

Back to the Drawing Board

Sierra Club of Canada's Response to the Ontario Power
Authority's Supply Mix Advice Report

February 28, 2006

Sierra Club of Canada is one of Canada's oldest and most respected environmental organizations and the oldest in North America, founded in 1892.

Sierra Club of Canada is a non-profit, national membership-based, volunteer-run, environmental organization. We have been active in Canada since the 1960s, with five regional chapters (British Columbia, Prairies, Ontario, Quebec, and Atlantic Canada), as well as a national youth coalition, offices in nine cities (Victoria, Edmonton, Calgary, Toronto, Ottawa, Montreal, Halifax, Sydney and Corner Brook), with a total of over 10,000 active members and supporters.

Sierra Club of Canada's national campaign programme is organized around four key themes: Energy and Atmosphere, Health and the Environment, Protecting Biodiversity, and the Transition to a Sustainable Economy. SCC has a long record of participation in inquiries, hearings and environmental assessments relating to energy choices, the threat of climate change, and advancing solutions that make economic and ecological sense.

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*Sierra Club of Canada dedicates this report to the memory of Bob Hunter
1941- 2005*



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1. Executive Summary

The Government of Ontario was on the right path when it announced the phase out of coal-fired power plants by 2009. Coal-fired power plants are extremely harmful to human health, through the creation of smog and distribution of toxic contaminants such as mercury, as well as being an environmental threat through the destabilization of the planet's climatic systems. Sierra Club of Canada supports the McGuinty government's resolve to close them in 2009.

Unfortunately, the release of the Ontario Power Authority (OPA) report on December 9, 2005 has created an aura of panic. At the same time, the report has failed utterly to provide a sound basis for decision-making. The facts of the case are simply incomplete. The recommendations in the OPA report concerning nuclear power are particularly troubling. Replacing coal-fired power plants with nuclear power plants is simply replacing one problem with another, and not solving Ontario's energy problem. In this critique of the OPA's supply-mix report, we have outlined inaccuracies, unjustified assumptions and important omissions made by the OPA in their report. We have also included suggestions on areas in which the OPA should conduct further research in order to adequately explore all options with regards to electricity use and generation in Ontario.

Sierra Club of Canada does not wish to minimize the real challenge to the Government of Ontario. Closing down the coal plants is the right thing to do. The pressure to know what should be done instead is real and the choices complex. What we are saying, and forcefully, is that the best way to "keep the lights on" this summer and into the future is to aggressively pursue the energy efficiency and conservation measures proven effective in other North American jurisdictions.



Our key recommendations to the Honourable Donna Cansfield and to Premier Dalton McGuinty are:

- Prior to making any new decisions on new nuclear reactors, or any other long-term rigid capital intensive mega-project, insist that the data gaps in the OPA report be filled;
- Critical information to determine the potential for demand side management and conservation is, according to the OPA report (p. 16, Vol.1) lacking. Measures to reduce demand are the most cost-effective and environmentally sound measures of the suite of possibilities reviewed. Yet, the OPA concedes it is “not in a position to recommend long-term conservation targets at this time.” It would be a gross abdication of political responsibility for the McGuinty Government to make decisions with economic, political, environmental and health impacts for the next four decades, creating a legacy of nuclear waste for a quarter of a million years, without thoroughly examining the potential for conservation; and,
- In order to reduce the electricity demand in advance of the high demand for air conditioning next summer, as well as to grasp the potential for cost-savings and reduced electricity demand for the long-term, the Sierra Club of Canada strongly recommends that the government consult experts from other jurisdictions that have demonstrated the enormous benefits of Demand-Side Management. In particular we urge the McGuinty government to consult key decision-makers from the State of California.



2. Introduction

Prior to examining in detail the flaws and gaps of the Ontario Power Authority (OPA) Report, it is important to recall the broader context and time frame that has led to the sense of panic the McGuinty Government has created around decision-making.

On May 2, 2005, then Energy Minister, the Hon. Dwight Duncan, wrote to the OPA to request that the body “begin the process of developing a proposed Integrated Power System Plan.” Explicitly, the Minister requested that the OPA report should include “recommendations with respect to conservation targets for Ontario for 2015, 2020 and 2025.” This was one of three specific information requests. He also requested that the OPA deliver the report by December 1, 2005.

In the month of August, 2005, the OPA placed a draft report on a website for public comment. There was no announcement to the media or advertisements urging the public to comment. Despite this largely invisible public consultation phase over the vacation period, many environmental groups and citizens responded in alarm to the suggestions that new nuclear power would be part of the recommendations. As expected, when the final report rolled out in December 2005, the report moved the debate on nuclear into high gear. The OPA says its full report on an Integrated Power System Plan will be tabled in two years. In many ways, this report should have been billed as “preliminary.”

However, the report was not treated as preliminary. It was not even subjected to a “sniff test” to see if it met the Minister’s explicit direction. Instead, the media, many environmental groups, and citizens, justifiably alarmed about the nuclear threat, seem to have jumped into high gear in a debate solely about whether the Ontario government should order new nuclear reactors. The minister has said a decision should be made as early as March.

The Sierra Club of Canada’s primary and over-riding recommendation is “slow down!” There is no justification, even within the OPA report itself, for a decision by March, nor for that matter within 2006 at all. The OPA report, based on this report’s



assumptions and data gaps, recommends that 3,000 MW of nuclear capacity, and maintaining current capacity could be needed nineteen years from now -- 2025.

Instead of jumping into a premature debate, the government should be scrutinizing the report and asking: Is this a credible basis for decision making? The answer is clearly “no.” The letter from the former Energy Minister was clear and unequivocal:

“The report should include recommendations with respect to conservation targets for Ontario for 2015, 2020 and 2025.”

In response, the OPA report states:

“The first requested recommendation is for conservation targets for the long term. OPA is not in a position to recommend long-term conservation targets at this time.”
(p.47, Vol 1)

The Government’s first response to this report should have been: ““Back to the drawing board!” The OPA has simply failed to deliver one of three mandated jobs directed by the government. *De facto*, those power sources with single, large, industry associations and well-funded lobbyists, and well-placed former politicians, made a case and brought it to the OPA.

Thus, the OPA report is biased toward everything except the most cost-effective and environmentally sound approach – reducing demand. The “nuclear cult” within the old Ontario Hydro (quoting former chair William Farlinger) is still in place and able to press its case. The only entity pressing for sensible demand side management is the public. The former Minister attempted to balance these interests by demanding a report that provided solid recommendations in all three areas – Demand side management, expanded renewables, and more conventional power sources.

Incredibly, no one seems to be pointing out that the OPA report is fatally incomplete. The report fails utterly and completely to meet the mandate issued to it by former minister Dwight Duncan. It admitted defeat in responding to one out of three clear



instructions. It delivered two-thirds of the required content. It should be rejected on that ground alone.

In defense of the OPA, however, the time frame set by Minister Duncan was virtually impossible. When one considers that the time elapsed from the Minister's letter to posting a draft on the website was three months, factor in time to issue contracts to consultants and researchers, it is no wonder the report is so incomplete. As we heard from several of the contractors who provided work to the OPA report, there just wasn't time to pursue all the issues they would have liked. Essentially the research took less than two months.

It is not responsible to make any decisions based on such a slap-dash, incomplete product. It is particularly inexcusable to use this report as a justification for multi-billion dollar commitments that will govern energy choices for the next half a century, and generate nuclear waste for the next quarter of a million years.

One last extraordinary irony of the current debate is this. With a decision to shut down coal plants in 2009, the government is justifiably nervous. The increased peak demand for summer air conditioning coupled with shutting down coal plants leaves Ontarians nervous that the lights might go out in brown outs and black outs as early as this summer. The panic to "keep the lights on" seems to be driving a political expedient of ordering a new nuclear reactor. In other words, there is a complete disconnect in the timing. We may have power shortages this summer, so the McGuinty government wants to be able to demonstrate it is on top of the situation by choosing the most expensive and least reliable power choice to be ready to deliver new sources of energy in a decade or so.

Sierra Club of Canada does not wish to minimize the real challenge to the Government of Ontario. Closing down the coal plants is the right thing to do. The pressure to know what should be done instead is real and the choices complex. What we are saying, and forcefully, is that the best way to "keep the lights on" this summer and into the future is to aggressively pursue the energy efficiency and conservation measures proven effective in other North American jurisdictions.



3. Conservation, Demand-Side Management, and Energy Efficiency

Sierra Club of Canada believes that conservation and demand-side management should be the priority of the Ontario government. While Premier McGuinty has called for the creation of a “conservation culture,” the OPA report estimates that energy demand will increase per capita by 0.9% annually for the next twenty years. Due to a lack of information on energy end-use in Ontario, this forecast is primarily based on extending an existing IESO forecast for 2014, which itself is based on housing development and labour force growth forecasts. The government has the responsibility towards its citizens to accurately evaluate the total energy efficiency potential, as well as all possibilities for electricity supply. As recognized in the OPA report, insufficient data is available on conservation potential in Ontario. Sierra Club of Canada deems it irresponsible to develop an energy plan without undertaking the necessary studies to provide accurate information on the potential for energy efficiency, conservation and demand-side management over the next twenty years. Currently, no systematic assessment of the demand-side for energy exists. In order to adequately plan for Ontario’s energy future, the government must undertake more studies and information collection in the following areas¹:

1. Establish public databases similar to the former Ontario Hydro End-Use databases. These databases should be publicly funded, collect annual information on performance information on electricity use, and be publicly available. The databases should include information on market rates and saturation rates for key end uses, such as the proportion of energy efficient appliances.
2. More studies are needed to assess the potential for space heating and water heating that can be taken off electricity and switched to other heating sources. Currently, about half of the electricity in the residential sector is used for space and water heating, presenting an important conservation potential. The studies should evaluate where in the residential sector electricity is used for space and water heating, how much is used for baseboard heating, and how much is used for this purpose in the commercial sector.



3. According to the OPA report, the Industrial sector uses about 30% of electricity consumed. The OPA projects that this proportion will stay the same for the next twenty years. However, it seems that the OPA has not considered the fact that a small number of facilities in the industrial sector consume the majority of electricity in the industrial sector. These include smelters, steel mills, and pulp and paper mills. In order to properly assess future demand in the industrial sector it is important to consider the future of these energy intensive industries in Ontario.

In ICF Consulting's report to the Chief Conservation Officer of the Ontario Power Authority, it is stated that average per-capita demand growth in Ontario for the last 15 years has been 0.5%². However, the OPA's estimate of per capita demand growth for the next twenty years is almost double that, at 0.9%. Such a high estimate, completely out of line with recent trends of energy consumption, is nowhere explained or justified in the report.

4. Examples of Measures in Place for Decreasing Peak Demand

As stated in the OPA report, the majority of consumers in Ontario are wary of the reliability of the energy supply, especially during summer peak demand. Increasing supply to meet this peak demand is the answer put forward to this problem by the OPA. However, looking at examples in California, there exist other solutions completely ignored by the OPA's recent supply-mix report.

The principal reason for peak demand during the summer is air conditioning usage during a hot day. Due to changes in the chemistry of the atmosphere due to burning of fossil fuels, southern Ontario will continue to experience above-normal numbers of 30+ degree C days every summer. In fact, in a short period of time, we will likely forget what "normal" meant. The new normal will be heat waves, more frequent and more severe. Energy planning, indeed all infrastructure and services must be forward-looking and focused on both adapting to those levels of climate change we can no longer avoid, while making decisions to reduce



reliance on fossil fuels and expand carbon sinks. Urban tree planting meets both the goals of adaptation and mitigation.

Rooftop gardens and urban tree planting actually contribute to reduced temperatures by creating micro-climatic cooling effects. The additional vegetation sequesters carbon. Many cities and states have already opted for planting trees which provide enough shade to the house or building to reduce its energy consumption in air conditioning.

An example of this is the “Trees for a Green LA” program launched by the Los Angeles Department of Water and Power (LADWP) in February 2001³. The program has provided approximately 200,000 shade trees in the past two years with the goal of cooling houses to conserve energy. When strategically planted alongside buildings, trees can decrease indoor temperature by more than 15 degrees on hot, sunny days.

A similar initiative was also undertaken by Sacramento Municipal District (SMUD) who predicted a 40% decrease in air conditioning costs once trees attain maturity⁴ resulting in an energy saving of 12 MW once 350,000 shade trees have reached maturity⁵.

Furthermore, California has also adopted regulations on efficiency building standards. The Building Standards Commission require all newly constructed homes to be 12 to 15 percent more energy efficient than previous California standards. New innovations like high-efficiency window glass that reflects more of the sun’s rays and insulation of ducts that prevent escape of cool or warm air make it easy to reach these new standards⁶.

California is also proving the value of replacing black roofing materials with white roofs. As roofs require replacement or for new homes, white roofs reduce electricity demand for air conditioning by 20% when compared with homes with dark roofs.



5. Solar Power Potential in Ontario

According to their recent Supply Mix Report, the Ontario Power Authority (OPA) recommends that only 40 MW of solar power be included in the provincial energy targets for 2025. The OPA has several explanations for including so little solar power in its Supply Mix recommendations. According to the Canadian Solar Industries Associations (CanSIA), however, many of their reasons have no merit. First of all, the OPA states that solar photovoltaics are only suitable for low power applications in remote areas, when in fact 78% of photovoltaic systems sold annually are now grid-connected. Secondly, although photovoltaic models are sealed units and thereby incapable of leaching, the OPA tried to make the claim that heavy metals leach from photovoltaics during their operation. Finally, the OPA argued that the greatest impact on the decommissioning waste associated with photovoltaics is the batteries used in the photovoltaic system⁷. The truth of the matter is that grid-connected photovoltaics do not even use batteries.

CanSIA estimates that the market potential for solar power in this province is 3,400 MW by the year 2025, with 47% of Ontario homes capable of installing a 3 KW photovoltaic array on their roofs. It has recommended that the OPA implement a program that would allow the following achievements by 2025: 1) photovoltaics installed on 400,000 homes, 2) 1,200 MW of installed capacity overall, 3) 290 MW installed annually and 4) and the creation of 10,000 jobs. The OPA report also neglects to include solar domestic water heating in its plans, although the contribution of this technology could be significant. CanSIA estimates that through long-term, low-interest loans to homeowners, 800,000 homes could make use of solar domestic water heating, providing a peak capacity rating of 3,200 MW.



6. Wind Power Potential

The Ontario Power Authority (OPA) recommends that wind power contribute to approximately 15% of Ontario's energy supply mix, or up to 5,000 MW of wind-powered generation by 2025. However, according to the David Suzuki Foundation, by 2012 the province could install as much as 8,000 MW of wind-generating capacity, which is equal to 14 TWh/year⁸. In addition to being an environmentally-friendly renewable resource with zero emissions, wind power has no fuel costs and therefore offers long-term price stability.

There are several reasons that the OPA does not incorporate more wind energy into its Supply Mix Report. The main rationale is that the greatest wind potential in Canada is located in the north. It argues that this makes it difficult to utilize the potential as it is out of reach of Ontario's existing transmission system. The David Suzuki Foundation states that there is a technically achievable wind resource of 86 TWh annually in southern Ontario, which accounts for approximately 58% of current provincial consumption.

One of the greatest wind resources in the province is the Great Lakes, for its 1500 km of shoreline and shallow offshore waters offer reduced turbulence and greater unobstructed winds which in turn produce higher wind-power yields than on land. The survey of wind potential in the OPA report inexplicably restricted itself to land-based wind potential. As a result the OPA report significantly underestimated the potential of wind near population centres.

Furthermore, the Canadian Wind Energy Association (CanWEA) states that average wind speeds throughout the whole of Ontario are comparable to those of Germany, where they use less efficient, earlier generation wind turbines yet still have a total installed wind generating capacity of over 17,000 MW⁹. In their recent submission to the OPA, CanWEA, like the David Suzuki Foundation, also concluded that there are well-distributed provincial wind resources in areas of high demand, specifically the southern part of the province, and overall the potential installed capacity in areas with winds greater than 7.0 m/s is approximately 39,000 MW for the entire province. CanWEA believes that by 2015 Ontario should integrate at least 6,000 MW of wind power into its energy supply mix, and this figure should rise significantly higher by 2025.



The OPA also argues that accommodating wind power is challenging because wind is not a dispatchable resource, i.e. increased demand cannot stimulate increased production.

According to the European Wind Energy Association (EWEA), however, it is very easy to make false assumptions about the reliability of fossil fuel or nuclear power plants versus wind turbines. First of all, there is no such thing as a power station of any type that is 100% reliable. Not only that, but up to 1,000 MW of capacity is taken off the network when fossil fuel or nuclear power plants trip unexpectedly. Secondly, the claim that wind energy is only intermittent and is therefore not a dependable power source is flawed for two main reasons:

- 1) these variations are evened out by the existence of numerous wind turbines in many locations all operating at the same time; and
- 2) improved technique and efficiency is allowing wind variability to be predicted to an increasingly accurate extent¹⁰.

Furthermore, it is impossible for wind energy to entirely trip off the system.

The current barriers which prevent greater expansion of wind power have nothing to do with the so-called intermittency of this energy source, and everything to do with what Corin Millais, EWEA Chief Executive, calls “a series of distortions in electricity markets that are neither free nor fair.” If political will and proper economic and technical infrastructure were to be put in place, more wind farms could be built over a larger geographical region, thus increasing wind energy reliability even more.

7. Waterpower Potential in Ontario

The OPA Report recommends that waterpower should provide up to 1,500 MW of power generation to the supply mix by 2025. Although the report notes that there is the potential for as much as 7,585 MW, OPA excludes all sites that are within parks, conservation reserves, or are subject to agreements with First Nations and the federal government from the final recommendation, drastically reducing the potential contribution of waterpower to the supply mix.



A report produced by the Ontario Waterpower Association (OWA), which was submitted to the OPA for consideration in determining supply options, states that there is the potential for approximately 6,600 MW of hydroelectric power in Ontario from projects that are “probable, committed or practical.”¹¹ The OWA specifically notes that sites within protected areas and those subject to political agreements should not be excluded from estimates of future supply given the changeable nature of the political decisions that currently hinder waterpower development in these areas¹².

While parks are inappropriate for large scale hydro electric, some run-of-the-river projects could be compatible with recreation areas and are certainly appropriate in conservation areas. Many conservation areas already have some forms of dams and impoundments, primarily for flood control. The potential for up-grading such facilities for better power generation should have been included in the OPA waterpower estimates.

Furthermore, although the environmental impact of large hydroelectric facilities is great, small-scale hydroelectric development can be designed to significantly minimize environmental impacts¹³. In addition, small hydro developments can create local economic development in areas with little economic security. Small-scale hydro developments in First Nation communities, for example, could provide these communities with the means to increase economic independence, as well as reducing reliance on decentralized diesel generation. Diesel is expensive and very polluting. Renewables on First Nations Reserves would contribute to community sustainability, improved air quality, and reduced production of greenhouse gases¹⁴.

Of the 7,585 MW of potential new hydro developments noted in the OPA report, 4,637 MW are excluded from consideration because they are subject to agreements with First Nations and the federal government. Given the potential for agreements to be reached and the numerous potential benefits of small hydro developments in these communities, the OPA report should not disregard the development of these sites and their potential contribution to the supply mix.



8. Imported Waterpower

The OPA report includes only a brief section on out-of-province purchases of waterpower and their potential contribution to the supply mix. The OPA recommendations include a total of 1,250 MW of hydro imports, noting that this is “a rough estimate only, taking into account both the considerable potential and the considerable uncertainties involved.”¹⁵ In its analysis, the report largely emphasizes the challenges and disadvantages associated with importing hydroelectric power from other provinces, thereby supporting its low estimate of the contribution to the supply mix from imported waterpower.

The estimate of hydro power imports in the OPA report does not include the potential transfer of up to 5,000 MW of energy supply from Manitoba to Ontario¹⁶. The assessment of the Clean Energy Transfer Initiative (CETI) has revealed that development of this supply is economically viable and would cause limited environmental impact¹⁷. Furthermore, creation of transmission facilities to transfer this supply would contribute to the strengthening of the East-West Canadian transmission grid, increasing the opportunity for import and trade¹⁸.

The so-called “east-west grid” has been supported by environmental groups within the Climate Action Network based on the seminal report on the potential for demand-side management by energy analyst Ralph Torrie. The report “Kyoto and Beyond” included the east-west grid between Manitoba and Ontario in forecasts allowing the shut down of nuclear reactors and coal-fired power plants. The federal Kyoto plan announced in April 2005, “Project Green,” included a Partnership Fund to assist provinces in meeting Kyoto targets. The east-west grid is one such project.

The outstanding question from an environmental point of view is the routing of the transmission lines. Avoiding the key boreal forest lands on the East Side of Lake Winnipeg is key.

In addition to a potential 5,000 MW of power supply that could be imported from Manitoba, imports from Labrador and Quebec could also contribute significantly to the total supply of imported waterpower¹⁹.



The OPA report therefore drastically underestimates the potential for future made-in-Ontario hydroelectric developments and future out-of-province hydro imports to contribute to the supply mix.

9. Power Generation from Biomass

The OPA report states that “ranges for biomass potential to generate electricity vary considerably, from a few hundred to several thousand megawatts”²⁰. The report goes on to note that the availability and transportation of forest resources present challenges to the use of this resource and that growing crops for use as biomass is “unlikely to be viable.”²¹ A report by the David Suzuki Foundation, however, suggests that growing crops such as switch grass and reed canary grass for energy production would be very beneficial in Ontario and that the potential for expansion of the biomass energy industry from agriculture is large²².

The OPA report also mentions the collection of methane from Municipal solid waste landfill sites and wastewater plants to generate electricity, but states that the amount of power this could contribute to the supply mix is likely to be small. In its recommendations, the OPA therefore includes a total of only 500 MW of potential power from biomass. This recommendation is extremely low considering the OPA’s earlier statement that there is the potential for biomass to contribute several thousand MW to the supply mix.

Contrary to the conclusions of the OPA that biomass is unlikely to be able to play a large part in the future supply of power for Ontario, a number of European countries have been moving forward on developing the biomass energy industry. In 2001, Finland was able to produce 19.4% of its energy supply and 7.9% of its fuel mix in district heating using biomass²³. Sweden is also a leader in the use of biomass²⁴. New initiatives to develop densified biomass for heat and power production, which reduce the challenges of transportation, are being successfully pursued in Europe.²⁵ The market in Ontario for biomass energy technology is just emerging; hence the future potential is large. The David Suzuki Foundation report concludes that between 2010 and 2020 up to 2,450 MW of biomass capacity could be installed in Ontario²⁶.



10. Potential Power Supply from Cogeneration

The OPA report includes 1,000 MW from cogeneration in its Supply Mix recommendations. A report prepared by the Ontario Clean Air Alliance (OCAA) states that total Combined Heat and Power (CHP) potential in Ontario will be 16,514 MW by 2020²⁷. The OCAA report also states that “[a]ccording to the Association of Major Power Consumers of Ontario, CHP is one of the best electricity supply options for Ontario.”²⁸ The OPA has therefore clearly underestimated the potential for CHP to contribute to the supply mix.

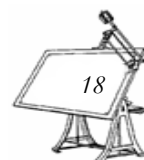
There are also opportunities that the OPA neglects in energy storage options. Although not generally categorized as co-generation, we note this issue here as being of the same character.

11. The Nuclear Option (NO)

Ontario’s experience with nuclear power certainly does not inspire confidence. Billions of dollars in stranded debt, unreliable supply that led to the increased dependence on dirty coal, the risk of accident or of terrorist attack, and the unresolved problem of nuclear waste all make the public extremely resistant to nuclear power. Some level of increased comfort has certainly occurred with the passage of time since the two major nuclear accidents at Three Mile Island and Chernobyl. It is a tribute to the salesmanship of the industry PR that nuclear is being considered at all. Many false claims have been made in the recent public debate in Ontario. Here is a quick summary of key points.

a) Nuclear Power is not Emission or Waste-Free

Routine emissions from nuclear reactors include a number of different elements such as carbon-14 and tritium. The long half-lives of these radioactive elements (5730 years for carbon-14 and 12.3 years for tritium) allow them to accumulate in the environment and in living tissue. Over the years, leaks around nuclear reactors in Canada have raised levels of tritium, a known carcinogen, well above background levels²⁹.



Spent fuel from CANDU reactors contains over 200 deadly radioactive elements - byproducts of the fission process - including uranium, plutonium, cesium, and strontium. Plutonium, for example, has a half-life of 24,400 years. Other waste byproducts have half-lives as long as 710,000 years (uranium235) or 15.8 million years (iodine129). High-level nuclear waste will remain toxic for periods far longer than recorded human history.

Neither is nuclear power “greenhouse gas emission free,” as claimed in the Ontario Ministry of Energy video shown in the recent public consultations. Clearly, nuclear energy has far lower GHG emissions than coal plants, but the construction of nuclear reactors creates many GHG emissions, mining of uranium involves GHG emissions, as does the fabrication of fuel rods, and trucking of uranium fuel across the country.

b) Nuclear Power is not a “Solution” to Climate Change

If the problems posed by high-level nuclear waste are not enough, there are far less expensive ways to mitigate the consequences of climate change. Nearly twenty years ago, the authors of a well-known study examined the abatement of CO₂ emissions from U.S. coal-fired power plants and found that every dollar invested in energy efficiency displaced seven times as much CO₂ emissions as the same dollar invested in nuclear power³⁰.

In a 2006 paper on the “economics and climate-protection potential” of nuclear power, internationally respected energy analyst Amory Lovins reaffirms the advantages of energy efficiency over nuclear and adds “... Nuclear power saves as little as half as much carbon per dollar as wind power and traditional cogeneration, half to a ninth as much as innovative cogeneration, and as little as a tenth as much carbon per dollar as end-use efficiency. Empirically, on the criteria of both cost and speed, nuclear power seems about the least effective climate-stabilizing option on offer.”³¹

c) Nuclear Power Has Cost the Canadian Public Billions

Strangely, the OPA uncritically accepts the AECL cost estimates for the building of a CANDU reactor. Having shown a high degree of skepticism when examining the price of



natural gas, the OPA's attitude shifted to gullibility when reporting on the cost of building a new reactor.

Over a fifty year period (from 1953 to 2002), government subsidies to AECL (Atomic Energy of Canada Limited) totaled \$17.5 billion (in 2001 dollars). Cost overruns on the last nuclear station to be built in Ontario at Darlington were in the billions of dollars. Debt incurred by Ontario Hydro (the predecessor to OPG) in the operations of its power reactors amounted to over \$35 billion dollars. The public cost of decommissioning nuclear reactors and attempting to contain the waste products over extended timeframes has yet to be determined.³²

d) Nuclear Power has Serious Safety Issues

Accidents at nuclear plants involving release of radioactive materials have had serious environmental and human health impacts, including exposure in the workplace. But it's not just Chernobyl or Three Mile Island that have raised concerns about the safety of nuclear power plants. In August 1997, following a series of safety problems at the Pickering nuclear station and elsewhere, Ontario Hydro Chairman William Farlinger announced that seven nuclear reactors would be closed and others repaired at a cost of several billion dollars. At the time, Farlinger stated that Ontario Hydro's nuclear division operated like a "special nuclear cult"³³.

Special treatment also extends to liability in the event of a nuclear power reactor accident. The nuclear industry in Canada has its own federal law, limiting civil liability for off-site damages to \$75 million, even if those damages are in the billions. No insurance company will insure private property against the consequences of a nuclear accident³⁴.

e) The Management of Nuclear Waste

In response to significant public concern regarding the management of nuclear waste, the OPA report states that "considerable progress has been made in [the area of nuclear waste management] by the Nuclear Waste Management Organization (NWMO), which issued its recommendations in November 2005."³⁵ There are several problems with this assertion:



- 1) Due to the fact that by legislation, the board of directors of the NWMO is comprised only of representatives of the owners of nuclear power plants that create the nuclear waste, the NWMO is essentially an extension of the nuclear industry. It is not an independent body; therefore its ability to produce objective scientific information on the management of spent fuel is seriously compromised. The need for an independent Nuclear Fuel Waste Agency was declared by the Environmental Assessment Panel, known as the Seaborn Panel, in 1998. In response, however, the government created an organization led by the same corporations responsible for producing nuclear fuel. The NWMO's ability to function as an independent organization has been criticized by many.³⁶

- 2) The recently released NWMO report presents "Adaptive Phased Management" as a novel approach to the disposal of nuclear waste. In fact, this strategy joins all three of the options that were originally to be evaluated: a) storage at nuclear reactor sites; b) centralized storage; and c) deep geological disposal. The end result, deep geological disposal, was rejected as a suitable option for managing spent fuel by the Seaborn Panel in 1998. The NWMO, therefore, has done little more than re-package the options for managing nuclear waste into a concept more palatable to the public. What it has done is create a planning horizon of 300 years, suggesting the final decision on rendering the nuclear waste irretrievable should be made by our descendants, 300 years from now. The uncertainties and risks associated with the management of nuclear waste, however, remain largely unresolved. The OPA report states that:

"[i]n the very long term, adaptive phased management is subject to the same risks as deep geological storage, though these risk are expected to be less given the extended period of testing and confirmation prior to permanent disposal. Similar to [deep geological disposal], long term performance is somewhat uncertain as advance "proof of concept" is not scientifically possible given the long time frame."³⁷

The report also acknowledges that adaptive phased management is "subject to the same risks as Options 2 and 3"³⁸, which are storage at nuclear reactor sites and centralized storage respectively. The OPA report, therefore, openly admits that there



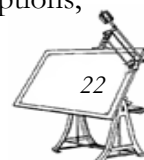
is as much risk and uncertainty associated with adaptive phased management as with deep geological disposal and other management options. It is unreasonable for the OPA to suggest that the management of nuclear waste has progressed significantly.

- 3) Decisions made about how to manage nuclear waste cannot be de-coupled from the production of nuclear waste. The NWMO, however, does not examine the continued or expanded production of nuclear generated electricity in its analysis of waste management options. The acceptance of a waste disposal method, therefore, translates into the acceptance of continued nuclear fuel generation. A critique of the NWMO Report by Gordon Edwards, President of the Canadian Coalition for Nuclear Responsibility, notes that “[t]he industry’s agenda is not to eliminate nuclear fuel wastes but to make the continued production of these wastes publicly acceptable.”³⁹

In addition, the OPA report dismisses the human health risks from the management of nuclear waste. The report states that “all current analyses suggest that the doses to people from waste management are likely to be very small.”⁴⁰ The OPA also states that “[i]n practice, human exposure to radioactivity from nuclear plants is less compared to coal-fired plants, and is lower than exposure arising from naturally-occurring radiation, commercial air travel or medical X-ray sessions.”⁴¹ A recent report released by the National Research Council of the National Academies confirms that even low levels of ionizing radiation may be harmful to human health and that there is no safe level of exposure to ionizing radiation⁴². The OPA’s overt dismissal of health concerns from the management of nuclear waste is unacceptable.

f) Radiation and Pollution from Uranium Mining

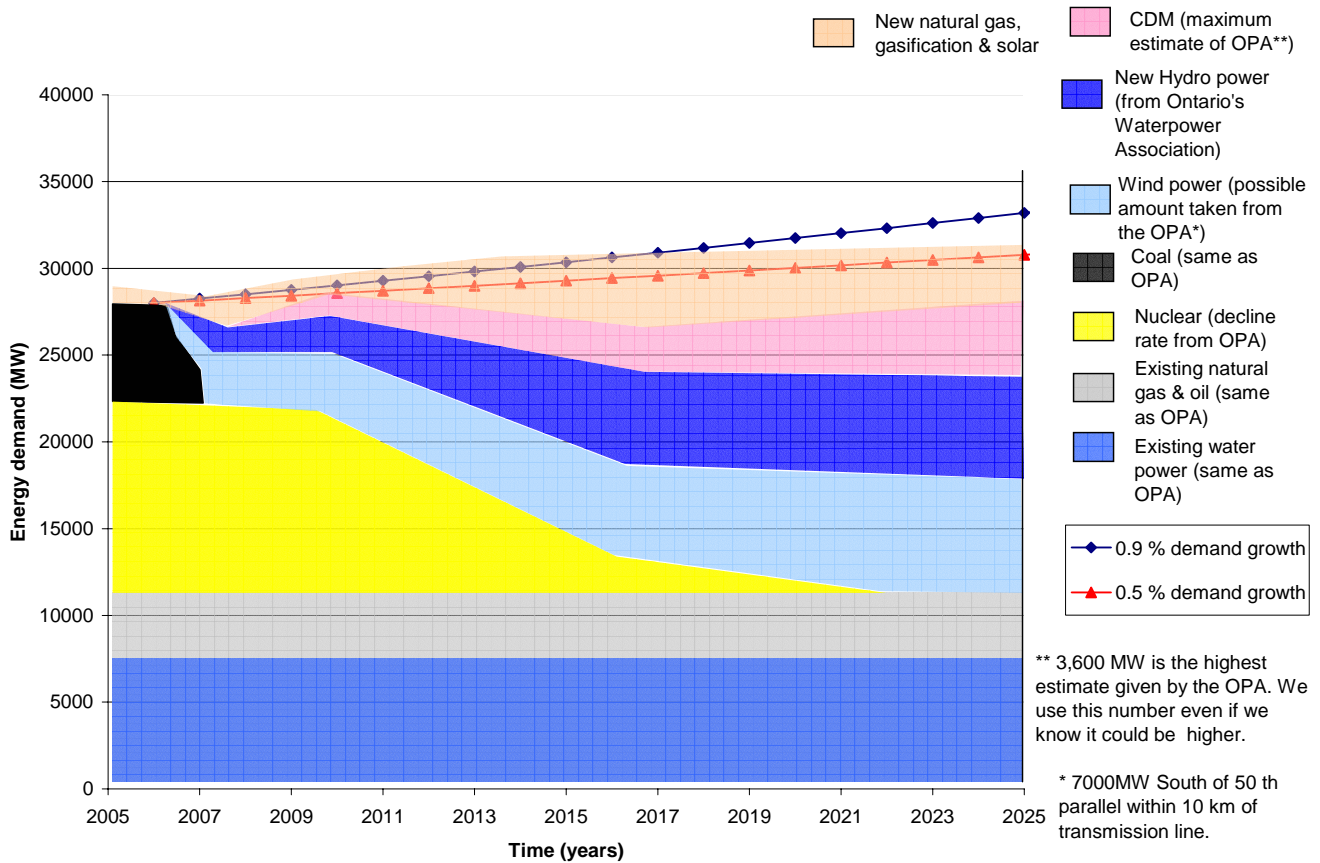
The OPA’s Supply Mix Report fails to properly assess the impacts of uranium mining on the natural environment. The report “Methods to Assess the Impacts on the Natural Environment of Generation Options” relies on documents from the United Nations Scientific Community on the Effects of Radiation (UNSCEAR), which focus on impacts of uranium mining on human populations in Europe. A representative from the consulting firm contracted by OPA to prepare the environmental impacts of various energy options,



SENES Consulting, informed Sierra Club of Canada that they were given under two months to compile this report, and consequently did not have sufficient time to incorporate information from Environmental Assessments on uranium mining in Saskatchewan. Therefore, the OPA report, in its weighting of environmental impacts of nuclear energy, apart from greenhouse gas emissions, does not incorporate impacts of uranium mining on the natural environment. This is a serious, if not scandalous, omission.

Information for impact assessment on different generating options is wholly inadequate. More time is needed to conduct a thorough study of the impacts of uranium mining on the natural environment and populations in a Canadian context. As well, the weighing of environmental impacts from nuclear must include the health impacts of long-lived radionuclides based on the most recent science and not old assumptions.

12. Examining the Demand for Energy with Time and the Proportion of the Different Sources of Power Using Only Slightly Different Assumptions than OPA



Demand of Energy with Time and the Proportion of the Different Sources of Power

This graph models two scenarios for increase in energy demand over twenty years: 0.9% (the forecast used in the OPA's Supply Mix Report) and 0.5 % (the average per capita rate of growth since 1990)⁴³. Our estimates of electricity generation include existing hydropower, natural gas and oil, with a phaseout of nuclear and coal generation, included in the OPA report. The proportion of wind power is taken as the maximum estimate south of the 50th parallel and within 10 km of transmission line submitted to the OPA by Helimax Energy of Montreal and the Canadian Wind Energy Association. This wind power potential was excluded from the OPA's final recommendations because the OPA judged wind power to not be a dispatchable resource. It does not include the potential of Great Lakes siting identified in this critique.

The estimate included in this graph for new natural gas, gasification and solar corresponds to the amount which has already been planned under the procurement plan for Ontario⁴⁴.

According to Ontario Waterpower Association (see Evaluation and Assessment of Ontario's Waterpower Potential- Final Report Oct. 2005) the potential for new water power is approximately 6,600 MW, included in the graph above. Conservation and demand management (CDM) was directly taken as the maximum estimate introduced by the OPA. The OPA acknowledge the fact that there is a lack of information concerning conservation and that they added nothing to the existing government commitment to 2007. Energy saved through conservation is surely many times larger. Nevertheless, for purposes of this graph, we have used the small number accepted by the OPA.

The addition of a new natural gas plant needed to satisfy a demand forecast which increases annually by 0.5% is lower than what has already been planned by the government of Ontario.

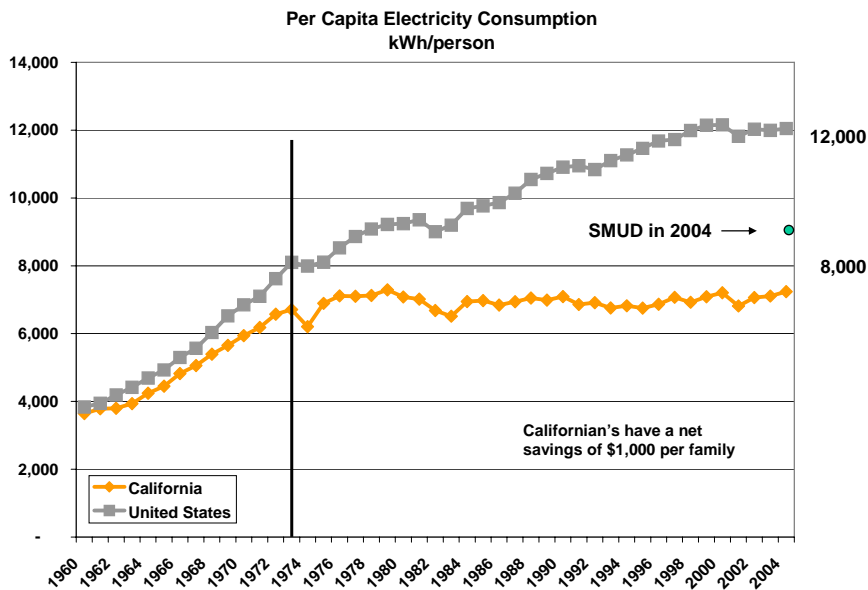


13. California's Experience

California has made remarkable strides in demand management. As noted above, one of our key recommendations is that the McGuinty Government should contact energy authorities in California, both public and private sector, and learn from their experience.

Measures that Ontario should replicate from California's experience include rebates for the purchase of large appliances (such as energy-efficient refrigerators), rebates to the manufacturers of compact florescent bulbs (for every bulb sold the manufacturer gets a \$2 rebate from the state), planting and siting of trees to reduce air conditioning, shifting to white roofs on homes and roof top gardens on larger units, smart metering of all the province with real time signals of costs to consumers, and aggressive public education programmes. Ideally, Ontario would have a coherent pricing system to send signals reinforcing the need for conserving electricity.

The following two slides summarize the huge electricity and economic savings from demand side management in California. There are no barriers to accomplishing the same in Ontario, other than lack of information and political will.



Source: http://www.eia.doe.gov/emeu/states/sep_use/total/csv/use_csv Arthur Rosenfeld, 3



Costs and Pollution Saved by Avoiding a 50% Expansion of California Electric System:⁴⁵

- Avoids 18 Million tons/year of Carbon;
- Equivalent to getting 12 million cars off the road,
 - along with their NO_x, CO, and particulate emissions;
- California has ~25 million motor vehicles,
 - avoided 50% more equivalent pollution;
- The Pavley bill, starting in model year '09, should start to reduce another 30%;
- California annual electric bill in 2004 ~ \$32 Billion; and
- Avoided ~\$16 Billion of bills, but net saving is only ~\$12 Billion/year, i.e. \$1,000/family.

14. Conclusion

The OPA should be instructed to go back to the drawing board, re-read the May 2, 2005 letter from the former Energy Minister Dwight Duncan, and answer it. Sierra Club of Canada estimates it may take as much as ten months to pull together the required information on electricity demand to properly estimate the long term potential of conservation, energy efficiency and demand-side management to 2010, 2015, and 2025.

The OPA is so completely dismissive of the role of conservation and renewable electricity in their Supply Mix forecast that they see an expansion of renewable supply as a trigger to further diminish the role of conservation. This OPA zero sum game between conserving electricity and green generation is evidence of what John Barber referred to as the "dangerous fantasy" that we can keep our lights burning without getting serious about conserving power.

These issues are far too important to be rushed, just as they are too important to be based on a flawed and incomplete information base.

Neither history, nor the voters, are likely to forgive another costly commitment to nuclear energy when there was a better choice left unexplored for lack of political will. Premier Dalton McGuinty must not squander his reputation for courage and foresight earned in



