure 1.1: Worldwide Use of Energy from 1850 to 2000¹

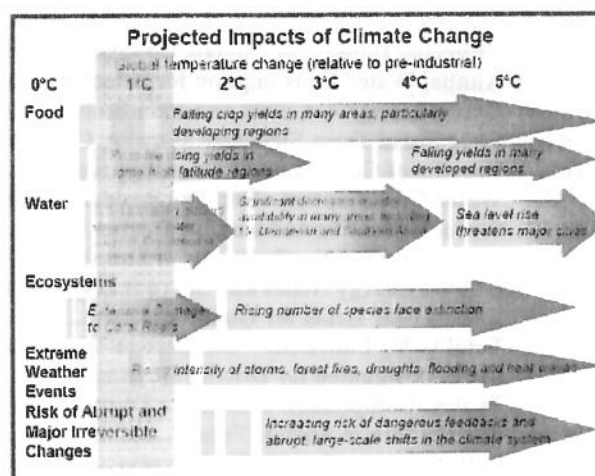


The probable contribution of human energy use to climate change (see Figure 1.2) is increasingly reflected in international, federal, and provincial legislation, ranging from changing building codes to fundamental restructuring of energy supply and distribution.

Increasingly, the likelihood of a worldwide market for emissions credits is emerging, built on the cap-and-trade model. Canada has responded to the 2008 recession, as have other countries, by targeting portions of stimulus budgets at creating green jobs and new businesses aimed at reducing energy use and impacts.

At 22.6 metric tons, Canada has the highest level of per capita greenhouse gas emissions in the world (total 2006 emissions being 721 megatonnes (Mt)³ of CO₂e)⁴. After a shaky start to putting in motion the actions needed to meet internationally agreed targets, the country is moving fast at both Federal and Provincial levels.

Figure 1.2: Projected Impacts of Climate Change on Various Natural Systems²



¹ IIASA plus update BP, IEA, EIA et al

² http://www.treasury.gov.uk/independent_reviews/stern_review_economics_climate_change/sternreview_index.cfm



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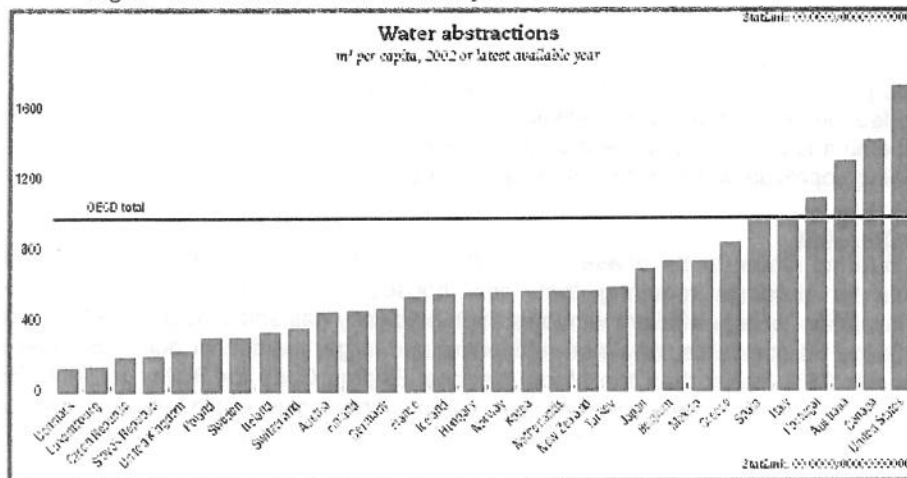


The demands of economic and population growth strains both fuel supply and the underinvested grids and networks delivering energy to cities. Ontario and the GTA recognize the need to reduce peak demands and move the centre of gravity of energy service closer to communities and their final end use.

Over half of the world's population lives in cities, and in Canada this is closer to 80%. Well over half of all of the energy used in Canada is for the homes, buildings, and transportation needs within cities. Homes and buildings alone account for 30% of all energy used and consume over half of all electricity. Transportation accounts for about a third of Canada's energy use on average, a ratio that increases in the urban environment. At least three quarters of this is from road vehicles of all types.

Closely related to energy is the challenge to ensure a low-cost, clean supply of water that will need to be addressed at many levels. Figure 1.3 shows Canada's relatively poor placement (29th among the 30 nations listed) in the 2002 OECD ranking of annual water abstraction per capita.

Figure 1.3: Annual Water Consumption for Selected Countries, 2002⁵



In many countries, especially in Europe, water efficiency and water savings became an issue of high public interest in the 1980s and 1990s. Important factors included increasing environmental awareness, and corresponding campaigns, compounded by rapidly increasing freshwater and sewage cost. This led to a substantial decrease in per capita water consumption. Since 1980, while the overall OECD water use increased by 4.5%, nine OECD nations⁶ successfully decreased their overall water use. In stark contrast, Canada's water use, during this same period, increased by 25.7%.

³ In this document the convention "Mt" is reserved for megatonnes while "mt" denotes metric tonnes.

⁴ Environment Canada, 2008. National Inventory Report 1990-2006, Canada's Submission to UNFCCC.

⁵ OECD <http://www.oecd.org/dataoecd/42/27/34416097.pdf>

⁶ Sweden, Netherlands, UK, Czech Republic, Luxembourg, Poland, Finland, Denmark and USA.



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Canadian provinces and cities are increasingly recognizing that their quality of life and competitiveness will be significantly influenced by how effectively they manage their energy needs. The recent changes in the 2006 Building Code and the Ontario Green Energy Act (see Figure 1.4) are just two examples of legislative change that recognize the pivotal role of the community.

Figure 1.4: Green Energy Act, 2009 and 2006 Building Code Summary⁷

Green Energy Act Summary

Vision: To make Ontario a global leader in the development of renewable energy, clean distributed energy and conservation, creating thousands of jobs, economic prosperity, energy security, and climate protection.

Purpose: The purpose of this Act is to facilitate the development of a sustainable energy economy that protects the environment while streamlining the approvals process, mitigates climate change, engages communities and builds a world-class green industrial sector. It will enable all Ontarians to participate and benefit from green energy as conservers and generators, at the lowest cost to consumers.

Key Policy Initiatives in the Bill

1. Enhanced policy commitment to conservation, smart grid and renewables
2. Enabling feed-in tariffs to procure renewables
3. Guaranteeing and prioritizing connection of renewables
4. Streamlining approvals while protecting neighbouring uses

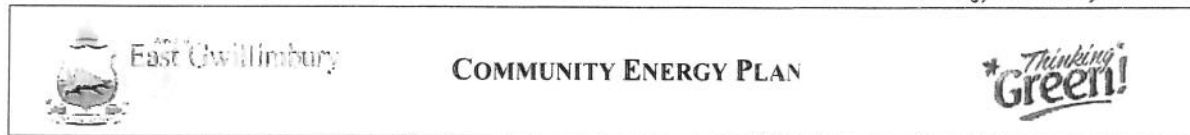
2006 Building Code

The 2006 Building Code (to be phased in by 2012) significant increases the energy efficiency requirements for buildings requiring that: new houses be constructed with near-full-height basement insulation, energy efficient windows, high-efficiency gas and propane-fired furnaces and meet EnerGuide 80 standards; new non-residential and larger residential buildings meet energy efficiency levels 25% higher than the Model National Energy Code for Buildings (MNECB); and that immediately promotes the use of certain green technologies (such as: solar photovoltaic systems, active solar hot water systems, rooftop storm water retention, storm and grey water use).

2 East Gwillimbury Growth Challenges

The Town of East Gwillimbury, in 2009, is a rural community of 23,000 inhabitants with 7,000 local jobs, located about 60km north of Toronto. The population is expected to grow to 88,000 by 2031, and will continue to increase to 150,000 by 2051 resulting in an estimated additional 40,000 to 50,000 housing units. At present, the majority of residents work outside the Town, most in the GTA. Under the current growth plans, the Town will create about 44,000 jobs by

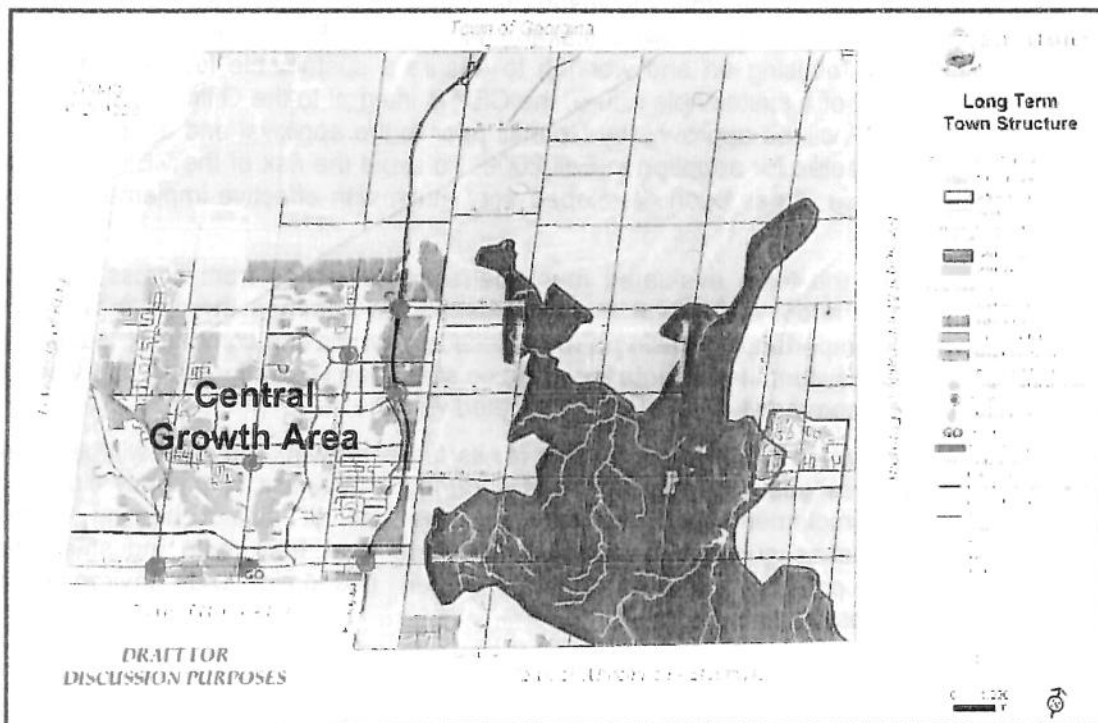
⁷ GEA and Building Code summary contains excerpts and quotes sourced from: <http://www.greenenergyact.ca>, <http://www.obc.mah.gov.on.ca/Page1402.aspx> and <http://www.mah.gov.on.ca/Page681.aspx>



2031 rising to 75,000 by 2051 resulting in an estimated additional 800,000 to 1,000,000 square metres of commercial, recreational, industrial and commercial space.

The Town is clearly committed to preserve its heritage and rural charm as it transitions from a rural, low-density community to a concentrated urban centre. This commitment is an overriding goal of the Town's Official Plan "To protect the Town's heritage through the preservation and enhancement of heritage buildings and areas".

Figure 2.1: Long Term Town Structure Showing Central Growth Area⁸



Consistent with Provincial and Regional legislation, the Town's future development is focused in the Central Growth Area (CGA), with the remaining 75% of the Town's area retaining its rural designation under the Provincial *Greenbelt Plan* and *Oak Ridges Moraine Conservation Plan* (see Figure 2.1).

3 Developing the Community Energy Plan

The leadership of the Town recognized that this growth presented unique opportunities and risks around energy resulting from increasing density, changes in transportation patterns and the impact of local employment. From an energy planning standpoint, the Town is essentially a Greenfield opportunity, a relatively unusual situation today. The current building stock, built to

⁸ Town of East Gwillimbury Planning Department



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less energy efficient standards, combined with a relatively small existing energy supply and distribution structure represents a small part of the total future energy footprint.

In 2006, the Town took several important steps requiring all new residential construction to meet Energy Star levels, requiring all new industrial, commercial, institutional and multi-unit residential construction to achieve Canadian LEED ratings and also deciding to develop an integrated Community Energy Plan with a perspective to 2031 and beyond.

Through an ongoing process of community and stakeholder engagement, the Town is now finalizing a Community Energy Plan that will ensure its long-term competitiveness, environmental performance and that will benefit the Town's stakeholders. The CEP will work in harmony with the Town's Official plan focusing on and working to ensure a sustainable future. Further, as energy is an integral part of a sustainable future, the CEP is integral to the Official Plan. Thus, it is expected that the CEP will be approved by Council prior to the approval and adoption of the Revised Official Plan targeted for adoption in Fall 2009. To avoid the risk of the CEP becoming a purely visionary exercise, it has been developed very much with effective implementation in mind.

In developing the CEP, the team evaluated municipal success stories from across Canada, Europe and the USA to adopt and adapt the best ideas. The common threads in all these success stories was the importance of taking a multi-decade view; having community leadership in place that ensured consistent implementation of basic strategies year-after-year; and viewing the energy supply to the community as a single integrated whole.

The Town has set aggressive employment targets for its future growth. The CEP will be a key element in achieving these goals by attracting and nurturing a business community clustered around its successful implementation. For example, the use of district heating in the Employment Corridor makes substantial recovery of waste heat from both industrial and commercial processes possible, improving both overall economic and environmental performance for both investors and the Town.

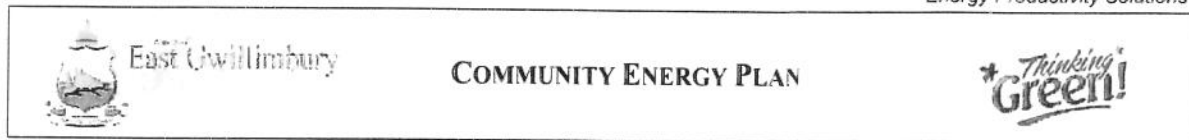
4 Community Energy Plan Vision and Goals

The headline measures of success are:

Energy services in East Gwillimbury will be reliable and lower cost than in comparable towns in Canada

By 2031 the greenhouse gas caused by the Town will be at least 50% less than business-as-usual and on track to be at least 70% less by 2051

The CEP builds on a number of existing land use and economic development plans and should be seen as a complementary "layer" to existing planning in the Town. Wherever possible, the CEP used existing assumptions around growth and land planning being completed as part of



the Town's Official Plan Review process. Where adjustments could bring clear energy or climate benefits, these were included.

The Town of East Gwillimbury's overall Energy Vision is straightforward:

East Gwillimbury has energy services that make it the most attractive Canadian community in which to live, work, play, learn and invest, while simultaneously ensuring that its impact on the environment will always meet, or be, global best practice

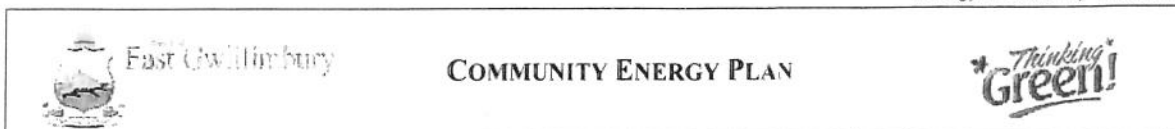
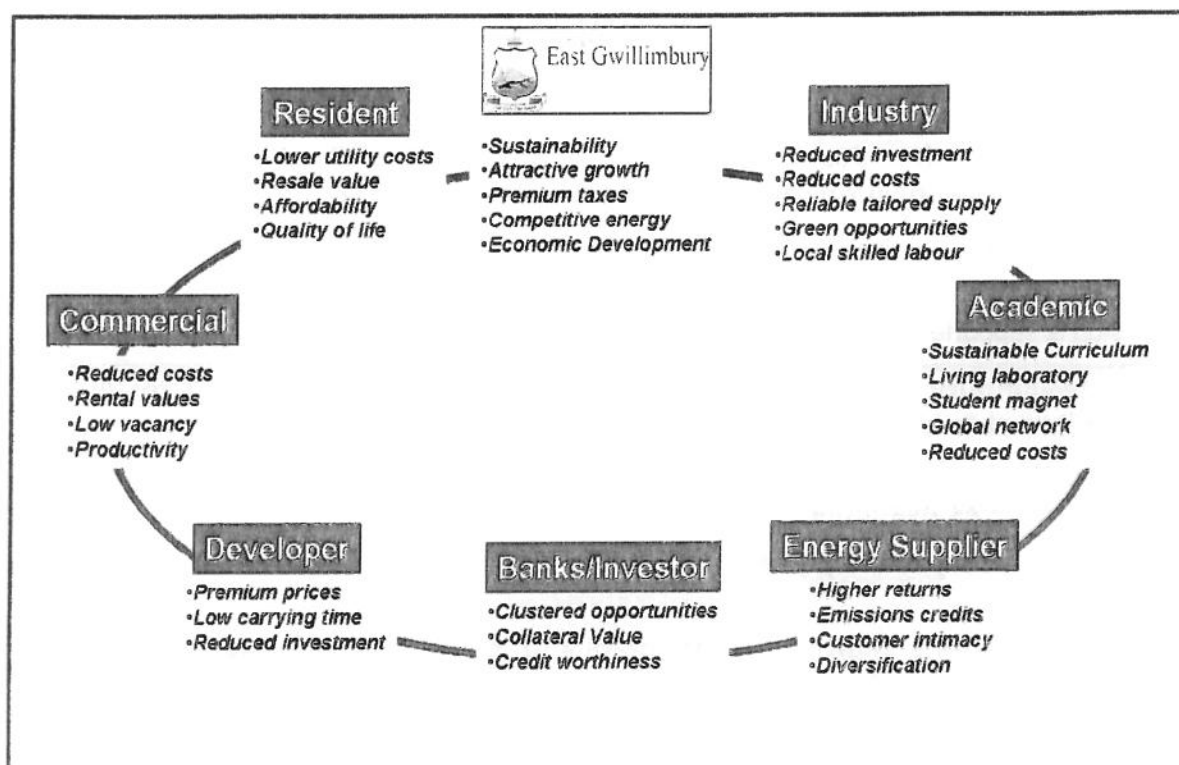
This Vision is supported by six goals:

- 1. East Gwillimbury is the place to live, work, play, learn and invest as a result of its commitment to a sustainable energy future**
- 2. East Gwillimbury will always have a range of reliable, competitive energy and transport services available to all**
- 3. East Gwillimbury is the place to teach, learn, and use sustainable community skills**
- 4. East Gwillimbury's energy use per capita and resulting greenhouse gas emissions will be less than the current global average**
- 5. East Gwillimbury will rank in the top quarter of efficiency for energy and water use per capita comparable to other Canadian cities**
- 6. East Gwillimbury's growth will use global best practices and act as a model for the province, the nation and the world to show that competitive growth can occur with sensitivity for the environment and climate**

Each goal recommends long-term measurements that will be consistently tracked and communicated through normal Town Council reporting.

As highlighted in Figure 4.1, successful delivery of these goals brings tangible financial, social, and environmental benefits to residents, local business, local academic institutions, developers and builders, banks, investors and energy suppliers, and of course, to the Town itself. It is a given that any investments made by the Town itself on behalf of the public must be clearly aligned with these goals.

An additional benefit will be the potential monetization of emissions credits from avoidance of greenhouse gas creation. This benefit could potentially accrue to any or all of the players highlighted below.

Figure 4.1: Benefits of Community Energy Approach⁹

5 Energy Related Baseline

In 2006, East Gwillimbury residents (21,900) used a total of 1,200 gigawatt-hours of energy of all types annually (GWh_e/yr). This translated to 55 megawatt-hours (MWh_e/yr) of energy of all types for each resident. Homes accounted for 47% of all energy used, followed by transport at 31%, commercial buildings 15%, with industrial representing a mere 8%. These numbers are the energy use baseline for the CEP.

For emissions a different picture emerges. In the same year, the per capita creation of greenhouse gases (GHG) of all types from the energy usage noted above is 8.1 metric tonnes (mt) of carbon-dioxide equivalent (CO_{2e}). However, analysis reveals a different ranking order: transport causes 53% of all emissions, followed by homes with 32%, buildings with 10%, and industry with 5%. These numbers are the GHG baseline for the CEP.

Methodologically, baseline emission calculations and assessments are based on primary and secondary data collected and gathered by the CEP team. Sources for these include: the Town's Planning Department, Hydro One and Enbridge Gas Distribution; other consultants' reports; and

⁹ Garforth International llc



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Statistics Canada, Transport Canada, Ministry of the Environment and other government agencies at federal, provincial, regional and municipal levels. Incorporating all data sources will ensure a comprehensive community sustainability approach. The base year used for emissions is a combination of 2006 (StatsCan Census data) and 2007 (current utility data) but is reported as 2006 in this report.

Both the energy and GHG numbers include the heat wasted in the production of electricity. It is the total energy directly consumed in the homes, buildings, vehicles and local industry. It does not include the other energy uses caused by the Town, such as long-distance freight, ships, airplanes and other industry from which the Town clearly benefits. The CEP will focus on the energy directly used by the Town as this is directly influenced by community actions and is locally measurable.

The average water consumption in the Town is 261 litres per person per day, lower than the 329 litre Canadian average domestic consumption. However, as experiences from many other countries show, there is room left for improvement. Figure 5.1 details the residential end use of water consumption in York Region and is provided here as a basis for the saving potential of individual measures.

Figure 5.1: Water Consumption - End Use Residential Benchmarks¹⁰

Usage	l/ca/day	%
Toilets	31	11.9%
Showers	36	13.8%
Baths	3	1.1%
Faucets	60	23.0%
Clothes-washing	36	13.8%
Dishwashing	8	3.1%
Leaks	15	5.7%
Irrigation	72	27.6%
Total	261	100.0%

Electricity is supplied to the Town and distributed within the Town by Hydro One under the pricing and regulatory framework administered by the Ontario Energy Board and the Ontario Power Authority. Gas is supplied to the Town by Enbridge Gas Distribution, with pricing tied less to regulatory structures, and more to the overall North American market.

In the case of both gas and electricity, the relatively small current demand combined with the rapid growth forecast, creates the opportunity to rethink energy distribution and supply systems within the Town.

Geographical location and climate conditions influence the heating and cooling needs of buildings. Heating and cooling degree days are a measure of the degree to which buildings need heating or cooling to maintain a specified level of temperature comfort.

A summary of both East Gwillimbury's heating and cooling degree days by month as an indicator of climate is shown in Figure 5.2. As illustrated, the Town is predominantly a heating environment with an annual average of approximately 4,088 heating degree days (referenced to an average outdoor temperature of 18 degrees Celsius) which indicates a high heating demand¹¹.

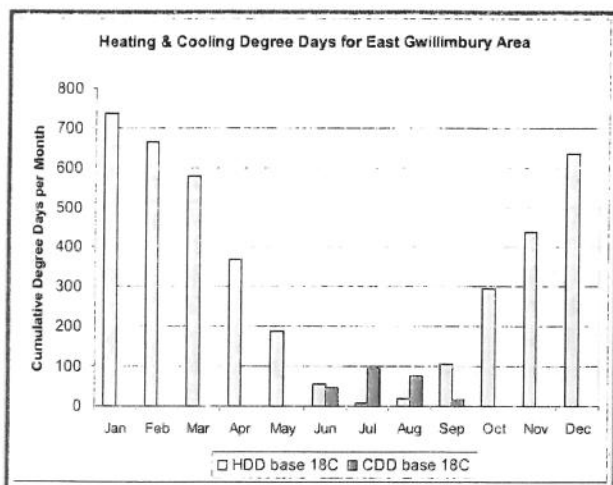
¹⁰ York Region, Water Efficiency Master Plan Update for 2006.

¹¹ For comparison - approximate heating degree days: Mannheim, Germany 3,470 and Cleveland, Ohio 3,900.



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Figure 5.2: Seasonal Heating and Cooling Degree Days¹²

Cooling degree days average approximately 231 days per year (referenced to an average outdoor temperature of 18 degrees Celsius). Historically, cooling would have been seen as a luxury. However, with the increased use of air conditioning throughout the affluent developed world, cooling load is becoming more significant and must be incorporated into energy planning.

The CEP puts high priority on minimizing the heat demand and creating an efficient, flexible approach to sourcing and distributing heat.

The potential for wind generation is average to poor based on wind quality and today's available technology. The solar potential to generate electricity is reasonably good when combined with other elements of the CEP.

To complete the baseline assessment a few words are needed on the nature of the planned growth of the Town, as these have a direct impact on energy opportunities.

The Town and surrounding York Region area are committed to the basic principles of Sustainable Community Design. These call for attractive higher-density, mixed use, walkable neighbourhoods served by a variety of transportation choices. These are distinctive neighbourhoods with a strong sense of place (see Figure 5.3).

Sustainable Community design offers a range of housing choices encouraging a balanced social mix, is intrinsically less energy and water intensive and opens up new energy supply and distribution options. This is a distinct break from the past 50 year US and Canadian trend where development was aimed primarily at low-density, single use, auto-oriented neighbourhoods.

Figure 5.3: Representative North American Sustainable Development¹³

¹² Garforth International llc using data from Barrie and Toronto weather centres.

¹³ Photo: Terra Sol



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6 CEP Structure and Recommendations

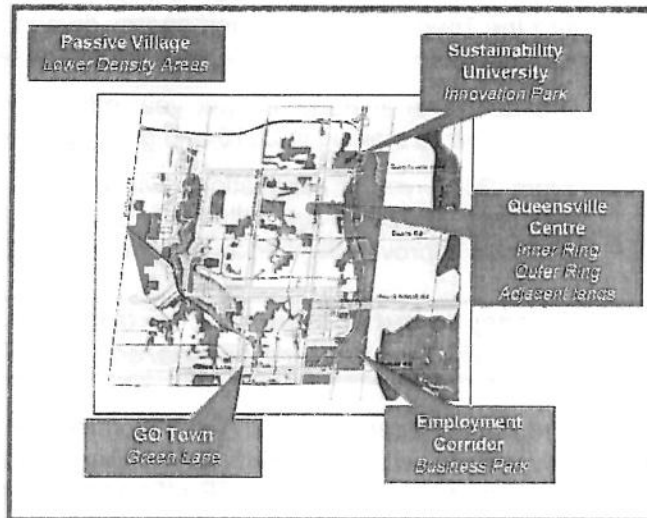
The CEP was structured along the following priorities:

- Maximize the energy efficiency in homes, buildings, industries, and transportation
- Maximize the use of clean, distributed combined heat and power solutions (CHP)
- Maximize the use of economically viable renewable energy sources
- Minimize the peak and average load increases to the existing electricity grid

On the efficiency priority, detailed assessments were made of the energy demands for the various growth areas of the Town under two scenarios – a base case and an efficient case.

Two residentially focused nodes for consideration are the “Queensville Centre” and surroundings and the neighbourhood around the GO Train station on Green Lane – dubbed “GO Town” for the purpose of the CEP. The “Sustainability University” is a planned academic and innovation campus, combined with some housing. The “Employment Corridor” will run predominantly north/south along the planned 404 highway aimed at attracting high quality employment supporting the long term goal to have a 50% activity rate. The remaining neighbourhoods will generally be somewhat lower density designed to blend seamlessly into the district energy nodes delivering high quality heating. Figure 6.1 indicates the suggested district energy nodes and surroundings in the CGA.

Figure 6.1: District Energy Nodes and Surroundings in the CGA¹⁴



Based on the overall CEP goals, and the above priorities, the CEP recommendations are described in the following paragraphs:

Create residential, commercial, and transport energy efficiencies through densification of mixed use neighbourhoods

Denser neighbourhoods are intrinsically more energy efficient through the building choices and the impact on transportation. The CEP is recommending adjusting the densities in two key mixed use neighbourhoods:

¹⁴ Garforth International llc.



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- Increase the overall number of homes in Queensville Centre and surrounding community from 10,400 to 14,400, resulting in an increase in target population from 33,000 to 36,000
- Increase the overall number of homes in GO Town from 7,600 to 17,000, resulting in an increase in population from 20,000 to 41,000.

Use efficiency to cut residential energy demand growth in half compared to business as usual

Adding approximately 46,000 homes to the existing 6,800 by 2051 at today's Energy Star level will increase the energy needs more than tenfold by adding an additional 2,705 GWh_e/year. The implementation of recommended CEP efficiency actions achieved via higher building standards will reward the Town with constrained energy demand growth to no more than fivefold by 2051, adding no more than 1,340 GWh_e/year by 2051. These actions include:

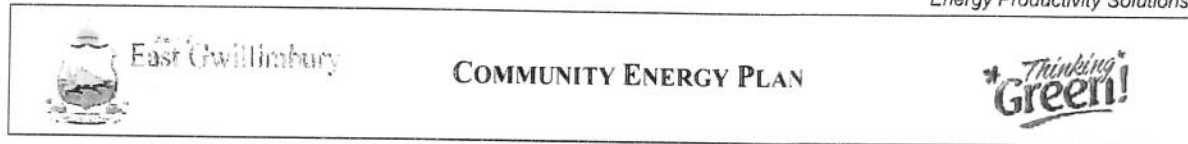
- Implement an average 1% per year efficiency improvement to the existing Energy Star requirements starting in 2010 and going at least through 2031 for all new construction
- From 2010, major renovations will be 25% more efficient than the Town average (currently estimated annually to be 285.5 kWh_e per square metre for site energy use), and then improve 1% year on year through 2051

Use efficiency to cut commercial, institutional, and industrial primary energy demand growth by one third compared to business-as-usual

Adding a mixture of approximately 70,000 commercial and industrial jobs based on business-as-usual assumptions, will add 2,660 GWh_e/year to the present 265 GWh_e/year by 2051. The implementation of recommended CEP efficiency actions in this sector will reward the Town with lower primary energy demand growth, estimated to be no more than an additional 1,790 GWh_e/year by 2051 – a 33% savings. These actions include:

- Achieve an average 0.75% per year efficiency improvement from current Town requirements for commercial new construction from 2010 to 2031 through outreach and education, regularly updated building efficiency standards and improved verification through performance labeling.
- From 2010 on, major renovations should be at least 25% more efficient than their current performance, and then improve 1% year on year through 2051
- Team with individual industrial users to ensure their building and process efficiencies are at least 10% higher than Canadian average supported by a continuous improvement plan and appropriate incentives

Adopt an energy performance labelling process for buildings as a voluntary initiative to gain at least 5% incremental delivered efficiency



Sample data shows that homes and buildings rarely perform to code even when new. In addition, the lack of transparency of energy use of existing buildings hides deterioration of energy performance. To gain at least a 5% "compliance" advantage, the CEP is recommending:

- All homes and buildings will have a current Energy Performance Label (see Figure 6.2) whenever sold or rented, using a low cost certification process
- Any building larger than 1,000 m² will be expected to display a current Energy Performance Label
- Explore availability of energy efficient mortgages or property financing.

Figure 6.2: Energy Star Label for Qualified Home¹⁵

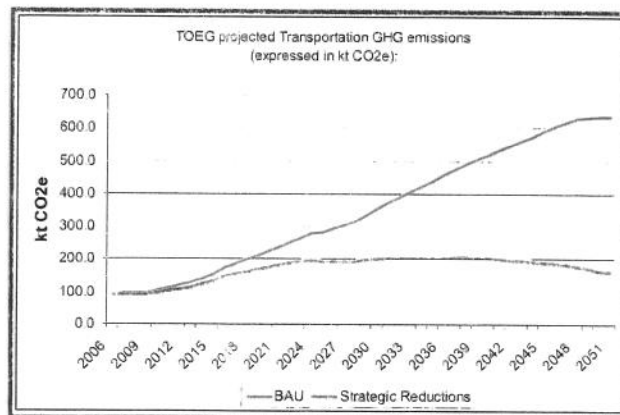
Increase overall transportation efficiency to reduce transport greenhouse gas emissions per capita by 75% compared to emissions today

A business-as-usual (BAU) growth pattern (auto-oriented bedroom community) would lead to a significantly higher transportation GHG emissions level (due to typical commuting patterns and mobility needs). For East Gwillimbury the BAU scenario, factoring in the transport needs of an additional 127,000 people by 2051 results in energy use increasing by 2,580 GWh_e/year (see Figure 6.3).

The implementation of recommended CEP transportation actions will reward the Town with reduced transport GHG emissions, estimated to be no more than an additional 660 GWh_e/year – a 75% savings. This will have a commensurate impact on GHG creation, from 4.3 mt per capita in 2006 to 1.1 mt per capita by 2051.

The contributory elements to the per capita reductions are multiple, some clearly within the Town's control, others clearly not:

Figure 6.3: Total GHG Emissions – Business-as-Usual Compared to CEP Case¹⁶



¹⁵ <http://oee.nrcan.gc.ca/residential/personal/new-homes/label.cfm?attr=4>

¹⁶ Garforth International Ilc



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- Transit linking Queensville Centre, Town Administration, and GO Town to GO Train service
- Denser neighbourhoods more amenable to walking, two wheelers, and small EV/Smart vehicles
- Creation of local employment in a live-work-play environment to reduce outbound commuting
- Consumer choice for smaller lighter vehicles
- Increased availability of clean diesels, electric vehicles, and hybrids

This is an area that would benefit from the collective creativity of the Town to develop an effective public outreach program with popular support. Two obvious examples of ways the Town can influence consumer choice are through rewarding drivers of fuel efficient vehicles with preferred parking spaces and allowing access to designated streets to drivers of lighter weight vehicles. Many more examples can be found in European, Canadian and US cities.

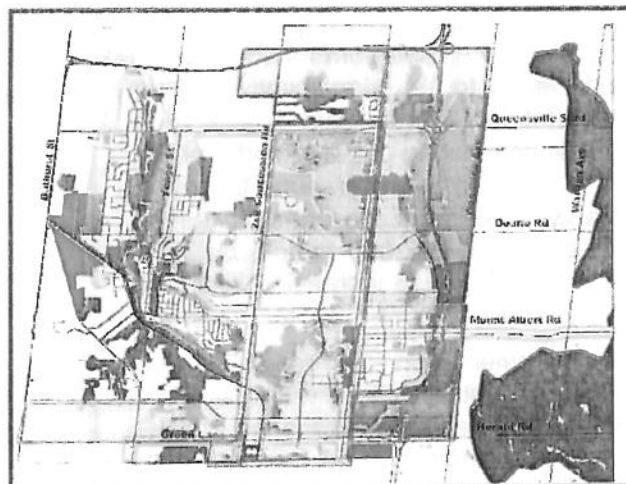
Create a professionally operated district energy system serving the majority of the Town with high quality services from sources that optimize cost, availability, and minimize environmental impact long into the future

Heating and domestic hot water represent over 60% of the energy needs of homes and buildings. With conventional development, this would be met with gas-fired boilers and furnaces in every building; a costly, inherently inefficient approach. Most benchmark cities with similar climates are systematically expanding district heating services to most residential and commercial properties. This is the CEP recommendation.

All new development on the east and south side of the CGA is recommended for district heating services, with the exception of existing neighbourhoods (see Figure 6.4).

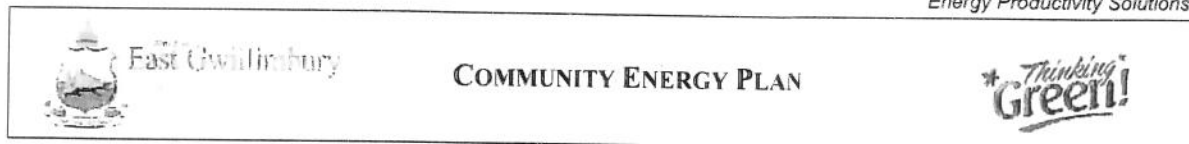
As a general rule, district heating is more economically and environmentally effective as densities of overall development increase. However, as the network develops the sensitivity to incremental density

Figure 6.4: Areas Designated for District Heating¹⁷



Purple: areas targeted for District Heating
Blue: areas targeted for individual building solutions

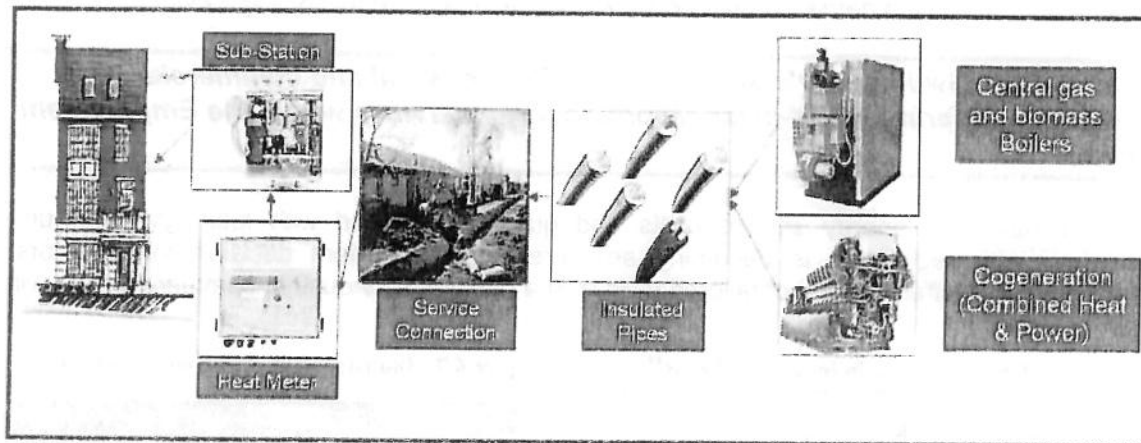
¹⁷ Garforth International llc



drops. For this reason, the CEP is recommending an energy zoning approach that will expect all significant developments to be either district energy connected, or configured in such a way that they can be network connected in the future.

Heat is distributed around the Town through highly insulated pipes, and transferred to buildings through a compact sub-station in place of a bulky furnace and boiler (see Figure 6.5). Heat services are metered in exactly the same way as gas or electricity.

Figure 6.5: Typical Components of Modern District Heating System¹⁸



For the end-user and for the builder, construction costs, and hence real estate market prices are lower as a result of the reduced heating equipment requirement within the building (individual furnaces are not needed). Although the common infrastructure slightly increments the overall investment, this initial capital investment is usually paid back by revenues over the lifetime of the equipment. Customers benefit from no maintenance worries on individual furnaces and savings that are passed along. The high efficiency of the fuel use generally means that heating costs will be less, typically at least 10 to 20% below the natural gas alternative.

The network heat will initially be supplied by a combination of natural gas-fired combined heat and power (CHP) engines and high-efficiency boilers. As future options become available, heat can be sourced from alternative sources such as industrial and commercial heat recovery, biomass boilers, and heat pumps. The choice of source will be based on a combination of availability, cost, environmental impact, and technical ease of implementation.

Common standards will be established for district energy metering, billing and control to minimize barriers to network integration by the Town through the newly formed District Energy Service Company.

The CEP is recommending that a community controlled Energy Service Company (ESCO) be established to manage the development of the district energy services. This will probably be structured as a public-private partnership, with ultimate control by the Town in terms of supply

¹⁸ Garforth International llc.



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quality and costs. The experience from the benchmark cities is that district heating services are an attractive long-term investment, generating acceptable returns for investors and incremental revenues for the Town.

The CEP has modeled the heating sales for the Queensville Centre, indicating rates of return on the capital investments in excess of 16% with reductions in greenhouse gas impacts by a further 10% over and above the reductions achieved by efficiency.

While the clear priority will be on developing district heating, some of the Town's commercial and recreational cooling demand could be served via selected district cooling networks.

Enhance East Gwillimbury's attractiveness for industrial and commercial investors by offering world-class tailored energy services within the Employment Corridor

The combination of energy service costs and quality, combined with future risks around greenhouse gas legislation is becoming an increasingly important decision for investors. Communities that offer a range of tailored utilities in a designated industrial-commercial park will attract investors.

Figure 6.6: The Domain in Austin, Texas¹⁹

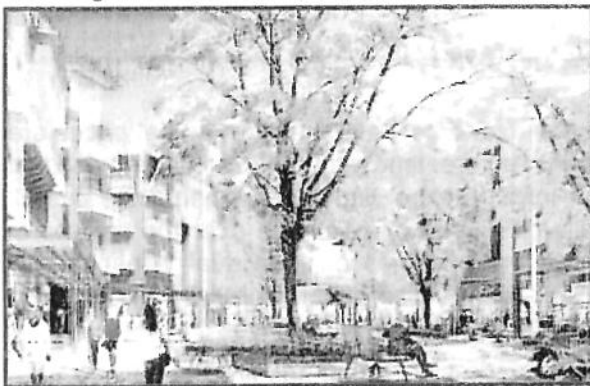


Figure 6.7: Industriepark, Gersthofen, Bavaria²⁰



In these business parks, the range of energy service will be configured to either attract particular types of businesses or adapted to meet a specific investor's needs. The Domain in Austin (see Figure 6.6) is tailored to attract light industrial and commercial clients and offers centrally managed heating and cooling services. The industrial park in Gersthofen (see Figure 6.7) is configured to serve medium industry and offers centrally managed heating, process steam, cooling, waste heat recovery and redistribution, compressed air and in-plant energy efficiency services. In both cases, the services are managed by a multi-utility company.

¹⁹ Austin Energy

²⁰ MVV Energie



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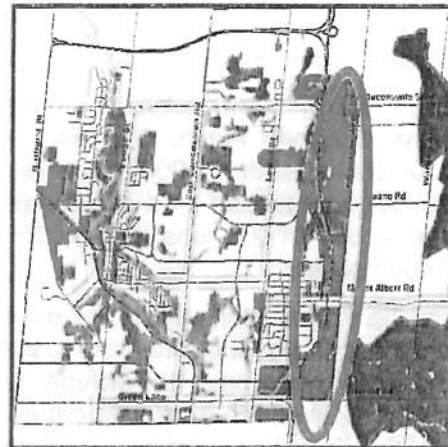
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A critical component in the success of the Town's development and overall outcome of the CEP is the success in creating high-value local employment. The availability of tailored utilities can be a major deciding factor contributing to this success.

The CEP is making two basic recommendations for the Employment Corridor and the Queensville Business Park (see Figure 6.8). Increase the 2051 long-term targeted jobs density from 26,500 to 50,000, and the total developed property from 286,000 m² to 630,000 m² to create an attractive density for shared utility services, including potential future energy systems integration with the newly developed sustainable neighbourhoods. The proximity of a large number of jobs, relative to new sustainable neighbourhoods will further encourage low energy transport, and in some cases may even trigger some blurring of the line between these neighbourhoods and the employment corridor.

Figure 6.8: Multi-utility Services in Employment Corridor and Queensville Business Park²¹



The second recommendation is to offer multi-utility services, anchored in the southeast corner of the CGA. This would offer district heating to all users as a part of the overall district heating recommendations for the Town, and selectively add utilities such as cooling, process steam, waste heat recovery, compressed air, etc., depending on the needs of new investors. The managing entity will be the same as the one serving the mixed use neighbourhoods. The energy sources will be a mix of gas-fired combined heat and power, boilers, with future options to include waste heat recovery, biomass, and waste-to-energy options pursued under the Green Energy Act. The central energy facilities will be sited for flexible fuel handling.

The CEP has modeled the heating utility alone for the employment areas, indicating returns in excess of 15% on energy sales alone, with reductions in greenhouse gas impacts by a further 15% over and above the reduction achieved by efficiency.

Enhance East Gwillimbury's competitive attractiveness for investors by developing a Sustainability University with a Green curriculum and serving as a living laboratory

²¹ Garforth International Ilc.



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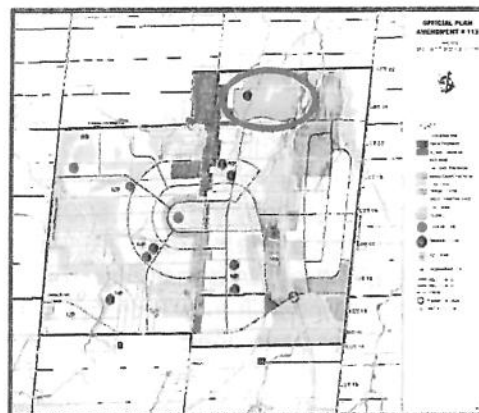
The rapidly accelerating focus in energy efficiency and clean and renewable energy systems is creating a worldwide shortage of skilled employees at all levels. The CEP is recommending combining this market demand with the Town's plan to develop an academic centre to the northeast of the CGA.

The CEP team envisions the Sustainability University (see Figure 6.9) as a facility of about 100,000 m² with 12,000 students and staff on a campus surrounded by a mixed-use innovation park with about 14,000 jobs and 8,000 people living in 2,400 homes.

The CEP is recommending the entire site be district heated, initially supplied from gas-fired CHP, and migrating over time to include biomass heating sources. Given the academic nature of the site, this would also be a logical part of the energy system to include energy management and supply approaches that may be marginal economically, but are the developments of the future.

The CEP has modeled the heating utility for the Sustainability University, indicating returns in excess of 18% on energy sales alone, with reductions in greenhouse gas impacts by a further 15% over and above the reduction achieved by efficiency.

Figure 6.9: Sustainability University and Innovation Park²²

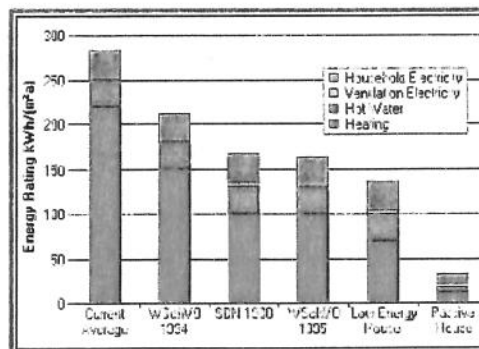


Enhance East Gwillimbury's position as a leader in implementing large scale sustainable solutions by developing a large scale passive village

There is a growing experience around constructing buildings that have very low heating and cooling energy needs (see Figure 6.10). When combined with super-efficient lighting and appliances, these structures can be very nearly self-sufficient in energy supply using a mix of renewable electricity from sun or wind, and heating from small scale biomass or geothermal sources. These are variously named "near-zero energy", net-zero energy" or passive homes and buildings. The EU, led by Germany, is creating formal constructions standards for Passive Buildings.

Many small-scale demonstrations of single or a handful of buildings have been done in North America. To the CEP team's knowledge, no

Figure 6.10: German Passive House Energy Use Compared to Traditional Codes and Norms²³



²² Garforth International llc

²³ Garforth International llc



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development on the scale of a small village has been done. The CEP is recommending that the Town create a dedicated Sustainable Overlay Zone for a small-scale mixed-use village consisting of about 700 apartments, town homes, and single family homes with a small amount of local retail and community facilities. At the time of writing the CEP, this would probably fail to meet competitive construction costs without some form of subsidy combined with strong environmental marketing. However, given the goal to always representative global best practice, this approach should be seriously considered. This could be a useful project to team with multiple European and Canadian manufacturers to produce a "living advertisement" for their capabilities and products. Failure to implement this recommendation has relatively minimal impacts on the overall CEP outcomes.

Buildings would meet or exceed the German Passive House Institute standards, with the maximum of viable renewable energy supply. This would be attractive to a developer looking to build and promote the next generation of low-impact communities.

The "Passive Village" would be used by the Sustainable University as a living laboratory, and offered up to the Province or the Federal Government as a national model.

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

In general, the CEP is advocating a flexible energy supply approach through the widespread implementation of district heating along with multi-utilities in the employment area, and maybe selected district cooling. This creates a flexible platform to mix-and-match energy supplied from conventional networks, renewable sources, waste energy recovery and clean CHP.

The current relatively low costs of electricity and natural gas, combined with uncertainty over pricing carbon emission reductions, favours the recommended CEP approach of initially focusing on efficiency and creating a flexible energy supply system. That being said, the CEP is recommending installing between 800,000 to 1,200,000 m² of solar cells by 2031. A detailed plan needs to be developed but at least 75% would be rooftop installations, with the balance being installed on one or two sites of between 100,000 and 200,000 m² each. Collectively this will supply about 20% of the anticipated electricity demands by 2031, at reasonable economics assuming the Ontario Standard Offer Program continues at its current levels.

The potential for wind electricity is marginal with the prevailing wind conditions and current technology, but over time may become more attractive as more efficient and lower cost units becoming available. In the current CEP, a single 1 MW unit is planned for 2011 as a symbol either for the Employment Corridor or the Sustainability University. By 2015, the recommendation is to add a further 5 MW of wind to the system.

As the Town heat system evolves, by 2031 there will be a need for about 15 to 20MW_{thermal} of renewable heat, with biomass the highest likely candidate.

Waste-to-Energy using well separated municipal waste as fuel is effectively a near-renewable supply and could be pursued under the Green Energy Act. Modern systems can generate cost-effective electricity, steam, and heat, and should be continually evaluated as an option for the



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Employment Corridor. The combination of latest technology and avoided land-filling could result in substantial greenhouse gas emissions avoidance. The CEP team recognizes this will require extensive community discussion and has not included any results of Waste-to-Energy options in the overall analysis.

Other renewables such as solar heating, geothermal, and renewable transport fuels can be selectively applied on a case-by-case basis depending on cost, availability and environmental constraints.

At least 50% of East Gwillimbury's anticipated electricity requirements will be associated with Combined Heat and Power (cogeneration) by 2031

The use of CHP as a significant source for the district heating and multi-utility supplies means that at least a half of all of the Town's electricity is associated with CHP systems that have total fuel efficiencies (power plus heat) in excess of 70%, with all the associated environmental benefits this creates.

East Gwillimbury will reduce the magnitude of the summer grid electrical peak by at least 20% by 2031 to avoid the need for unnecessary investment in electrical infrastructure and improve overall system efficiency

The very rapid growth of the Town could be a significant source of summer peak electricity demand. Without the recommendation of the CEP this peak could average 125MW during mid-summer. The current CEP recommendations that combine efficient construction, CHP systems, Solar PV and wind have the capacity to meet or exceed this outcome. However, to maintain efficiency with CHP in the summer requires finding uses of heat. Depending on the economics, CHP heat could be converted by absorption chillers into cooling, which then would be used for base cooling for applications like ice-rinks or food storage, creating efficient summer heat load and further reducing peak electricity demand.

The Town of East Gwillimbury will register its greenhouse gas baselines and continuously track ongoing performance to capture monetization opportunities

With more than one million tonnes of greenhouse gas reduction per year by 2051, the Town has a potentially valuable stream of income it can capture. These future emission reductions are tradable in a rapidly evolving carbon market, but will require registration under a credible regime like the Kyoto-based Programmatic Joint Implementation emission credits, the Climate Action Reserve and the California Climate Action Registry, or the Canadian Standards Association's GHG CleanProjects Registry.

To initiate, implement and track GHG monetization, the Town should immediately form a GHG Trading Advisory Team of city staff and advisors that will identify activities that have the highest probability of creating tradable GHG credits. Given the quick speed at which GHG policy in Canada, the U.S., and world-wide is now moving, the Team must move quickly towards



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registration by assessing the standards, commercial viability and applicability of the portfolio of GHG management measures that the Town has adopted, once the CEP has been approved.

The Town of East Gwillimbury is committed to successfully implementing the CEP

The majority of Community Energy Plans fail to be implemented effectively. This is often the result of an ambiguous community commitment to all the elements of the plan, resulting in a slow erosion of the integrated results. It is important to state that a CEP is not a menu of options which can be individually accepted or rejected on a project by project basis. Rather, it is an integrated solution where each element enhances and amplifies the values of other elements.

It is also a road map for the next 20 to 30 years and beyond, so it is critical that the political leadership from all sides, the business community, financial institutions, neighborhood groups, utilities, architects, developers, construction industry, academia, and the Town administration will treat the vision, goals, recommended actions and progress of the CEP as a key measure of East Gwillimbury's overall success in becoming a world class urban centre in which to live, work, play, learn and invest.

Another important point is that the Town should systematically report on the progress to implement the CEP to the political leaders, residential and stakeholders both at official council meetings and through regular updates on Town web sites, local radio, community meetings etc. There should also be effective information sharing to educate various constituencies of the impacts of the CEP in particular and sustainable development in general. This should include comprehensive access to information around available expertise, incentives, and rules.

In moving from analysis to implementation, the following three key steps are firmly recommended:

- That Town Council approve the CEP as a formal document that will become the basis for future Town Energy and Climate policy and then the Town will rapidly move to put in place the necessary by-laws and planning guidelines for developers and residents.
- The Town should immediately register its greenhouse gas baselines for future monetization opportunities.
- Establish the regulatory, business, and operating framework to ensure the district energy services are in place coincident with the first wave of major land development.

7 CEP Results

The combined recommendations of the CEP result in East Gwillimbury having a clean, reliable, low-cost energy service structure for residents and businesses. It clearly supports the sustainability and employment objectives of the Town and in some cases may even act as a significant accelerator.



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By committing to Town-wide execution, East Gwillimbury will be seizing a rare moment in history and creating a community that can serve as a large scale community role model for the North American continent. The skills and experiences learned to execute the CEP within the Town will become magnets for new business well beyond the Town.

By forming a Community District Energy company, the Town is ensuring not only high-quality service implementation, but is also creating an annuity for the Town for the next 100 years. The three "Scale Projects" analyzed in detail as indicative examples – Queensville Centre,

Sustainability University, and Employment Corridor, all showed 15% or better returns in investments with relatively modest energy price and greenhouse gas credit assumptions. GO Town was not analyzed in this same level of detail, however, the economics should be comparable or better than Queensville Centre.

Figure 7.1: Per Capita Greenhouse Gas Use from Non-transport Energy Uses²⁴

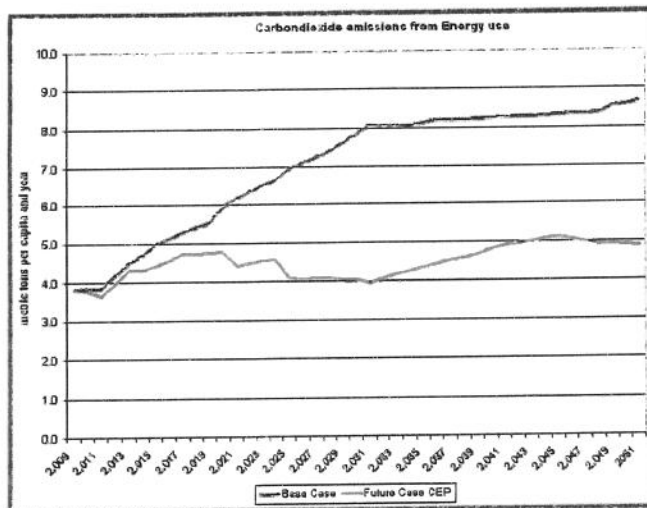
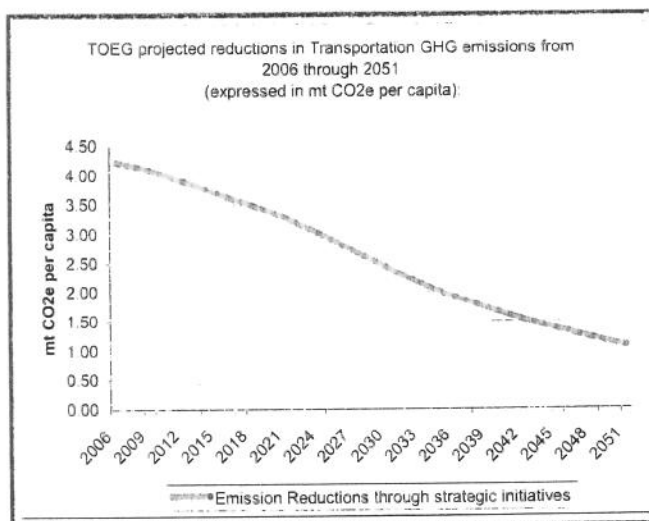


Figure 7.2: Per Capita Greenhouse Gas Use from Transport Energy Use²⁵

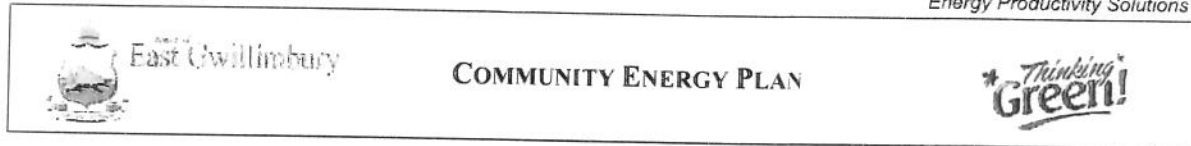


By 2051, the GHG per capita from the non-transport use of energy rises from 3.8 mt to 4.9 mt under the CEP (see Figure 7.1 above), however, without the CEP, this would have been substantially higher at 8.7 mt. It is important to remember that the Town's built infrastructure will increase to accommodate 68,000 new jobs and that there will be a much higher job to population ratio than today.

By 2051, the GHG per capita from transport use of energy falls from 4.3 mt to 1.1 mt, in large part due to the sustainable neighbourhood design and the avoidance of commuting caused by strong local employment (see Figure 7.2). Clearly evolution of vehicle choice and technology plays a role as well.

²⁴ Garforth International llc.

²⁵ Garforth International llc.



While hard to quantify precisely, the overall GHG emission gap between Canada and the EU in 2007 is indicative. The current EU GHG emissions are in the range of 216 g/km versus 338 g/km in Canada.

Combined, the overall GHG per capita drops from today's 8.1 mt to 6.0 mt compared with a business-as-usual scenario of 13.0 (see Figure 7.3). The current 8.1 mt is artificially low, since it should really carry the emissions caused by the residents' places of work out of the Town, since over 80% of the workers are outbound commuters. A more accurate current number would be between 13.0 and 16.0 mt on a comparative basis. Figure 7.4 contrasts the Town's GHG emissions from Buildings and Transport under a Business-as-Usual scenario with those projected under the CEP scenario.

Figure 7.3: Per Capita Greenhouse Gas Use from All Energy Uses²⁶

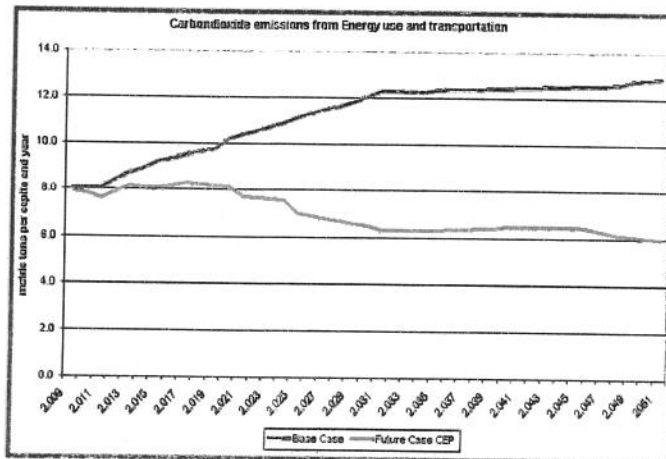


Figure 7.4: Total GHG Emissions – BAU vs. Target²⁷

Sector	GHG per Capita		
	Today	2051 BAU	2051 CEP
Buildings	3.8	8.7	4.9
Transport	4.3	4.3	1.1
Total*	8.1	13.0	6.0

*Total without considering factors outside municipal constituents' control and not including upstream emission considerations for items other than electricity.

With a final population count of 150,000, the annual avoided GHG emissions are a little over 1 million tonnes of GHG a year. Some significant percentage can be monetized through a well structured emissions trading approach.

Conclusion

The CEP makes major progress towards the 2031 target of 6.0 mt GHG per capita, a result that could not be achieved without the implementation of a district energy strategy, maintaining

²⁶ Garforth International, llc.

²⁷ Garforth International llc



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reasonable construction standards, and focusing on sustainable community design principles for most of the Town's development.

While these CEP recommendations will ensure the Town moves very near to its target of 4.0 mt by 2051, still more will need to be done. There are obvious areas for adjustments:

- Accelerate the use of renewable heat sources with a high focus on biomass alternatives, though some way to manage the initial the financial impacts will need to be developed.
- Accelerate the integration of industrial and other waste heat into the Town's heating system, through both policy and public outreach approaches.
- Accelerate the residential and commercial building efficiency standards for both new construction and renovation.
- Take a more aggressive stance on the process efficiencies of industry and heavy commercial users. This will always be a balancing act between attracting investment and employment and achieving environmental results. This is a territory for community creativity and could involve the Town facilitating benchmarking and other industrial energy performance related support.
- The community use of electricity for such things as street lighting has been treated on a business-as-usual basis. The Greenfield nature of the development would clearly favour a very low demand LED's combined with active traffic sensing and controls.

In the final analysis, Canada as a whole is likely to embrace GHG targets in the range of 30% to 50% below 1990 levels by 2051. The CEP as outlined is basically the minimum acceptable set of recommendations to start the Town on the journey to both meet its ambitious goals and to support or even lead the achievement of national targets. Getting these recommendations in place will create the platform for East Gwillimbury to move to even wider and deeper energy and climate improvements.



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COMMITTEE OF THE WHOLE COUNCIL
DEVELOPMENT AND LEGAL SERVICES

MOVED BY “Councillor Hackson”

DATE : June 1, 2009

BE IT RESOLVED THAT Development and Legal Services, Planning Branch Report P2009-43, dated June 1, 2009, regarding the Community Energy Plan Update, be received; and

THAT Council authorize Staff to host a workshop and consultation session with representatives of the local community; and

THAT Report P2009-43 be forwarded to the Ministry of Energy and Infrastructure, the Minister of Municipal Affairs and Housing and the Regional Municipality of York.

CARRIED ☒
DEFEATED ☐
TIED (LOST) ☐

“Councillor C. Morton, Chair”
Councillor C. Morton, Chair