

An Energy Efficiency Strategy

FOR ONTARIO'S HOMES,
BUILDINGS AND INDUSTRIES

Ontario Clean Air Alliance and
Ontario Clean Air Alliance Research Inc.
October, 2011

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The Ontario Clean Air Alliance is a coalition of health and environmental organizations, faith communities, municipalities, utilities, unions, corporations and individuals working for cleaner air through a coal phase-out and a shift to a renewable electricity future.

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executive summary

In the 20th century, Ontario's economy was built on a foundation of low-cost and abundant energy supplies. From 1906 to 1959 we enjoyed continuously falling electricity rates as Ontario Hydro developed virtually all of our low-cost hydro-electric resources.

And starting in 1958 with the completion of the TransCanada pipeline system from Alberta to Ontario, we began to rely on low-cost natural gas to heat our homes and fuel our industries. Times have changed, however.

WE NO LONGER HAVE ACCESS TO additional low-cost Made-in-Ontario electricity supplies (pending further developments in renewable technologies). And we must dramatically reduce our natural gas consumption as part of a comprehensive strategy to reduce our greenhouse gas emissions to 80% below 1990 levels, by 2050. Therefore Ontario needs a new energy strategy to heat our homes and buildings and power our province in the 21st century.

As a result of over a hundred years of low-cost energy, Ontario's energy consumption per person is amongst the highest in the world. For example, our energy consumption per person is 50% higher than New York State's and double that of the United Kingdom.

This means we are sitting on top of a huge untapped energy efficiency gold mine that can and should be fully exploited to meet our energy needs.

- According to a Canadian Manufacturers & Exporters report, Ontario's industries could cost-effectively reduce their energy consumption by 29% by 2030 by implementing all the economically feasible best practices that are readily available.
- A study for Enbridge Gas Distribution found that the natural gas consumption of its residential, commercial and industrial customers could be cost-effectively (e.g., a net gain in savings over the life of the investment) reduced by 18%, 29% and 34% respectively by 2017. A similar report for Union Gas concluded that its customers could cost-effectively reduce their natural gas consumption by 30% by 2017.
- Since 2004, the Hospital for Sick Children in Toronto (Sick Kids) has reduced its energy consumption by 19.3% despite the addition of more energy intensive medical equipment and the expansion of services. Sick Kids is now one of Ontario's most energy efficient hospitals but it believes that its work has just begun. It is now planning to double its energy savings over the next few years.

By investing in energy efficiency we can reduce our energy bills, raise our GDP, create jobs, reduce the federal and provincial deficits and lower our greenhouse gas emissions.

- The cost of saving electricity is 76-94% lower than the cost of new nuclear energy. Nevertheless, Ontario is proposing to spend six times more on new electricity supply (\$75.4 billion) than on energy efficiency (\$12 billion). By shifting more spending to low-cost energy efficiency from high-cost new supply we can keep the lights on and reduce our electricity bills.
- A recent study by Dr. Ernie Stokes of The Centre for Spatial Economics (CSE) for the Ontario Clean Air Alliance calculated the economic benefits of energy efficiency investments that would reduce our natural gas consumption by 15% by 2026. According to Dr. Stokes' analysis, these investments would provide the following benefits in 2026: raise our GDP by \$5.1 billion (0.6%); create 28,500 new jobs; raise corporate profits by \$451 million; and reduce the combined federal and provincial deficits by \$591 million – all while reducing Ontario's total greenhouse gas emissions by 5.5%.

To fully exploit our energy efficiency gold mine we must develop and implement an energy efficiency strategy that will motivate and help millions of Ontario consumers and businesses to achieve all their cost-effective opportunities to save energy (all opportunities that will provide energy consumers with a net financial gain over the lifecycle of the initiative). Our five-step energy efficiency strategy is as follows.

First, we need big, bold energy efficiency objectives that can be used to drive the practical changes needed to achieve all cost-effective conservation. These objectives are:

1. Move our homes and buildings towards super efficiency;
2. Make Ontario's industries the most energy efficient in the world; and
3. Squeeze all available energy from the natural gas we use.

Second, we need a plan to move Ontario towards our three big, bold objectives at *no extra* cost to the province's energy consumers. That is, the life-cycle electricity and/or natural gas savings of the plan's energy conservation and efficiency measures must exceed their costs.

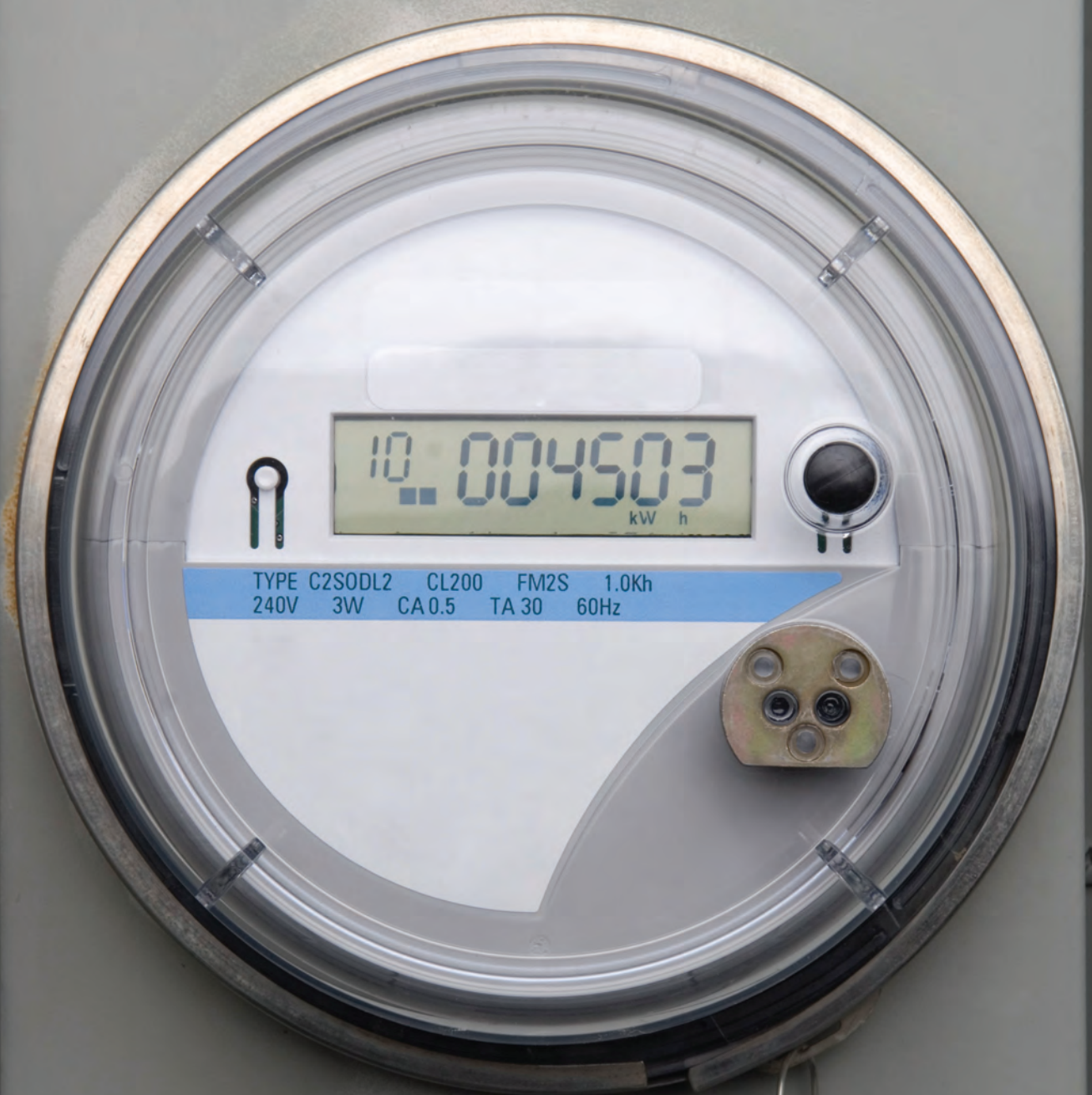
Third, we need to find smart individuals, municipalities and private sector corporations that will agree to play a leadership role in promoting and implementing these goals because they understand the benefits to the province and their own bottom lines.

Fourth, we need our municipal electric utilities (e.g., Toronto Hydro), Hydro One, Enbridge Gas Distribution and Union Gas to expand their energy conservation and efficiency programs to help their customers achieve *all* of their cost-effective energy savings opportunities, which will help move our homes and buildings towards super efficiency and make our industries the most energy efficient in the world.

Fifth, the Government of Ontario must ensure that its policies and regulations align with these objectives:

- a) Energy efficiency labelling must be mandatory for the sale of all Ontario homes;
- b) Our minimum legally-binding energy efficiency standards for new homes, buildings, appliances and equipment must be continuously improved to reduce the energy bills of Ontario's homeowners and reflect advances in technology;
- c) The Ontario Energy Board and the Ontario Power Authority must eliminate their red tape that is limiting the ability of our electric and gas utilities to help their customers achieve all of their cost-effective energy saving opportunities;
- d) The Ontario Energy Board must ensure that its rate design policies for our electric and gas utilities promote the wise and efficient use of energy, not wasteful consumption; and
- e) Ontario's electric and gas utilities must be allowed to invest in district energy projects.

By pursuing our five step strategy to fully exploit all of our energy efficiency opportunities that are lower cost than new energy supply, we can help ensure that Ontario's future will be clean, green and prosperous.



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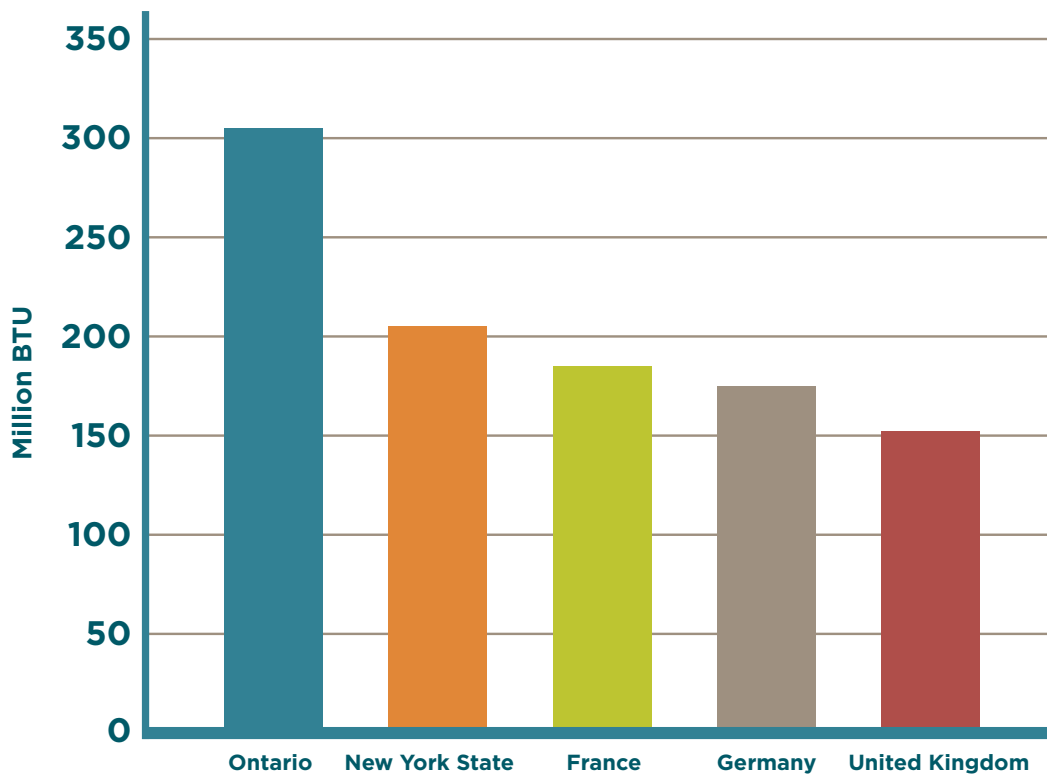
Introduction

ONTARIO'S ECONOMY DURING THE 20TH CENTURY was built on a foundation of low-cost and abundant energy supplies. From 1906 to 1959 we enjoyed continuously falling electricity rates as Ontario Hydro developed virtually all of our low-cost hydro-electric resources. And starting in 1958 with the completion of the TransCanada pipeline system from Alberta to Ontario we began to rely on low-cost natural gas to heat our homes and fuel our industries.

Times have changed, however. We no longer have access to additional, low-cost made-in-Ontario electricity supplies (pending further developments in renewable technologies). And we must dramatically reduce our natural gas consumption as part of a comprehensive strategy to reduce our greenhouse gas emissions to 80% below 1990 levels, by 2050. Therefore Ontario needs a new energy strategy to heat our homes and buildings and power our province in the 21st century.

As a result of over a hundred years of low-cost energy, Ontario's energy consumption per person is amongst the highest in the world. As **Table 1** reveals, our energy consumption per person is 50% higher than New York State's and double that of the United Kingdom.

Table 1: Primary Energy Consumption Per Person in 2008 ¹



This means we are sitting on top of a huge untapped energy efficiency gold mine that can and should be fully exploited to meet our energy needs.

- According to a Canadian Manufacturers & Exporters report, Ontario’s industries could cost-effectively reduce their energy consumption by 29% by 2030 by implementing all the economically feasible best practices that are readily available.²
- A study for Enbridge Gas Distribution found that the natural gas consumption of its residential, commercial and industrial customers could be cost-effectively (e.g., a net gain in savings over the life of the investment) reduced by 18%, 29% and 34% respectively by 2017³. A similar report for Union Gas concluded that its customers could cost-effectively reduce their natural gas consumption by 30% by 2017.⁴
- Since 2004, the Hospital for Sick Children in Toronto (Sick Kids) has reduced its energy consumption by 19.3% despite the addition of more energy intensive medical equipment and the expansion of services. Sick Kids is now one of Ontario’s most energy efficient hospitals but it believes that its work has just begun. It is now planning to double its energy savings over the next few years.⁵

The Benefits of Energy Efficiency

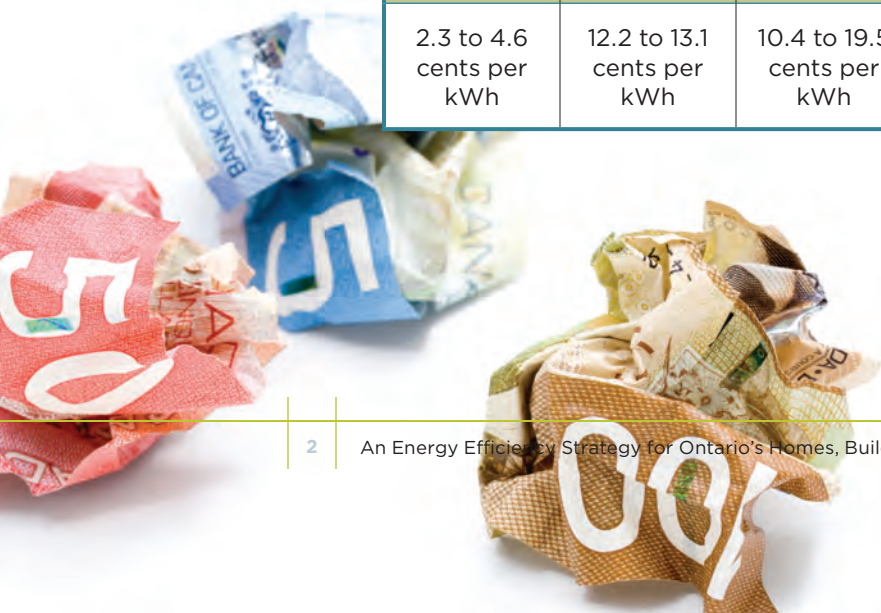
Lower electricity bills

Ontario’s electricity system is in need of significant investment to replace aging generation and transmission equipment. And according to *Ontario’s Long-Term Energy Plan*, residential electricity rates must double by 2030 to pay for this re-building of our electric power system.⁶

Table 2 compares the cost of energy efficiency versus the cost of new made-in-Ontario electricity supply options.

Table 2: Costs of New Made-in-Ontario Electricity Resource Options ⁷

| Energy Efficiency | Water Power | Biogas | Wind Power (Onshore) | Darlington Nuclear Re-Build Project | Solar Electricity |
|--------------------------|----------------------------|----------------------------|----------------------|-------------------------------------|----------------------------|
| 2.3 to 4.6 cents per kWh | 12.2 to 13.1 cents per kWh | 10.4 to 19.5 cents per kWh | 13.5 cents per kWh | 19 to 37 cents per kWh | 44.3 to 80.2 cents per kWh |



As Table 2 reveals, the cost of saving a kWh of electricity is 56-97% less than the cost of obtaining a new kWh of electricity supply from made-in-Ontario renewable or nuclear energy. Nevertheless, *Ontario's Long-Term Energy Plan* is proposing to spend six times more on electricity supply (\$75.4 billion) than on energy efficiency (\$12 billion).⁸ This doesn't make sense. By increasing our spending on low-cost energy efficiency and reducing our spending on high-cost new supply we can keep the lights on and reduce our electricity bills.

Energy efficiency investments will raise our GDP by \$5.1 billion, create 28,500 jobs and reduce our GHG emissions by 5.5%.

Lower natural gas bills

Ontario's investor-owned natural gas utilities, Enbridge Gas Distribution and Union Gas, have developed some of North America's most cost-effective energy conservation programs. Specifically, the two gas utilities' energy conservation programs are reducing their customers' bills by \$3.1 billion at a cost of only \$191 million. That is, for every dollar of utility spending, their customers are achieving \$16.2 dollars of bill reductions.⁹

Higher GDP and profits, more jobs and smaller deficits

A recent study by Dr. Ernie Stokes of The Centre for Spatial Economics (CSE) for the Ontario Clean Air Alliance calculated the economic benefits of energy efficiency investments that would reduce our natural gas consumption by 15% by 2026. According to Dr. Stokes' analysis, these investments would provide the following benefits in 2026: raise our GDP by \$5.1 billion (0.6%); create 28,500 new jobs; raise corporate profits by \$451 million; and reduce the combined federal and provincial deficits by \$591 million – all while reducing Ontario's total greenhouse gas emissions by 5.5%.¹⁰

A University of California Berkley study of energy efficiency programs in that state found that its energy efficiency initiatives have created 1.5 million full time equivalent jobs with a total payroll of \$45 billion over the past 34 years and have saved California households \$56 billion in energy costs. The study's authors note that the benefits don't end there: "As a result of energy efficiency, California reduced its energy import dependence and directed a greater percentage of its consumption to instate, employment-intensive goods and services, whose supply chains also largely reside within the state, creating a 'multiplier' effect of job generation."¹¹

A study of the economic impacts of electricity conservation efforts conducted for the Ontario Power Authority produced findings similar to the CSE and California studies. It found that achieving the electricity conservation targets outlined in the province's master electricity supply plan would result in \$16.4 billion in net avoided costs by 2027.¹²

The OPA study echoes the messages from the California and CSE studies: "The economy of Ontario does not only reap these energy savings and the associated reduction in pollution and greenhouse gases, it is also expected that Ontario will gain significant employment increases and higher wages and salaries. The energy savings release

funds that can be used by consumers and businesses on consumption and investment. Governments would also fare well under these programs as the energy conservation is also expected to result in higher government revenues. These added revenues add up to a total of \$2 billion.”¹³

Lower greenhouse gas emissions

The Government of Ontario is committed to reducing the province’s greenhouse gas emissions by 80% below 1990 levels by 2050.¹⁴ The electricity and natural gas consumption of Ontario’s homes, buildings and industries is responsible for 40% of Ontario’s total greenhouse gas emissions.¹⁵ By investing in energy efficiency we can simultaneously reduce the energy bills of our homes, buildings and industries and reduce our greenhouse gas emissions.

Figures 1 and 2 provide a break-out of Ontario’s electricity and natural gas consumption by our homes, buildings and industries.

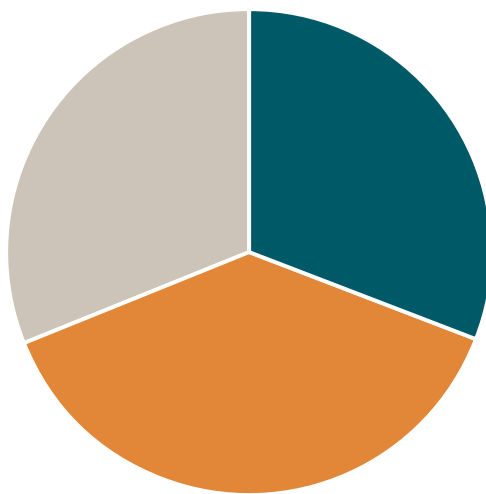


Figure 1: Ontario’s 2007 Electricity End-Use Consumption by Sector¹⁶

- Homes 31%
- Commercial and Institutional Buildings 38%
- Industries 31%

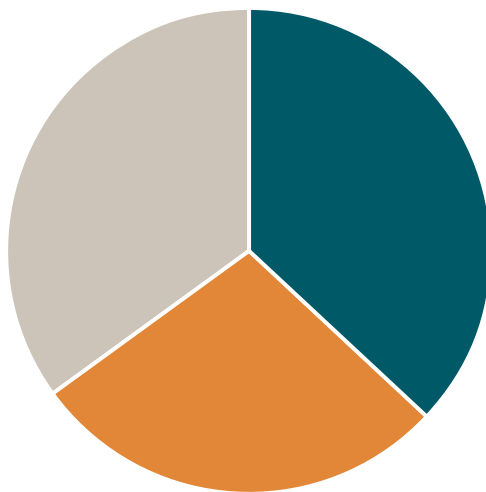


Figure 2: Ontario’s 2007 Natural Gas End-Use Consumption by Sector¹⁷

- Homes 37%
- Commercial and Institutional Buildings 28%
- Industries 35%

In 2007, electricity generation was responsible for 20% of Ontario's energy-related greenhouse gas emissions¹⁸ with most of these emissions produced by Ontario's four coal-fired power plants.¹⁹ However, pursuant to a legally binding regulation issued by the Government of Ontario in 2007, all of the province's coal-fired electricity generation will be phased-out by December 31, 2014 at the latest. Much of the coal-fired generation will be replaced by natural gas-fired combined-cycle power plants whose greenhouse gas emissions are approximately 60% lower than those of coal-fired power plants.²⁰

There are three options for reducing the greenhouse gas emissions from Ontario homes, businesses and industries.

All of the province's coal-fired electricity generation will be phased-out by 2014.

Option 1

The first option would be to completely phase-out the use of fossil fuels (i.e., natural gas) for electricity generation. Nevertheless, even if this were to occur, Ontario's homes, buildings and industries would *still* have to reduce their direct natural gas consumption (consumption by furnaces and boilers) by approximately 70%, relative to their 2007 levels, to achieve an 80% reduction in their total electricity and natural gas greenhouse gas emissions by 2050 relative to 1990 levels.²¹

Option 2

A second option would be to continue to use natural gas for electricity generation, but use it much more efficiently. Currently, most of Ontario's natural gas-fired electricity is produced by large *combined-cycle* power plants (e.g., the Portlands Energy Centre on the Toronto waterfront) that use natural gas to produce only one service — electricity — and that have an energy efficiency of approximately 50%.

On the other hand, natural gas-fired *combined heat and power* (CHP) plants are much more energy efficient than *combined-cycle* power plants. CHP plants use the same molecules of natural gas to simultaneously produce electricity and heat. As a result, they can have an overall energy efficiency of 80-90%. To achieve these high energy efficiency levels, CHP plants must be located in buildings, factories or district energy centres so that the thermal heat from the electricity generator can be captured to provide heat for the building(s) or to drive an industrial production process. CHP is a proven off-the-shelf technology in wide use around the world.

If all of our natural gas in 2050 was consumed by CHP plants, we could achieve an 80% reduction in the electricity and natural gas greenhouse gas emissions of our homes, buildings and industries and produce 29 billion kWh of electricity (our total fossil generation in 2007 was 41.1 billion kWh²²). However, the amount of heat provided by the CHP plants would be approximately 85% less than was previously supplied by natural gas furnaces and boilers in 2007, requiring significant upgrades to buildings to reduce their heating requirements from fossil fuels.²³

Option 3

Alternatively, we could achieve our greenhouse gas emission reduction targets by using some of our natural gas to power high-efficiency CHP plants and the remainder to fuel super-efficient (95%) natural gas furnaces and boilers to heat our homes and buildings and drive our industrial production processes.

Market and Political Barriers to Energy Efficiency

There are numerous market and political barriers that are preventing us from reaping the full economic and ecological benefits of our energy efficiency gold mine. These major barriers are:

Missing information

Most energy consumers have limited information about their full range of cost-effective energy efficiency options. According to an Ipsos Reid poll for the Ontario Power Authority, for example, more than 59% of Ontarians believe they need to know more about using electricity wisely.²⁴

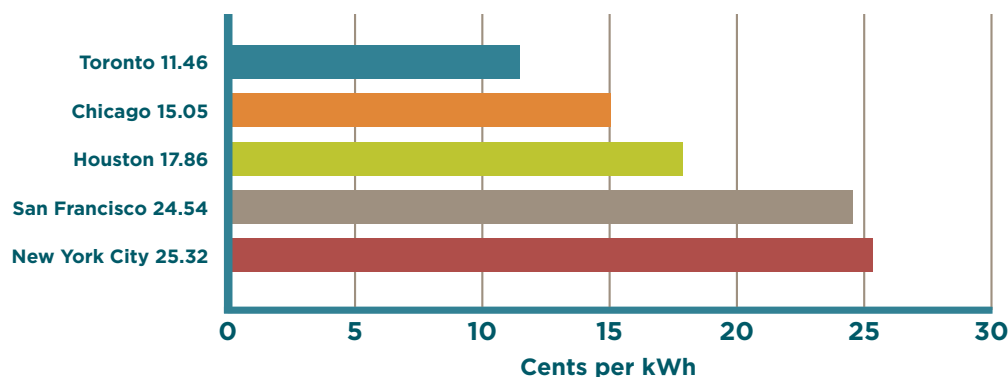
Limited access to capital

Most consumers lack access to sufficient capital to invest in all of their financially beneficial energy options. As a result, residential, commercial and industrial consumers typically demand very short (1-5 year) payback periods for energy efficiency investments in order to recover their capital outlays quickly, despite the fact that these investments can generate savings for decades. This leads to a tendency to, at best, “cherry pick” fast payback items while ignoring more capital intensive projects that can deliver deeper longer term returns. As a result, many energy efficiency investments that are cost-effective on an equipment or building life-cycle basis are not pursued. In contrast, on the supply-side, electricity generating companies are willing to recover their capital costs over time periods ranging from 15-100 years.²⁵

Prices that don't tell the truth

As **Table 3** reveals Ontario's electricity rates are amongst the lowest in North America. For example, Toronto's residential price of electricity is 55% lower than New York City's.

Table 3: Residential Electricity Prices in 2009 ²⁶



Our low energy prices are due to numerous subsidies for energy consumption that disguise the true cost of new energy supplies and encourage wasteful energy use.

Hydro-electric subsidy for higher cost fossil and nuclear generation

Ontario obtains approximately one-quarter of its electricity supply from very low cost hydro-electric generating stations that were built during the first half of the 20th century. For over 50 years, these low-cost water power facilities have been used to disguise the true cost of our much higher cost coal and nuclear power plants. For example, in 1998, Ontario Hydro's cost of producing electricity from water power was 1.1 cents per kWh versus 4.3 cents and 7.7 cents per kWh for fossil and nuclear power respectively.²⁷ That is, our low-cost hydro-electric power plants are subsidizing our dirty and dangerous non-renewable electricity generating stations.

Provincial government subsidy for stranded nuclear debt

As a result of the cost overruns and the poor performance of its nuclear reactors, which left the company saddled with enormous debts, Ontario Hydro was broken up into five companies in 1999. All of its generation assets were transferred to Ontario Power Generation (OPG). However, in order to keep OPG solvent, \$19.4 billion of Ontario Hydro's debt was transferred to the Ontario Electricity Financial Corporation (an agency of the Government of Ontario) as "stranded debt" or "unfunded liability"²⁸. Since 1999 the Government of Ontario has devoted all of its corporate income tax revenues from OPG, Hydro One and Ontario's municipal electric utilities (e.g., Toronto Hydro) and all its dividend payments from OPG and Hydro One to servicing the stranded nuclear debt. In 2010 these subsidy payments equalled \$1.16 billion.²⁹ In other words, revenues that should be used to pay for our hospitals, schools and universities are being used to subsidize unnecessary electricity consumption.

Air-conditioning subsidy

According to the Ontario Power Authority, it costs up to \$1.19 to \$1.64 per kilowatt-hour (kWh) to meet our electricity needs on extremely hot summer days when our air-conditioners are running full out.³⁰ That is, the cost of producing electricity during these peak hours is approximately 10 times greater than the peak hour residential price of electricity (about 14 cents per kWh). As a consequence, consumers are given a massive subsidy to crank up their air-conditioners when the cost of producing electricity is at its highest and air quality may be at its worst.

Clean Energy Benefit subsidy

The Government of Ontario's "Clean Energy Benefit" program provides a 10% discount on the total electricity bills of residential, farm and small business consumers for five years commencing January 2011. This subsidy will add \$1.135 billion per year to the provincial debt³¹ and reduce the incentive for consumers to invest in all of the energy efficiency opportunities that can meet their electricity needs at a lower cost than new supply.

Greenhouse gas emission subsidy

Ontario's electricity and natural gas consumers are not required to pay a carbon tax with respect to the greenhouse gas emissions that are caused by their energy consumption. In other words, we allow free pollution of the atmosphere despite the clear social, economic and ecological harm that will be caused by climate change.



An Energy Efficiency Strategy for Ontario

For most of the 20th century Ontario's energy supply decisions with respect to electricity and natural gas were made by four large companies: Ontario Hydro, TransCanada PipeLines, Enbridge Gas Distribution and Union Gas. On the other hand, Ontario's energy efficiency decisions are made by millions of Ontario consumers and businesses. Therefore, to fully exploit our energy efficiency gold mine we must develop and implement an energy efficiency strategy that will motivate and help millions of Ontario consumers and businesses to achieve all their cost-effective opportunities to save energy. Our five-step energy efficiency strategy is as follows.

First, we need big, bold energy efficiency objectives that can be used to drive the practical changes needed to achieve all cost-effective conservation. These objectives are:

1. Move our homes and buildings towards super efficiency;
2. Make Ontario's industries the most energy efficient in the world; and
3. Squeeze every drop of energy out of the natural gas we use.

Second, we need a plan to move Ontario towards our three big, bold objectives at *no extra cost* to the province's energy consumers. That is, the life-cycle electricity and/or natural gas savings of the plan's energy conservation and efficiency measures must exceed their costs.

Third, we need to find smart individuals, municipalities and private sector corporations that will agree to play a leadership role in promoting and implementing these goals because they understand the benefits to the province and their own bottom lines.

Fourth, we need our municipal electric utilities (e.g., Toronto Hydro), Hydro One, Enbridge Gas Distribution and Union Gas to expand their energy conservation and efficiency programs to help their customers achieve *all* of their cost-effective energy savings opportunities, which will help move our homes and buildings towards super efficiency and make our industries the most energy efficient in the world.

Fifth, the Government of Ontario must ensure that its policies and regulations align with these objectives:

- a) Energy efficiency labelling must be mandatory for the sale of all Ontario homes;
- b) Our minimum legally-binding energy efficiency standards for new homes, buildings, appliances and equipment must be continuously improved to reduce the energy bills of Ontario's homeowners and reflect advances in technology;
- c) The Ontario Energy Board and the Ontario Power Authority must eliminate their red tape that is limiting the ability of our electric and gas utilities to help their customers achieve all of their cost-effective energy saving opportunities;
- d) The Ontario Energy Board must ensure that its rate design policies for our electric and gas utilities promote the wise and efficient use of energy, not wasteful consumption; and
- e) Ontario's electric and gas utilities must be allowed to invest in district energy projects.

By pursuing our five step strategy to fully exploit all of our energy efficiency opportunities that are lower cost than new energy supply, we can help ensure that Ontario's future will be clean, green and prosperous.

Laying the groundwork for achieving all cost-effective efficiency

Make our utilities conservation champions

Ontario's investor-owned natural gas utilities, Enbridge Gas Distribution and Union Gas, have developed some of North America's most cost-effective energy conservation programs. Specifically, the two gas utilities' energy conservation programs are reducing their customers' bills by \$3.1 billion for a cost of only \$191 million. That is, for every dollar of utility spending, their customers are receiving \$16.2 dollars in bill reductions.³²

As a result of the success of the gas utilities' energy efficiency programs, in 2003, the mandates of Ontario's municipally-owned electric utilities (e.g., Hydro Ottawa, Toronto Hydro) and Hydro One (which serves rural Ontario and very large industrial customers) were expanded to include the promotion of energy efficiency. According to the Government of Ontario, these electric utilities will play a key role in helping Ontario achieve its energy conservation and efficiency targets.

Ontario's electric and gas utilities are ideal agencies to help remove the market barriers to increasing our energy productivity because:

- They have existing relationships with every electricity and natural gas consumer in the province.
- They are very knowledgeable and trusted sources of energy information.³³
- They can establish rental and on-bill financing (in co-operation with financial institutions) programs to help their customers overcome the high up-front capital cost barrier to energy efficiency and renewable energy investments.
- They can provide financial incentives to encourage their customers to pursue all their cost-effective energy savings opportunities. These financial incentives will be needed as long as governments continue to subsidize energy consumption.

Ontario's two major natural gas utilities, Enbridge Gas Distribution and Union Gas, serve virtually all of Ontario's gas consumers. Hydro One and Ontario's eight largest municipal electric utilities (Enersource Hydro Mississauga, Horizon Utilities, Hydro One Brampton, Hydro Ottawa, London Hydro, PowerStream, Toronto Hydro and Veridian Connections) serve 70% of Ontario's electricity consumers.³⁴ These utilities have the ability and the size to develop first rate, cost-effective energy efficiency programs for their own customers and for the customers of Ontario's more than 60 small municipal electric utilities.

Premier McGuinty and his Ministers of Energy have repeatedly stated their strong support for the promotion of energy efficiency by Ontario's electric and gas utilities. Nevertheless, two of Ontario's energy bureaucracies, the Ontario Energy Board (OEB)

and the Ontario Power Authority (OPA), have responded with red tape to limit our gas and electric utilities' ability – and motivation – to implement innovative, customer-focussed energy efficiency programs that will maximize bill savings for Ontario's consumers.

The OEB's and the OPA's actions reflect their continued belief in the mid-20th century conventional wisdom that increased energy supply is the best option to meet Ontario's energy needs and that the prime role of Ontario's electric and gas utilities should be simply to distribute electricity and natural gas. However, as we have noted earlier, the mid-20th century's conventional wisdom is not supported by the 21st century's facts: Namely, the cost of saving electricity is much lower than the cost of new made-in-Ontario renewable and/or nuclear electricity supply. And we must dramatically reduce our natural gas consumption to meet our greenhouse gas emission reduction targets.

In Appendix A we provide a detailed description of the OEB's and the OPA's energy efficiency red tape and our recommendations for ensuring that Ontario's electric and gas utilities can and will help their customers' achieve all their cost-effective energy savings opportunities.

**red tape is
limiting utilities'
ability to help
their customers
save energy**

Reduce utility reliance on fixed charges

Another key element in making utilities true conservation champions is to reduce their growing reliance on fixed monthly customer charges.

The electricity and natural gas bills of residential and small commercial customers are a function of a *fixed* monthly customer charge and numerous *variable* energy and distribution charges which are directly related to the amount of electricity and gas consumed.

During the past ten years the Ontario Energy Board has allowed the electric and gas utilities to dramatically increase their fixed monthly customer charges. For example, Toronto Hydro's residential customer charge has risen from \$9.46 per month in 2000 to \$18.25 per month in 2010.³⁵ As the utilities recover a higher proportion of their costs in the fixed monthly charge, their customers' ability to reduce their bills by conserving energy is diminished. This doesn't make sense if we want to reduce the need for new high-cost electricity generating facilities.

What the Ontario Energy Board should do

Reward energy conservation by directing the province's electric and gas utilities to lower their fixed monthly charges and increase their variable charges.

Expand use of district energy and combined heat and power

A district energy system uses underground pipes to distribute hot and/or chilled water to neighbouring homes, buildings and/or factories from one or more common energy

**municipalities
have a number
of tools they can
use to support
greater energy
efficiency**

plants. The district energy system's thermal energy can be provided from multiple potential sources including solar energy, geothermal energy, biogas, waste heat from factories, natural gas combined heat and power plants and high-efficiency condensing gas boilers.

As a result of economies of scale, common energy plants can provide clean and renewable energy at a much lower cost than multiple energy systems located in each home and building. Therefore district energy systems can help to lower the cost of moving our homes and buildings to super efficiency.

In Ontario district energy systems can be found in Cornwall, Hamilton, London, Markham, Ottawa, Sudbury and Toronto. For example, the Enwave district energy system provides heating and cooling (deep lake water cooling from Lake Ontario) to buildings in downtown Toronto (e.g., Air Canada Centre, Fairmont Royal York Hotel, the TD Centre, Hospital for Sick Children). However, there is the potential to establish many additional district energy systems in Toronto and across Ontario, including in new subdivisions.³⁶

Some of Ontario's district energy systems are municipally owned, others are privately owned, and the Enwave system has both municipal and private sector shareholders. However, a major barrier to new district energy systems is their high upfront capital cost. Consequently, there is a need to encourage companies that will accept long pay-back periods and relatively low rates of return on capital to invest in district energy systems. Ontario's municipal electric utilities and Enbridge Gas Distribution and Union Gas are ideal candidates for this role. Due to their local monopolies with respect to the distribution of electricity and gas, they are willing and able to accept long pay-back periods for their investment projects. As a result, these utilities will be able to obtain the capital needed to build new district energy systems at a relatively low cost if the *Ontario Energy Board Act* is amended to allow them to expand their mandates to become rate-regulated electricity *and district energy* utilities and rate-regulated natural gas *and district energy* utilities.

Get municipalities to support energy efficiency

Municipalities have a number of tools they can use to support greater energy efficiency, particularly when it comes to buildings. As large energy importers (only a minute fraction of the energy consumed in most of Ontario's cities is locally produced), municipalities will reap numerous benefits from improved efficiency, from new jobs and new businesses in the energy efficiency sector to a lower cost of living for residents and higher tax revenues combined with utility cost savings for the municipality itself. In Toronto, for example, just a 10% reduction in municipal corporate energy use would save the City \$20 million per year.³⁷

Cities can also use innovative finance tools, such as Local Improvement Charges, to help residents and businesses overcome the capital cost barrier to deep energy efficiency.

By harnessing the long-term certainty of this financing mechanism, cities can benefit from improved housing stock and more competitive businesses while helping to shift focus from short payback items to achieving the full benefit of energy efficiency improvements (in part, by helping residents overcome the “what if I move?” concern about undertaking longer payback actions).

What municipalities can do to promote energy efficiency:

1. Amend their official plans and building permit approval processes to encourage and/or mandate the construction of energy efficient (EnerGuide Rating of 86 or greater) and solar-ready new homes and buildings.
2. Direct their municipally owned electric utilities to implement programs to help their customers achieve all their energy saving opportunities that can meet their needs at a lower cost than new supply.
3. Provide low-interest building-tied financing for energy savings retrofits, which can be repaid as a fee on the municipal tax bill.³⁸
4. Develop policies and programs to facilitate the implementation of cost-effective district energy projects.



**we need to
adopt ambitious
but achievable
objectives to
help focus our
efficiency efforts**

Spurring action on energy efficiency

To ensure we make the most of the opportunity to reduce costs and the flow of energy dollars out of our province, we need to adopt ambitious but achievable objectives to help focus our efficiency efforts. In this section, we outline three objectives to help focus our energy efficiency efforts: moving homes and buildings toward super efficiency, making Ontario's industries tops for efficiency, and squeezing every drop of energy out of the natural gas we use.

Move our homes and buildings toward super efficiency

A home or building is super efficient if its energy consumption is at least 50% lower than a standard home or building. A Zero Net Energy home or building is built to super efficient standards and can meet all of its energy needs on an annual basis from its on-site renewable energy supply (e.g., solar, geothermal). To cope with fluctuations in demand, Zero Net Energy homes and buildings can be connected to the electricity grid and/or a natural gas distribution system, exporting energy when there is a surplus, and importing energy when not enough renewable energy is being produced on-site.

California has adopted the following goals for "Zero Net Energy" buildings:

- a) All new residential construction will be zero net energy by 2020; and
- b) All new commercial construction will be zero net energy by 2030.³⁹

The Town of Markham's *Greenprint Sustainability Plan* is calling for the Town to move to zero net energy, water, waste and emissions by 2050.⁴⁰

Moving to super efficiency

By pursuing all the cost-effective options to move our new and existing homes and buildings towards Zero Net Energy we can achieve a dramatic reduction in our energy consumption and bills. Investing in all of our cost-effective energy conservation and efficiency options *first* is the key to moving towards Zero Net Energy at the lowest possible cost. As we move along the path to Zero Net Energy, the cost of achieving incremental energy savings will decline due to innovation and advances in energy efficiency and renewable energy technologies. For example, the U.S. Department of Energy's "Sun Shot Initiative" is seeking to make solar electricity cost-competitive with fossil fuel generation by 2020,⁴⁸ which means it may be cost-effective for our new homes to be 100% Zero Net Energy as early as 2020. As a consequence, all new homes and buildings should be made "solar ready" so that they will require minimal retrofits to install solar energy in the future when it is cost-effective.

To transition toward Zero Net Energy, we can build on the Government of Canada's EnerGuide for Houses program by encouraging builders to go above and beyond the minimum building code standards and by encouraging home buyers to look more closely at a home's operating costs, particularly in light of rising energy costs.

SUPER EFFICIENCY IN ACTION

Inspiration – The Minto ecohome

The Minto Group has built *Inspiration*, a Zero Net Energy home in Ottawa that proves that homeowners can enjoy energy efficient living without compromising comfort and style in a northern climate.

Key features of the *Inspiration*, Zero Net Energy Home include:

- Extended roof-line to block heat from the summer sun;
- Natural ventilation design to cool the home at night;
- Passive solar design with slate floors to retain solar heat;
- Double insulated walls for added warmth, quiet, draft proofing, and durability;
- Triple pane windows;
- Compact fluorescent lights throughout;
- A convenient All-Off switch connected to green plugs to make conserving energy easy;
- Solar thermal air collectors;
- Solar hot water collectors;
- Photovoltaic solar electricity panels;
- Rainwater harvesting for irrigation and toilets;
- Low flow faucets and fixtures; and
- Dual flush water saving toilets.⁴¹

The *Inspiration's* energy conservation and efficiency measures are very cost-effective, paying for themselves in energy savings in just three years. On the other hand, *Inspiration's* solar photovoltaic electricity panels are not yet cost-effective given today's residential electricity prices.⁴²

The Minto Group has committed to offering Zero Net Energy homes for sale in all of its new developments in Canada.

In addition, the Minto Group is planning to offer solar ready homes that will require minimal retrofits to install solar energy in the future.⁴³





TD Zero Net Energy Bank

In May 2011 the Toronto-Dominion Bank opened a Zero Net Energy branch in Fort Lauderdale, Florida.⁴⁴ The new location is 50% more energy efficient than branches built to the bank's previous design and is slated for LEED Platinum status. Its 400 solar panels will produce all the energy required by the building.⁴⁵

Manitoba Hydro Place

Manitoba Hydro's new 22 floor head office building in Winnipeg is a leading example of the potential for large buildings to move towards Zero Net Energy.



Key features of Manitoba Hydro Place include:

- Its energy consumption is 65% lower than the Canadian Model National Energy Code for Buildings;
- Its primary source of heating and cooling is a geothermal system consisting of 280 wells, 122 meters deep, located under the building;
- High ceilings and narrow floor plates help to maximize natural lighting;
- Exterior walls made of low-iron glass for maximum solar gain;
- Double walls buffer against extreme climate;
- Automated solar shading;
- Solar chimney provides natural displacement ventilation and air movement throughout the building;
- Building form, location and design selected to maximize use of solar energy; and
- High-efficiency condensing natural gas boilers provide remaining heating needs during the coldest overcast days of the year.⁴⁶

All of Manitoba Hydro Place's energy conservation measures are cost-effective on a life-cycle basis.⁴⁷

Natural Resource Canada’s EnerGuide Rating System measures a home’s energy efficiency on a scale of 0 to 100.⁴⁹ A rating of 0 represents a home with major air leakage, no insulation and extremely high energy consumption. A Zero Net Energy home has a rating of 100.

EnerGuide Home Rating System⁵⁰

| House Characteristics | Typical Rating |
|---|------------------|
| Older house not upgraded | 0 to 50 |
| Upgraded older house | 51 to 65 |
| Energy-efficient upgraded older house | 66 to 74 |
| Minimum Ontario Building Code for new homes as of January 1, 2012 | 80 ⁵¹ |
| An energy efficient new home | 86+ |
| House requiring little purchased energy | 91 to 99 |
| Zero Net Energy home | 100 |

What new home buyers can do

1. Buy new homes that have EnerGuide ratings of 86 or better and are solar ready.

What homeowners can do

1. Contact a Natural Resources Canada energy advisor to arrange an ecoENERGY assessment of their house and implement the recommended energy savings measures.
2. Buy appliances and equipment (e.g., light bulbs, computers, TVs, air-conditioners, boilers) and energy conserving products (e.g., windows, doors) that have the Energy-STAR high-efficiency label.
3. Consider installing a solar/electric or solar/gas hot water system; a geothermal system for heating and cooling; or a solar photo-voltaic system for renewable electricity.

What new home builders can do

1. Provide potential customers with the EnerGuide energy efficiency ratings for all of their new homes.
2. Make a commitment that all their new homes will have EnerGuide ratings of 86 or higher and be solar ready by 2014.

Offer mortgages with lower interest rates for energy efficient homes.

What financial institutions can do

1. Offer mortgages with lower interest rates for energy efficient homes to reflect their lower carrying costs.

The Bank of Montreal offers Eco Smart Mortgages with a special low interest rate for energy efficient homes. To qualify a single family home must have six of the following seven features: a) high efficiency heating system; b) high efficiency air cooling system or no air cooling; c) good quality attic insulation; d) EnergyStar windows; e) EnergyStar hot water system or solar or tankless hot

water system; f) EnergyStar doors; g) at least three EnergyStar major appliances.⁵²

What owners and tenants of new commercial and institutional buildings can do

1. Commit that the energy consumption of all of the new buildings that they own or lease will be at least 65% lower than the Model National Energy Code for Buildings.

What owners and tenants of existing commercial and institutional buildings can do

1. Publicly release the annual energy consumption per square foot of each of their buildings and set annual energy savings targets for their buildings.

The energy consumption per square foot of similar buildings varies dramatically. For example, according to *Greening Health Care* – a collaborative of 33 Ontario hospitals – most Ontario hospitals can significantly reduce their energy costs while maintaining and improving patient care. Their data shows that some Ontario hospitals are using *double or triple* as much energy per square foot as others. As a result, energy wasteful hospitals can typically save hundreds of thousands of dollars annually. And most of these savings require “only operational and maintenance improvements, involving little capital expenditure but delivering remarkable results.”⁵³

Large variances in energy consumption are not limited to the healthcare sector. According to the Real Property Association of Canada (REALpac), the normalized energy consumption (adjusted for weather, building type and use) of its members’ Ontario buildings also varies dramatically. Specifically, the least efficient building uses four times more energy per square foot than the most energy efficient one.⁵⁴

REALpac has adopted the following energy consumption target: 20 equivalent kilowatt-hours of energy use per square foot of building area by 2015. That is, a 25% reduction relative to the average energy consumption of its member’s Ontario buildings in 2010.⁵⁵

What Ontario’s electric and natural gas utilities can do

1. Establish rental programs for high-efficiency and renewable energy equipment (e.g., high efficiency air-conditioners and boilers, solar/electric and solar/gas water heaters; geothermal energy systems, micro-turbine combined heat and power systems).
2. Establish, in co-operation with third party financial institutions, low-interest on-bill

financing programs for energy efficiency upgrades and renewable energy equipment.

3. Provide financial incentives for the construction of high-efficiency (EnerGuide Rating of 86 or greater) and solar ready new homes and buildings.
4. Provide financial incentives for energy saving retrofits of existing homes and buildings.

What the Ontario government can do

1. The Ministry of Energy should regularly raise its minimum energy performance standards for new appliances and equipment to help move our homes and buildings towards Zero Net Energy and to drive improvements in technology.
2. The Ministry of Municipal Affairs and Housing should regularly raise the Ontario Building Code's minimum energy efficiency standards to continuously and cost-effectively move our new homes and buildings towards Zero Net Energy.

Help homeowners make good energy decisions

Give home buyers clear and upfront information on true home costs

Energy efficiency labelling must be mandatory for the sale of all Ontario homes. Mandatory home energy efficiency labelling will provide multiple benefits. First, it is a consumer protection measure that will ensure that home buyers will have the information they need to make informed choices. Second, it will ensure that existing home-owners and new home builders will be able to recover the costs of all the cost-effective actions that they take to increase the energy efficiency of their homes. Third, by encouraging home owners and home builders to invest in energy conservation and efficiency, it will create energy conservation jobs in Ontario and will reduce the outflow of Ontario dollars to purchase natural gas from Alberta. As the Stokes Report has shown, these actions will also raise Ontario's GDP and reduce the size of the provincial deficit.⁵⁶

The Ministry of Energy should require the sellers of existing and new homes to provide potential purchasers with the EnerGuide energy efficiency rating of their homes. Right now, home sellers spend hundreds and even thousands of dollars preparing their homes for sale (also known as "fluffing"). Requiring home owners to undertake an energy assessment is a modest addition to this cost and is in their best interest because almost every seller will also be a buyer who deserves to know the true operating cost of the home they are purchasing.

Put achieving the full benefit of efficiency within reach for homeowners

Homeowners often lack the ready capital to undertake extensive energy retrofits to their homes, even when such retrofits can provide a direct net economic benefit and a more comfortable home. Even those with access to significant home equity may be reluctant to leverage that to improve their home's efficiency due to concerns that payback periods

The least efficient building uses four times more energy per square foot than the most energy efficient one.

may extend beyond their period of home ownership (the “what if I move?” syndrome).

Allowing homeowners to rent or lease more efficient HVAC equipment as part of their existing utility agreements can go some way to addressing this barrier. However, for improvements to insulation, windows or other capital improvement measures, Local Improvement Charges can also be a solution. These charges provide low cost financing for such upgrades and tie that financing to the home rather than the homeowner, which gives homeowners the confidence to proceed with longer payback measures.

What Ontario’s Ministry of Municipal Affairs and Housing can do

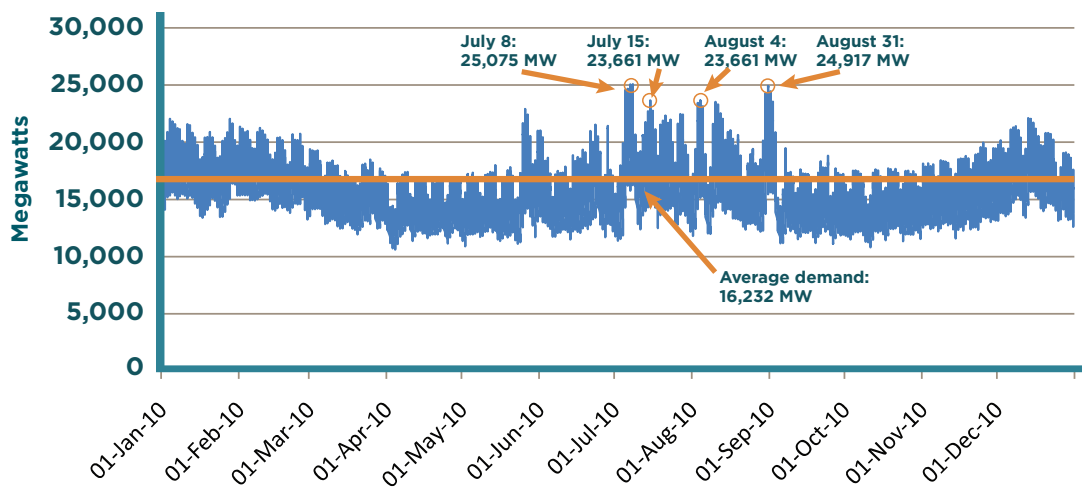
1. The Ministry of Municipal Affairs and Housing should support the use of mechanisms such as Local Improvement Charges or other means to help building and homeowners overcome concerns about longer payback periods by tying financing to a specific building rather than a specific owner.⁵⁷

Better align peak pricing with true peak demand

Ontario is on the right track with its introduction of smart meters and time-of-use pricing for electricity. However, the differential between peak and off-peak electricity rates needs to be increased to reduce the air conditioning subsidy and the need for high cost and highly unpopular natural gas-fired peaking plants (e.g., York Energy Centre in King Township).

Figure 3, which plots Ontario’s demand for electricity during each hour of 2010, highlights two important facts. First, on an annual basis, our demand for electricity spikes during about a dozen very hot summer afternoons when our air-conditioners are running full out. Second, during these summer spikes in demand (needle peaks), the demand for electricity is up to 50% higher than Ontario’s average annual hourly demand.⁵⁸

Figure 3: Ontario’s Demand for Electricity in 2010



Reducing demand on the dozen extreme demand days is crucial for two reasons. First, the cost of building new simple-cycle gas-fired power plants and transmission capacity to supply these needle peaks far outstrips what Ontario is recovering through its current peak period electricity prices. Specifically, it can cost up to \$1.19 to \$1.64 per kWh to supply power during these peak periods, while the billing rate for this power is only 14 cents per kWh (peak summer rate).⁵⁹ Second, these peaks typically occur on smog alert days. Needless to say, firing up fossil-fired power plants to meet our electricity needs on smog alert days is not good for our lungs.

The corollary of Ontario's policy of *undercharging* for power during extreme peak periods is that we *overcharge* for electricity during off peak periods, when electricity can cost consumers more than four times its actual cost of production. This doesn't make sense.

Ontario can reduce its electricity costs and average annual electricity rates by encouraging consumers to reduce their demand for electricity during the summer needle peaks and/or by shifting some of their consumption to off-peak periods.

There are numerous options for consumers to reduce their electricity consumption during the summer needle peaks:

- Turning up their air-conditioner thermostats during the summer electricity demand spikes or enrolling their air-conditioner in their local utility's *peaksaver* load control program which automatically turns their thermostats up marginally during high demand periods.
- Pulling their curtains to reduce solar gain.
- Install ceiling fans.
- Purchasing high-efficiency air-conditioners.
- Purchasing energy conserving EnergyStar windows that reduce solar gain during the summer.
- Installing geothermal heat pumps.
- When purchasing a new home, insisting on Zero Net Energy home features such as extended roof-lines to block heat from the summer sun; natural ventilation to cool the home at night, and double insulated walls.

A powerful option to encourage consumers to pursue these options would be to increase peak electricity rates and lower off-peak electricity rates. In addition, utilities could offer critical peak rebates to consumers who voluntarily curtail their electricity consumption during the summer needle peak periods.

In 2006 Hydro Ottawa initiated a pilot project to test the impacts on residential consumer behaviour of time-of-use rates and critical peak rebates. In addition to a 7 cent per kWh differential between peak and off-peak rates, participants were provided with a critical peak rebate of 30 cents for every kWh reduction in demand below their "baseline" usage that they achieved during the critical peak hours. As a result, the

Firing up fossil-fired power plants to meet our electricity needs on smog alert days is not good for our lungs.

Adjust time-of-use pricing to better reward homeowners and building owners who reduce their demands on very hot summer afternoons.

participants reduced their peak hour demands by 17.5% on four critical peak summer days.⁶⁰

Meanwhile, the province's *peaksaver* load control program, which has relied almost entirely on consumer goodwill, has failed to achieve significant market penetration. This is a low-cost way for reducing demand particularly during needle peaks (the *peaksaver* program, for example, reduced demand by the equivalent of taking the City of Kingston off the electricity grid on the hottest day in 2009). *Peaksaver* participants should receive an annual payment of \$50 to spur greater uptake for this languishing program.

To curtail any impact of higher peak pricing on vulnerable populations, the province, together with utilities, can also establish a system of medical exemptions from peak pricing for homebound citizens. Utilities can also offer incentives for the purchase of timers suitable for large appliances or can install timers on electric water heaters on behalf of clients.

What the Ontario Energy Board should do

Reduce the Air Conditioning Subsidy by adjusting time-of-use pricing to better reward homeowners and building owners who reduce their demands on very hot, summer afternoons.

Keep electric heating from burning a hole in consumers' wallets

Electric heat is still widely used in some Ontario communities. An increase in the peak/off-peak price differential when combined with the installation of electric thermal storage heaters will also reduce the electricity bills of electric heating customers in the winter. These devices, which store heat in ceramic blocks or other mediums, can be charged up in off-peak periods when electricity costs are low and discharged during the day when costs are higher.⁶¹ While relatively new to Ontario, they have been in use in the United States and Europe for more than 20 years.

Ontario's electric utilities can help their customers reduce their electric heating bills by renting electric thermal storage heaters or by providing low-interest on-bill financing for them.

Make Ontario's industries the most energy efficient in the world

For most of the 20th century Ontario had one of the most prosperous and productive economies in the world. The growth of our manufacturing industries was fuelled by our low-cost made-in-Ontario hydro-electric resources, a protective tariff, a low dollar and federally-regulated low cost pricing for our natural gas imports from Alberta. All of these historic foundations of our economic prosperity have now disappeared. As of 1959, Ontario Hydro had fully developed virtually all of our low-cost hydro-electric resources. Successive General Agreement on Tariffs and Trade (GATT) negotiations and the Canada-U.S. Free Trade Agreement have eliminated our protective tariffs. And the Free Trade Agreement also eliminated federally regulated, low-cost pricing for our natural gas imports from Alberta. Due to the rise in oil prices, our dollar is now more valuable than the once mighty U.S. dollar.

According to the Task Force on Competitiveness, Productivity and Economic Progress, since the early 1980s Ontario's prosperity has declined relative to its North American peers. Specifically, in 2009, our Gross Domestic Product (GDP) per capita was lower than all but two (Michigan, Quebec) of the 16 largest states and provinces in North America. According to the Task Force one of the reasons for our declining prosperity is that our businesses invest less in machinery, equipment and information and communications technology than their North American competitors.⁶²

To survive and prosper in the global economy Ontario's manufacturing industries must continuously increase their productivity. As Roger Martin, Chairman of the Task Force on Competitiveness, Productivity and Economic Progress, has noted:

"Our prosperity gap is a productivity gap, and this productivity gap is an innovation gap. Ontarians are among the world leaders in work effort – that is, the hours of work per person. But we are laggards in creating economic value per hour worked."⁶³

Mr. Martin's conclusions are supported by a Canadian Manufacturers and Exporters (CME) study which found that most of Ontario's manufacturing plants manage and finance energy projects on an ad hoc basis and have failed to implement the best practices associated with continuous improvement. Specifically, according to the CME, most of our industries have implemented less than 42% of the technical best practices available for energy efficiency.⁶⁴ As a consequence, the CME believes that Ontario's industries can cost-effectively reduce their energy consumption by 29% by 2030 by implementing all of the economically feasible best practices that are readily available.⁶⁵

As Dr. Stokes' analysis has made clear, by pursuing cost-effective options to increase the energy efficiency of our industries we can simultaneously make our economy more productive and competitive, create jobs and reduce our greenhouse gas emissions.⁶⁶

What Ontario's industrial companies can do

1. Pursue all of their energy savings opportunities that are cost-effective on a life-cycle basis.
2. Set energy productivity improvement targets for their Ontario operations.
3. Submit annual reports on their energy productivity (ratio of value added to energy inputs) as part of their greenhouse gas emission reporting that will be soon required by Ontario's participation in the Western Climate Initiative.

What the Ontario Power Authority and Ontario's electric and gas utilities can do

1. Pay Ontario's industrial companies up to the same price to save energy as they pay energy companies to produce and deliver new energy supply.

The Ontario Power Authority's (OPA) payments to consumers to save a kWh are dramatically lower than its payments to electricity generators to produce a kWh. For example, its Industrial Accelerator Program pays large industrial consumers an annual average payment of between 2.3 to 4.6 cents per kWh to save electricity;⁶⁷ whereas the cost of re-building the Darlington Nuclear Station is estimated to be 19 to 37 cents per kWh.⁶⁸ That is, the OPA's payments for saving electricity are 76-94% lower than the cost of new nuclear supply. This doesn't make sense. Buying high-cost electricity pushes up electricity rates and makes Ontario's industries less competitive; whereas paying our industries to pursue all their energy efficiency opportunities that can meet their needs at a lower cost than new supply will reduce the need for higher cost new supply, reduce our energy bills and make our industries more productive and competitive.

Similarly energy efficiency investments which reduce the outflow of Ontario dollars to Alberta to purchase natural gas will make our industries more productive, will create jobs in Ontario and will reduce our greenhouse gas emissions.

Squeeze every drop of energy out of the natural gas we use

Most of Ontario's natural gas-fired power plants use gas to only produce electricity and have energy efficiencies of approximately 30-50%.⁶⁹ This means 50-70% of the natural gas used by these plants is simply wasted heating up our atmosphere and lakes. It is much more efficient to use the same molecules of natural gas to simultaneously produce electricity and useful heat for a building or to drive an industrial production process. This is what combined heat and power (CHP) plants do. As a result, they can have an overall energy efficiency of 80-90%.⁷⁰ Clearly, given Ontario's goal of dramatically reducing its greenhouse gas emissions by 2050, all of our future natural gas-fired plants should be CHP.

CHP plants can be installed in apartment buildings, condominiums, shopping centres, hospitals, universities, airports and factories. As a result, they do not entail the transmission and distribution losses associated with large, centralized power plants. On average, approximately 7% of the electricity generated in Ontario is lost by our transmission and distribution systems before it reaches the consumer.⁷¹

According to the Ontario Power Authority, CHP plants can supply base-load electricity at a total cost of approximately 6 cents per kWh assuming natural gas costs of \$8 per MMBTU.⁷² (On September 26, 2011 the spot price of natural gas at Dawn, Ontario was \$4.10 per MMBTU.⁷³) In addition, as a result of its very high efficiency, the greenhouse gas emission rate of a CHP plant is 80% lower than that of a coal-fired power plant.⁷⁴

While nuclear power plants have even lower greenhouse gas emission rates than CHP plants, the incremental cost of achieving these additional greenhouse gas emission reductions by re-investing in nuclear power instead of CHP plants would be at least \$616 per tonne.⁷⁵ This makes nuclear a hugely expensive greenhouse gas emissions reduction option.

What the Ontario Power Authority should do

1. All of the OPA's future natural gas-fired electricity supply procurements should be combined heat and power.

To date the OPA has contracted for 7,935 MW of natural gas-fired generation capacity of which only 968 MW is combined heat and power.⁷⁶

Conclusion

In the 20th century, Ontario became the industrial heartland of Canada by developing its low cost hydro-electric resources and by importing low cost natural gas from Alberta. But as a consequence, in 2011, Ontario's economy is one of the most energy wasteful in the world. And today, our 20th century energy strategy is a very problematic as we have fully exploited our low-cost hydro-electric resources and we now need to reduce our natural gas-related greenhouse gas emissions.

To meet our future energy needs Ontario has two choices:

We can continue with our status quo energy policies, which primarily focus on building high cost new supply and sending Ontario dollars to Alberta to purchase natural gas. And we can continue to attempt to disguise the economic folly of these energy policies by raising taxes (or accumulating debt) to subsidize our wasteful energy consumption.

Or we can focus on pursuing all of our cost-effective energy saving opportunities in order to actually reduce the energy bills and greenhouse gas emissions of our homes and buildings. This would create good jobs by increasing the productivity and competitiveness of our manufacturing and resource industries.

The choice is ours, but it needs to be made now. Let's choose a clean, green and prosperous future for our great province.



Appendix A: Eliminating Ontario Energy Board (OEB) and Ontario Power Authority (OPA) Red Tape

Red Tape Example #1: No competition, entrepreneurship and innovation rule

Ontario's municipal electric utilities have two options to promote energy conservation and efficiency. First, they can deliver one or more of the OPA's conservation programs (e.g., *peaksaver*) or they can develop and implement their own energy efficiency programs. However, in 2010 the OEB issued its Conservation and Demand Management Code which prohibits the electric utilities from modifying or expanding an existing OPA program to make it better, more comprehensive and/or more successful. In addition, the OEB has prohibited the electric utilities from developing their own energy efficiency programs that are similar, but an improvement on, an OPA program.⁷⁷

The adverse consequences of the OEB's "No Competition, Entrepreneurship and Innovation Rule" can be seen in the *peaksaver* air-conditioner load control program. This innovative and cost-effective program allows utilities to remotely control residential and small business central air conditioners to reduce the demand for electricity on very hot summer days. Since the air-conditioner's fan continues to operate while load reduction is in effect, the program will only lead to a one to two degree change in the temperature of a customer's home during the up to ten summer days when the program is activated. As result, customers don't even notice a difference in home comfort when the program is in operation. As well, utility intervention is rotated among customers participating in the program, meaning no one customer will repeatedly have their air conditioners performance adjusted.

The *peaksaver* program was launched in 2006 but, as of December 2010, the program had signed up only 5.2% of the eligible devices (air-conditioners, water heaters) across the province.⁷⁸ Furthermore, the OPA's goal is to increase this market penetration to only a modest 10% by December 2014.⁷⁹ Despite the OPA's lack of compelling results with this program, the OEB's Conservation and Demand Management Code prohibits municipal electric utilities from implementing technology, financial or marketing enhancements (e.g., hiring an army of summer students to go door-to-door to sign up new participants) to increase *peaksaver's* market penetration. This doesn't make sense since *peaksaver* has the potential to be as ubiquitous and successful as the Blue Box program and can help Ontario keep its lights on at a much lower cost than politically unpopular and high cost new natural gas-fired peaking plants.

Recommendation #1: Ontario's electric utilities should be allowed to improve the OPA's conservation programs and/or implement their own energy conservation programs that are similar to, but a measurable improvement over, the OPA's conservation programs.

Red Tape Example #2: Needlessly increasing the cost of utility equipment rental and on-bill financing programs

Most consumers lack access to sufficient capital to invest in all of their cost-effective energy options (e.g., energy conserving windows, high-efficiency air-conditioners, tank-less water heaters, high-efficiency gas boilers, solar/electric or solar/gas water heaters; geothermal heat pumps). As a result, residential, commercial and industrial consumers typically demand very short (1-5 year) payback periods for energy efficiency investments in order to recover their capital quickly despite the fact that these investments can generate savings for decades. This means that many energy efficiency investments that are cost-effective over their expected economic lives are not pursued. In contrast, on the supply-side, electricity generating companies are willing to recover their capital costs over the full expected economic life of their projects, which can range from 15 to 100 years.⁸⁰

Ontario's electric and gas utilities have access to capital at a much lower cost than most of their customers. As a result, they can help their customers overcome the upfront capital cost barrier to energy saving investments by establishing appliance and equipment rental and/or on-bill financing programs. For example, Manitoba Hydro helps its customers' invest in geothermal energy by providing them with on-bill financing at an interest rate of only 4.9% for loans of up to \$20,000, which can be repaid out of energy savings over 15 years.⁸¹

However, to be able to provide on-bill financing or equipment rental programs at the lowest possible rates, the utilities must be allowed to take reasonable actions to ensure that their customers pay their on-bill financing and/or equipment rental charges. In particular, they must be able to disconnect customers who don't pay their financing and/or equipment rental charges.

While the OEB permits our electric utilities to disconnect customers who don't pay their electricity supply charges, it doesn't allow them to disconnect customers who don't pay their utility rental or on-bill financing charges.⁸² This policy doesn't make sense for a number of reasons. First, the recovery of energy conservation costs is just as important as the recovery of electricity supply costs. Second, it needlessly increases the default risk of the utilities' on-bill financing and/or equipment rental programs which, in turn, entails the need for higher financing and rental charges for their customers. Third, by creating another barrier to energy efficiency investments, it increases our need for the new high-cost electricity generating stations that are pushing up everyone's electricity rates and making it more difficult for people to pay their electricity bills. Fourth, the combination of energy efficiency measures and low cost financing will lead to a net reduction in customers' bills compared to the status quo, which will actually make it easier for customers to pay their energy bills. Fifth, unlike our electric utilities, Enbridge and Union Gas are allowed to disconnect customers who fail to pay on-bill financing or rental program charges.

Recommendation #2: Ontario's utilities should be allowed to disconnect customers who fail to pay their on-bill financing or equipment rental charges.

Red Tape Example #3: Arbitrary cap on utility conservation profits

On March 31, 2010 Ontario's Minister of Energy, Brad Duguid, directed the OEB to provide conservation profit bonuses to electric utilities that meet and/or exceed their conservation targets by up to 50%.⁸³ That is, the utilities cannot earn additional profits by exceeding their energy savings targets by more than 50%. This directive doesn't make sense since every additional kWh saved will reduce customers' bills and the need for much higher cost new supply projects. The only beneficiaries of Minister Duguid's cap on the municipal utilities' conservation profits are Ontario's electricity generators.

In apparent response to Minister Duguid's directive with respect to electric utility conservation bonuses, the OEB has recently decided that Enbridge's and Union's profit bonuses for saving energy should be capped at a "scorecard weighted score of 150%" which could be achieved when the actual gas savings of their energy efficiency programs are only 17% greater than their targeted levels.⁸⁴ Once again, denying our utilities the ability to increase their profits by achieving additional bill savings for their customers does not make sense. The only beneficiaries of Ontario's wasteful use of natural gas are Alberta gas producers.

Recommendation #3: The cost-effective achievement of additional energy savings should always be the most profitable course of action for Ontario's electric and gas utilities.

Red Tape Example #4: OEB and OPA profit incentives working at cross-purposes

The OPA has entered into a Master CDM Program Agreement with the electric utilities to provide them with funding for the delivery of its CDM [Conservation and Demand Management] programs. Pursuant to this Agreement, the OPA is providing the province's electric utilities with Program Administration Budgets totaling \$269.32 million for the administration and marketing of its CDM programs (e.g., *peaksaver*).⁸⁵ Unfortunately, the Agreement also provides the utilities with perverse profit bonuses that can completely negate the positive financial impact of the OEB's profit bonuses for meeting or exceeding their CDM targets.⁸⁶

Specifically, the OPA Agreement provides the electric utilities with a profit bonus for under spending their CDM budgets. To add insult to injury, the OPA will provide them with this profit bonus even if they fail to achieve their OEB-mandated minimum CDM targets. For example, pursuant to the Agreement, Toronto Hydro can earn a profit bonus of up to \$8,533,102 for under spending its CDM budget even if it fails to achieve its minimum energy conservation targets established by the OEB.⁸⁷

In addition, assuming an electric utility has achieved its minimum CDM targets, the OPA's under spending incentive could motivate an electric utility to not try to achieve additional CDM bill reductions for its customers. For example, if Toronto Hydro has

achieved its minimum CDM targets, it would be eligible to receive a \$1,166,493 performance bonus from the OEB if it exceeds its CDM targets by 10%. On the other hand, it could earn an OPA under spending incentive of up to \$8,533,102 if it simply shuts down its CDM programs and does not try to achieve additional energy savings for its customers.⁸⁸ That is, the OPA's cost reduction incentive could motivate the electric utilities to not seek to exceed their CDM targets. This perverse incentive structure is not in the best interests of Ontario's electricity consumers.

While achieving energy savings as cost-effectively as possible is a very important objective, it does not make sense to provide utilities with profit bonuses that can be earned by simply failing to pursue all of the energy saving opportunities that can reduce their customers' bills.

Recommendation #4: The OPA and the OEB should ensure that cost-effectively achieving additional energy savings is always a municipal electric utility's most profitable course of action.

Red Tape Example #5: Arbitrary cap on the gas utilities' energy efficiency budgets

On March 29, 2011 OEB denied Enbridge and Union Gas budgetary approval to develop more comprehensive and robust energy efficiency programs.⁸⁹ The budget proposals put forward by the OEB's own staff would have allowed the two gas utilities to implement new energy efficiency programs which would have reduced their customers' energy bills by approximately \$870 million.⁹⁰ Now, instead, the two gas utilities will face an energy efficiency budget freeze for three years.

The OEB's decision is penny wise and pound foolish. It is also a slap in the face to Energy Minister Brad Duguid who on July 5, 2010 asked the Board "to consider expanding both low-income and general natural gas DSM [demand side management] efforts relative to previous years."⁹¹

According to a report prepared by independent advisors for Enbridge, the natural gas consumption of its residential, commercial and industrial customers can be cost-effectively reduced by 18%, 29% and 34% respectively by 2017 through proven energy efficiency measures.⁹² A similar report for Union Gas concluded that its customers' gas consumption can be cost-effectively reduced by 30%.⁹³

Recommendation #5: The OEB should rescind its arbitrary budget cap with respect to Enbridge's and Union's energy efficiency programs and direct them to seek approval for energy efficiency budgets that will allow them to obtain all the feasible, cost-effective natural gas savings in the communities they serve subject to the constraint that this must not lead to undue rate increases.

Appendix B: Summary of Recommendations

First, we need big, bold energy efficiency objectives that can be used to drive the practical changes needed to achieve all cost-effective conservation. These objectives are:

1. Move our homes and buildings towards super efficiency;
2. Make Ontario's industries the most energy efficient in the world; and
3. Squeeze every drop of energy out of the natural gas we use.

Second, we need a plan to move Ontario towards our three big, bold objectives at no extra cost to the province's energy consumers. That is, the life-cycle electricity and/or natural gas savings of the plan's energy conservation and efficiency measures must exceed their costs.

Third, we need to find smart individuals, municipalities and private sector corporations that will agree to play a leadership role in promoting and implementing these goals because they understand the benefits to the province and their own bottom lines.

Fourth, we need our municipal electric utilities (e.g., Toronto Hydro), Hydro One, Enbridge Gas Distribution and Union Gas to expand their energy conservation and efficiency programs to help their customers achieve all of their cost-effective energy savings opportunities, which will help move our homes and buildings towards super efficiency and make our industries the most energy efficient in the world.

Fifth, the Government of Ontario must ensure that its policies and regulations align with these objectives:

- a) Energy efficiency labelling must be mandatory for the sale of all Ontario homes;
- b) Our minimum legally-binding energy efficiency standards for new homes, buildings, appliances and equipment must be continuously improved to reduce the energy bills of Ontario's homeowners and reflect advances in technology;
- c) The Ontario Energy Board and the Ontario Power Authority must eliminate their red tape that is limiting the ability of our electric and gas utilities to help their customers achieve all of their cost-effective energy saving opportunities;
- d) The Ontario Energy Board must ensure that its rate design policies for our electric and gas utilities promote the wise and efficient use of energy, not wasteful consumption; and
- e) Ontario's electric and gas utilities must be allowed to invest in district energy projects.

Making Our homes and buildings super efficient

What the Ontario Energy Board should do

1. Reward energy conservation by directing the province's electric and gas utilities to lower their fixed monthly charges and increase their variable charges.
2. Reduce the Air Conditioning Subsidy by adjusting time-of-use pricing to better reward homeowners and building owners who reduce their demands on very hot summer afternoons.
3. Permit Ontario's electric utilities to improve the Ontario Power Authority's (OPA's) con-

servation programs and/or implement their own energy conservation programs that are similar to, but a measurable improvement over, the OPA's conservation programs.

4. Allow Ontario's utilities to disconnect customers who fail to pay their on-bill financing or equipment rental charges.
5. Ensure that the cost effective achievement of additional energy savings is always the most profitable course of action for Ontario's electric and gas utilities.
6. Rescind its arbitrary budget cap with respect to Enbridge's and Union Gas' energy efficiency programs and direct them to seek approval for energy efficiency budgets that will allow them to obtain all the feasible, cost-effective natural gas savings in the communities they serve subject to the constraint that this must not lead to undue rate increases.

What the Ontario Power Authority should do

1. Ensure that cost-effectively achieving additional energy efficiency savings for its customers is always a municipal electric utility's most profitable course of action.

What municipalities can do to promote energy efficiency

1. Amend their official plans and building permit approval processes to encourage and/or mandate the construction of energy efficient (EnerGuide Rating of 86 or greater) and solar-ready new homes and buildings.
2. Direct their municipally owned electric utilities to implement programs to help their customers achieve all their energy saving opportunities that can meet their needs at a lower cost than new supply.
3. Provide low-interest building-tied financing for energy savings retrofits, which can be repaid as a fee on the municipal tax bill.
4. Develop policies and programs to facilitate the implementation of cost-effective district energy projects.

What new home buyers can do

1. Buy new homes that have EnerGuide ratings of 86 or better and are solar ready.

What homeowners can do

1. Contact a Natural Resources Canada energy advisor to arrange an ecoENERGY assessment of their house and implement the recommended energy savings measures.
2. Buy appliances and equipment (e.g., light bulbs, computers, TVs, air-conditioners, boilers) and energy conserving products (e.g., windows, doors) that have the EnergySTAR high-efficiency label.
3. Consider installing a solar/electric or solar/gas hot water system; a geothermal system for heating and cooling; or a solar photo-voltaic system for renewable electricity.

What new home builders can do

1. Provide potential customers with the EnerGuide energy efficiency ratings for all of their new homes.
2. Make a commitment that all their new homes will have EnerGuide ratings of 86 or higher and be solar ready by 2014.

What financial institutions can do

1. Offer mortgages with lower interest rates for energy efficient homes to reflect their lower carrying costs.

*What owners and tenants of **new** commercial and institutional buildings can do*

1. Commit that the energy consumption of all of the new buildings that they own or lease will be at least 65% lower than the Model National Energy Code for Buildings.

*What owners and tenants of **existing** commercial and institutional buildings can do*

1. Publicly release the annual energy consumption per square foot of each of their buildings and set annual energy savings targets for their buildings.

What Ontario's electric and natural gas utilities can do

1. Establish rental programs for high-efficiency and renewable energy equipment (e.g., high efficiency air-conditioners and boilers, solar/electric and solar/gas water heaters; geothermal energy systems, micro-turbine combined heat and power systems).
2. Establish, in co-operation with third party financial institutions, low-interest on-bill financing programs for energy efficiency upgrades and renewable energy equipment.
3. Provide financial incentives for the construction of high-efficiency (EnerGuide Rating of 86 or greater) and solar ready new homes and buildings.
4. Provide financial incentives for energy saving retrofits of existing homes and buildings.

What the Ontario government should do

The Ministry of Energy should regularly raise its minimum energy performance standards for new appliances and equipment to help move our homes and buildings towards Zero Net Energy and to drive improvements in technology.

The Ministry of Municipal Affairs and Housing should regularly raise the Ontario Building Code's minimum energy efficiency standards to continuously and cost-effectively move our new homes and buildings towards Zero Net Energy.

The Ministry of Municipal Affairs and Housing should support the use of mechanisms such as Local Improvement Charges or other means to help building and homeowners overcome concerns about longer payback periods by tying financing to a specific building rather than a specific owner.

Making Ontario's industries the most energy efficient in the world

What Ontario's industrial companies can do

1. Pursue all their energy savings opportunities that are cost-effective on a life-cycle basis.
2. Set energy productivity improvement targets for their Ontario operations.
3. Submit annual reports on their energy productivity (ratio of value added to energy input) as part of their greenhouse gas emission reporting that will be soon required by Ontario's participation in the Western Climate Initiative.

What the Ontario Power Authority and Ontario's electric and gas utilities can do

1. Pay Ontario's industrial companies up to the same price to save energy as they pay energy companies to produce and deliver new energy supply.

Squeeze every drop of energy out of the natural gas we use

What the Ontario Power Authority can do

1. All of the Ontario Power Authority's future natural gas-fired electricity supply procurements should be combined heat and power.

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