

Getting Green Power On-line in Toronto:

A Report from the Toronto Environmental Alliance to the Toronto Atmospheric Fund



October 2005

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The way we produce and use energy in Toronto has huge implications for our environment, our economy, and social equity. The time is right to move forward on the City of Toronto's commitment to get 25% of its own energy requirements from green power sources, and for the City to exercise leadership in extending green power options to Toronto businesses and households.

Key Themes

This summary report has been prepared by the Toronto Environmental Alliance, based on a review of electricity policy in other jurisdictions, current developments in Ontario, and interviews with over 20 key stakeholders/informants, including city staff, provincial and federal officials, potential green power suppliers and marketers, environmental advocates, gas and electric utilities, and academics. The key themes that have emerged from this research include:

Toronto City Council has made Clear Commitments to Green Power

- Council adopted an Environmental Plan, *Clean Green and Healthy – A Plan for an Environmentally Sustainable Toronto*, at its April 2000 meeting that reaffirmed its commitment to meet 25 percent of its energy needs through green power by 2005.
- In November 2001, Council adopted a Policy and Finance Committee recommendation (Report No. 14, Clause 13) that authorized payment of a premium for green power of up to 60% above the average cost for other sources of electricity.
- Currently, however, Toronto is purchasing very little, if any, green power.

There is a Lack of Coordination of Efforts Locally

- Key players in the local green energy community are unaware of each others presence and/or activities so that there are no synergies being created.
- City staff are unfamiliar with green power options, and moving up that learning curve is a lower priority than dealing with their core responsibilities managing day-to-day business.
- The provincial policy framework has been changing rapidly and drastically over the last five years, making some of the City's green power plans obsolete.

The Time is Right

- Green Power is taking off globally, driven primarily by 20 years of progressive policy-making in Europe, environmental concerns, and rising prices for fossil fuels.
- There is significant support for green power available from the provincial government (to meet electricity needs) and the federal government (to meet Kyoto commitments), but there are still a number of policy barriers.
- Technological advances have resulted in better performance from renewable energy generators, at lower costs.
- Rising energy prices reduce the premium for green power (even without including health or environmental costs of traditional energy sources), and green can hedge against future price rises as there are no fuel costs for the sun, wind or rain.
- The provincial government's commitment to develop Standard Offer Contract may simplify the process for getting green power on-line, but based on the European experience, it may take several iterations before the policy gets the incentives right.

- A strong signal from the City could help catalyze action by firms that are considering green power business models and generate local economic activity:
 - City-owned Toronto Hydro is reviewing a variety of green electricity generation options, including wind, methane and solar;
 - Enbridge Gas is reviewing the business case for solar;
 - Toronto-based Green Power start-up companies like Mondiale Energy and Bullfrog Power should be supported as part of green economic development strategy.

Long term commitment needed

- Green power technologies have relatively large up-front capital expenditures and low operating costs (no need to pay for fuel), hence a year-by-year decision on whether to pay a premium for green power won't provide a stable enough income stream for investors.
- Investing in the technology directly (or through Toronto Hydro) would create new generation and provide a hedge against energy price increases.
- The City's initiative can be leveraged to provide options for public to get directly involved in the green power future, for example by buying green power through Bullfrog Power or putting solar thermal or PV panels on their roof.
- The City's purchase could anchor a corporate Green Power Buyers Club.

Need for a Broader Green Energy Vision

- Beyond the City using green power for its own energy need, there is a need for a community-wide greenhouse gas reduction strategy that seeks to reduce Toronto's greenhouse gases by 60 – 80% by 2050.
- The Green Power commitment should be contextualized within a broader Greenhouse Gas Reduction Strategy that aims to improve our environment, reduce our contribution to climate change, tackle fuel poverty and promote economic development.
- There is broad public support for renewable power, but each particular project will require building local understanding and support. Community partners (like TEA) can work with proponents and the public to build this support.

Opportunities

1. Follow through on City's Green Power commitment by hiring a Renewable Energy Planner for two years to develop and oversee an implementation strategy that includes a diverse mix of generation options (wind, solar, methane and geothermal).
2. TAF should convene a workshop this Fall of City staff and key green energy actors to discuss how this commitment should be acted upon and agree upon a workplan for the Renewable Energy Planner.
3. Work with advocates at the provincial and federal levels to support policies (such as Standard Offer Contracts or changes to the Building Code) which remove barriers to green power in Toronto, and facilitate action.
4. Make long-term commitments to green power by investing directly in the generation technology, directing Toronto Hydro to pursue green power as part of their core business, and/or by leasing renewable energy generating technologies on long-term contracts from private suppliers.
5. The Mayor and Council should work with community partners to create a broader green power vision for Toronto.

Getting Green Power On-line in Toronto

We all take energy for granted - until the lights go out and the subways grind to a halt. Thankfully, these are rare events, but they remind us just how fundamental energy is to our lives. What isn't always as evident is how the way we produce and use energy in Toronto has huge implications for our environment, our economy and social equity.

A large amount of energy is needed to ensure that Toronto is a safe and healthy place to live and work, and remains as a lively and dynamic hub for business, tourism and entertainment. We all bear some responsibility for how this energy is used. The decisions we make about how we travel and how we use heating and lighting in our homes and offices all have an effect in a city of 2.5 million people.

But the City – because it is such a large energy consumer – has the capacity and obligation to be a leader. The corporation of the City of Toronto, and its agencies, boards and commissions, together use over \$200 million worth of energy each year to run offices, the transit system, water treatment facilities, and fleet of over 5000 vehicles. The City also owns one of the largest energy companies in the country (Toronto Hydro, with \$2.5 billion in annual revenues), as well as over 40% of Enwave, a district heating and cooling firm which recently launched a cutting-edge renewable energy system employing cold water from deep in Lake Ontario to cool buildings in the downtown core.

Changing the way we produce and use energy is fundamental to long-term sustainability. When fossil fuels such as coal, oil or natural gas are burnt to produce energy, the resulting emissions play a major role in poor local air quality, acid rain and global warming. Nuclear power is not an environmentally sound alternative, as it creates its own set of environmental problems, is an expensive and a high-risk energy option that diverts scarce resources away from the real green alternatives, and there is no know way to safely deal with radioactive wastes which will be dangerous for millenia.

Yet these negative environmental impacts are not inevitable. Toronto can make a significant contribution to the reduction of greenhouse gases and smog-causing pollution by dramatically reducing our use of fossil fuels through greater energy efficiency and switching to renewable energy.

This report examines how we can move forward on Toronto's green power commitments. It identifies a number of key themes that emerged in the course of this research and opportunities for getting green power on-line.

This report is based on a review by the Toronto Environmental Alliance of the academic and policy literature on electricity policy in other jurisdictions, an analysis of current developments at the provincial and federal levels, and interviews with over 20 key stakeholders/ informants, including city staff, provincial and federal officials, potential green power suppliers and marketers, environmental advocates, gas and electric utilities, and academics (see appendix 1). While we appreciate all of the insights gained from those who took the time to share their views, the opinions expressed here (and any errors or omissions) are of course those of the Toronto Environmental Alliance, and any questions should be directed to TEA staff person Keith Stewart.

Our principal conclusion is that now is the time to move forward on the City of Toronto's commitment to get 25 percent of its own energy requirements from green power sources, and for the City to exercise leadership in extending green power options to Toronto businesses and households.

Toronto City Council has made Clear Commitments to Green Power

Toronto has made impressive commitments to the efficient use of energy that comes increasingly from renewable sources. Building on pre-amalgamation commitments, Toronto City Council adopted an Environmental Plan – *Clean Green and Healthy: A Plan for an Environmentally Sustainable Toronto* – at its April 2000 meeting that included commitments to reduce its own energy consumption by 15 percent and to meet 25 percent of its energy needs from green power sources¹ by 2005 relative to 2000 levels.

Since then, there have been significant investments in improving energy efficiency but the green power commitment has not been acted upon, in spite of the fact that Council adopted a Policy and Finance Committee recommendation (Report No. 14, Clause 13) in November 2001 that authorized payment of a premium for green power of up to 60% above the average cost for other sources of electricity.

Some of the barriers that have been identified to taking action on green power include:

- Issues of cost, i.e. the need to pay a premium price for green power vs. regular 'brown' power (which doesn't have to include the environmental and health costs associated with its production and use within its price).
- A lack of coordination, whereby key players in the local green energy community are unaware of each others presence and/or activities so that there are no synergies being created.
- City staff are unfamiliar with green power options, and moving up that learning curve is a lower priority than dealing with their core responsibilities managing day-to-day business.
- The need for a long-term commitment to green power (in order for it to be built) that is impossible to guarantee if green power is dependent upon year-by-year operating budget approvals.
- The provincial policy framework has been changing rapidly and drastically over the last five years, making some of the City's green power plans obsolete and creating a sense of frustration amongst City staff.
- Ongoing policy barriers at the provincial level.
- The lack of an overall vision within which the green power purchasing commitment is situated and 'makes sense'.

Opportunities for overcoming these barriers are identified below, but in order to take advantage of these opportunities, the City will have to adopt a much more focused approach to green power.

There are, however, a number of factors which make the present a potential turning point in the history of Ontario's energy system.

¹ 'Green power' is energy from low-impact, renewable sources of energy such as wind, solar, small "run-of-the-river" hydro or from the combustion of landfill gases or biomass (see the federal government's EcoLogo definition at www.environmentalchoice.ca for detailed criteria).

The Time is Right

It has become a political truism in Ontario to say that our electricity system stands at a crossroads. Over the next fifteen years, Ontario's electricity system will be largely rebuilt in what the province's Minister of Energy has called "one of the largest peace-time investments in Canadian history."²

The choice of the energy path we will follow is not a purely technical or economic decision, for it will have profound political, social and ecological implications. The decisions we make in the next few years will shape our electricity system for the next generation and this historical moment represents an opportunity to rebuild our electricity system along more sustainable lines.

The City of Toronto – as one of the largest energy consumers in the province, as the owner of large energy companies, and as a level of government with significant control over planning issues – can influence the direction our energy system takes locally and provincially. It can do this as a consumer (by reducing its own demand through energy efficiency and by buying green power), as a producer (by investing in conservation measures and green power technologies directly or through Toronto Hydro and Enwave), as a regulator (through changes to municipal and net-metering regulations) and as an advocate (supporting policy changes by other levels of government that create new supports for, and remove existing barriers to, green power).

This is a particularly auspicious moment for green power, which is taking off globally. The switch to green power is being driven by a combination of environmental concerns, rising prices for traditional sources of energy, and policy innovations in other jurisdictions. Technological advances have also resulted in better performance from renewable energy generators, at lower costs.

The province has committed to phasing out coal-fired electricity by 2009, but to do so it must either reduce demand or replace electricity from coal with other sources – with the choice being primarily between new nuclear plants, natural gas, and green sources (renewables and conservation). There is growing fiscal and policy support for green power available from the provincial government (to meet electricity and smog-reduction needs) and the federal government (to meet Kyoto commitments on reducing greenhouse gases).

The provincial government has issued Requests for Proposals for up to 1500 MW of new renewable power and is considering Standard Offer Contracts to support renewable energy (see below). The federal government's 2005 budget allocated \$200 million over 5 years and a total of \$920 million over 15 years to expand the Wind Power Production Incentive target to 4,000 MW. It also provided \$97 million over the next 5 years and a total of \$886 million over 15 years for the Renewable Power Production Incentive (for energy from renewable sources other than wind).

Renewable energy is also getting a boost from rising prices for traditional forms of energy, thereby reducing the premium for green power (even without including health or

² Dwight Duncan, "Choosing What Works For a Change", Speech by the Ontario Minister Of Energy to the Empire Club (Toronto: April 15, 2004).

environmental costs of traditional energy sources). Green power can also be used to hedge against future price rises as there are no fuel costs for the sun, wind or rain.

In making the shift to renewable energy, Ontario can benefit from the experience of twenty years of progressive policy-making in Europe, which leads the world in the generation and use of renewable energy. Germany alone has 16,600 MW of wind power and 110,000 solar installations producing over 700 MW of power, compared to Ontario's total of about 13 MW of wind (with more to come through the province's Request for Proposal process) and less than 1 MW of solar.

One of the key European policy innovations was a renewable feed-in tariff (also known as Advanced Renewable Tariff or as a Renewable Energy Mechanism). In Ontario, they are being called Standard Offer Contracts. Whatever the name, the cornerstone of this policy mechanism is a 20 year fixed-price contract (where the price varies by technology and location to ensure minimal profitability) and the right to interconnect to the grid.

These Standard Offer Contracts were adopted in Europe as a way of encouraging small-scale or community-owned renewable energy, and in response to problems with a Request for Proposal system which proved to be administratively cumbersome and ineffective in getting new generation built. Some of the advantages using Standard Offer Contracts to encourage small-scale, decentralized renewable generation include:

- Improved system reliability, stability, and reduced line losses as power is generated near to, and in roughly the same amounts, as it is used.
- Standard Offer Contracts are more likely to get green power on-line than the Request for Proposal process, wherein many of the successful bids are never actually built, because they provide greater certainty for investors and are more accessible to small players.
- Greater public awareness and acceptance of renewable energy (because they are more likely to be locally owned and the economic benefits are captured locally):
- Greater potential for attracting new manufacturing and adding new skilled jobs.
- Avoiding paying for fuels (fossil or uranium) from outside of the region.
- Insurance against fuel cost increases.
- Simpler administration reduces government's costs.
- Improved air quality as renewable energy displaces fossil fuel-fired generation.³

The Ontario government has asked the Ontario Power Authority to propose a Standard Offer Contract system for the province this Fall. While the details of the proposed regulation have not yet been released it seems likely (based on interviews and the European experience) that the system initially proposed will not be extensive enough to incent large amounts of new renewable generation, and significant effort will be required to improve the system over time.

³ For details, see Paul Gipe, Deb Doncaster and Dave McLeod, *Powering Ontario Communities*, (Study prepared by the Ontario Sustainable Energy Association for the Ontario Ministry of Environment, May 2005).

Toronto should, however, ensure that both it (i.e. the corporation of the City of Toronto) and its citizens can take advantage of the Standard Offer Contracts and support advocacy efforts to improve the policy (if necessary). Some of the principal green power opportunities in Toronto are summarized below in Table 1.

| Table 1: Overview of Green Power Options in Toronto | | | |
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| Source | Characteristics | Availability in Toronto | Price Premium |
| Wind – large turbines / wind farm | Large turbines (like the one at Exhibition Place) can produce large amounts of electricity at a reasonable cost, if there is sufficient wind. | Toronto Hydro is considering a wind farm in Lake Ontario that could provide the bulk of the City's commitment. | Low: 2 – 6 cents per kWh (and dropping as price rises). |
| Wind – small turbines mounted on buildings | Would require clearer city permitting rules, esp. re. noise concerns. Not as efficient as large turbines due to rougher/slower winds, but they reduce stress on distribution grid (esp. important in Toronto) by producing where energy is used. | Office towers and condos could provide multiple sites with little concern around noise. | Moderate: Higher per kWh than large turbines, but no cost for distribution/transmission |
| Solar - Hot Water | Sun heats liquid in black panel that pre-heats water in tank, cutting water heating requirements from gas or electricity in half. Local business would lease panels on ten-year contract, at or below current price of natural gas per joule of heating energy delivered. | City pools would be ideal site (also good from public education perspective). Also cost-effective for hot water in City buildings. | None. Payback in 3 – 8 years (less if energy prices stay high). |
| Solar – Space Heating | The Solarwall system, developed by a Toronto-based company, is a perforated dark-coloured metal cladding, which is installed on south-facing walls. It can pre-heat ventilation air by 17- 30°C, cutting down on delivered heat from the primary heating system. It also captures heat escaping through the building's south wall. | Buildings with large south-facing walls. | None. Payback in 3 – 8 years (less if energy prices stay high). |
| Solar – Photovoltaic (PV) | Converts sunlight directly into electricity. By using PV modules as building components, you can offset some of the high initial costs. PV can be incorporated into roofing, glazing and wall components, providing benefits other than electricity generation, including weatherproofing, aesthetic appearance, daylighting, shading and thermal or acoustic insulation. | Any roof-top or wall. | High: 25 cents/kWh+ but produces the most at time of peak prices. Building-integrated PV can reduce cost. |

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| Methane | Methane (i.e. natural gas) is produced as organic matter decomposes and has 23 times the global warming impact of carbon dioxide. Costs could be offset by federal government's Climate Fund, which will pay per tonne of greenhouse gas reduced | Methane from sewage treatment plants (Ashbridges Bay and Highland Creek) and Thackery landfill could meet roughly one fifth of City's commitment. Could also collect methane from green bin composters. | Moderate: NRCan estimates payback in 5 - 9 years for anaerobic digesters. |
| Geothermal – Deep Lake Water Cooling | Cold water from deep in the lake used to power chillers in downtown office buildings, replacing need for air conditioning. | Enwave can provide it to City buildings near their pipe. | None. |
| Geothermal – Ground Source Heat Pump | Liquid is circulated through a pipe deep in the earth where temperature is constant, providing cooling in summer and warming in winter, reducing other energy needs. | Could be a major part of energy infrastructure for new development in the Waterfront. | None (for new buildings). Cost of adding it to existing buildings varies. |
| Run-of-the-river hydro | Small-scale hydro plants that do not hold back water behind storage dams, so they have less effect on upstream water levels and downstream stream flow than storage projects. | No obvious suitable sites in the Toronto area. | Moderate: 4 - 8 cents per kWh. |

A strong signal from the City could help catalyze action by firms that are considering green power business models and generate local economic activity. In particular:

- City-owned Toronto Hydro is reviewing a variety of green electricity generation options, including wind, methane and solar. The City, as shareholder, can direct Toronto Hydro to pursue these options and work with advocacy organizations to ensure that provincial policy governing local distribution companies facilitates and encourages such activities.
- Enbridge Gas is reviewing the business case for solar power, particularly solar thermal technologies.
- Toronto-based Green Power start-up companies like Mondiale Energy and Bullfrog Power should be supported as part of green economic development strategy.

To help make this happen, the City should follow through on its Green Power commitment by hiring a Renewable Energy Planner for two years to develop and oversee an implementation strategy that includes a diverse mix of generation options (wind, solar, methane and geothermal).

To guide the work of this Renewable Energy Planner, TAF should convene a workshop this Fall of senior City staff and key green energy actors outside the City (e.g. from the Ontario Ministry of Energy, Toronto Hydro, the Better Building Partnership, Exhibition Place, environmental non-governmental organizations, and renewable energy companies) to discuss options for fulfilling this commitment.

Long-term Commitment Needed

To be effective, the implementation strategy must make it clear that the City will be supporting green power over the long term.

Green power technologies have relatively large up-front capital expenditures and low operating costs (as there is no need to pay for fuel), hence a year-by-year decision on whether to pay a premium for green power won't provide a stable enough income stream for would-be investors faced with large up-front costs.

Investing in the technology directly (or through Toronto Hydro) would create new generation and provide a hedge against energy price increases. The City could use methane from its wastewater treatment and composting facilities to generate heat and power, deep lake water cooling (through Enwave, which it partially owns) for its downtown air conditioning needs, and could invest directly, or through Toronto Hydro, in a windfarm to meet its green power commitments. It could also provide incentives for solar photovoltaic and solar thermal panels on homes and businesses (as in Chicago and other U.S. cities).

Another viable business model would be for the City to sign long-term (10 year) leases for applications such as solar thermal heating for buildings, hot water and swimming pools. This would primarily displace natural gas consumption, which is becoming increasingly attractive as natural gas prices rise.

The City's green power initiative could then be leveraged to provide options for public to get directly involved in the green power future, for example by buying green power from Toronto Hydro, through the newly-launched Bullfrog Power, or by putting solar thermal or PV panels on their roof. The City's purchase could also serve as an anchor for a corporate Green Power Buyers Club that would include Toronto businesses.

Need for a Broader Green Energy Vision

Action on green power should be linked to a broader strategy on smog and climate change that recognizes the environmental, economic and social implications of energy production and use.

Toronto has been a global leader on climate change in the past, and could be once again. Toronto hosted the 1988 *World Conference on the Changing Atmosphere* of scientists and policy-makers that launched the United Nations process that ultimately led to the 1992 Framework Convention on Climate Change signed in Rio at the Earth Summit, and the 1997 Kyoto Protocol which committed Canada to reducing greenhouse gas emissions to 6% below 1990 levels by the 2008 – 2012 period.

In 1989, the City of Toronto set a target to reduce its greenhouse gas emissions to 20% below 1990 levels by 2005 (this came to be known internationally as the Toronto Target and many other cities adopted it). As of 1998, Toronto was on track to at least meet the Kyoto target, if not the deeper 20% target, as city-wide emissions were down by 2% relative to 1990 levels (the Toronto Atmospheric Fund is currently updating its greenhouse gas inventory for Toronto to better track progress, with the results due to be completed in early 2006).

Yet if we are to stabilize the climate, scientists say that developed countries need to reduce their greenhouse gas emissions by between 60 and 80 percent from 1990 levels by 2050. Meeting the long-term challenge of preventing dangerous climate change demands much deeper changes in the way we design our cities and our transportation systems, how we build and power our homes and workplaces, and how we live.

As the City develops its a new Air Quality Management Strategy this year to replace the old Smog Plan, it should have this longer term vision in mind. And green power will be a vital part of such a strategy.

Beyond the City using green power for its own energy need, there is a need for a community-wide green power vision and implementation strategy. For example, London England has set a target of installing at least 7,000 domestic photovoltaic installations, converting sunlight into electricity; 250 photovoltaic applications on commercial and public buildings; six large wind turbines; 500 small wind generators associated with public or private sector buildings; 25,000 domestic solar water heating schemes; 2,000 solar water heating schemes associated with swimming pools; and more anaerobic digestion plants with energy recovery and biomass-fuelled combined heat and power plants by 2010, with these capacities then be at least tripled by 2020.

To this end, TEA believes that Toronto should develop an Greenhouse Gas Reduction Strategy that aims to improve our environment, reduce our contribution to climate change, tackle fuel poverty and promote economic development. The Strategy's specific aims should be:

- o Reducing Toronto's contribution to climate change by minimizing emissions of carbon dioxide from all sectors (commercial, domestic, industrial and transport) through energy efficiency, renewable energy, and combined heat and power.
- o Helping to eradicate fuel poverty by giving Torontonians, particularly the most vulnerable groups, access to environmentally-sound, affordable energy and conservation services.
- o Contributing to Toronto's economy by increasing job opportunities and innovation in delivering sustainable energy, and improving Toronto's housing and other building stock.

To achieve these aims, Toronto should define an Energy Hierarchy as a guide to how individuals and organisations should use energy. In particular, those involved in designing and building new developments, managing the energy of commercial and industrial organisations, the City, housing developments and transportation companies, can use the hierarchy to help them contribute towards making Toronto a leading city for sustainable energy:

- o **Use less energy** (*Be Lean*) - This will minimise demand for energy
- o **Use renewable energy** (*Be Green*) - As much energy as possible should come from zero-carbon sources, so climate change impact is reduced, and natural resources conserved
- o **Supply energy efficiently** (*Be Clean*) - Where it is not practical to use renewable energy, the energy should be supplied as efficiently as possible - for example from combined heat and power, so that the use of fossil fuels is

minimised, further reducing overall carbon dioxide emissions. This principle would include opposing nuclear power as it is very expensive, and presents significant health and environmental risks. It also diverts resources and attention away from cleaner technologies such as renewables.

Specific projects can then be understood in the context of this broader vision. While there is broad public support for renewable power, each particular project will require building local understanding and support. Community partners (like TEA) can work with proponents and the public to build this support.

Appendix 1: List of Key Interviewees/Informants

John Alderdice
Economic Development
City of Toronto

Ken Church,
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Sustainable Buildings & Communities
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With special thanks for their written work to Ralph Torrie, Paul Gipe, Mark Winfield, the David Suzuki Foundation, and David Nye.