

To: The Ontario Energy Ministry: (Questions submitted by email for meeting on April 11)

From: Ron Tolmie

Atmospheric energy systems are described in considerable detail in the [Sustainability Journal](#) so I would suggest that the meeting on Wednesday should concentrate on how they might fit in with the other sources. Although the OPA and the Ministry reports tend to concentrate on electricity to the exclusion of heating issues, these two topics are so inextricably linked that the discussion should concurrently consider both electrical and thermal forms of energy.

Conservation:

The Ontario objective is to conserve 6,300 megawatts in peak demand. That is to be the primary mechanism for maintaining an almost constant demand in spite of population changes. That objective could be met by using the cold ground as the heat sink for air conditioning instead of using the hot summer air, and by replacing the 68% of electricity that is used for residential thermal demands. However, both the Ministry and the OPA have declined to include this option in their reviews. Although conservation accounts for about a quarter of the anticipated need the 2008 expenditure on the Conservation Fund accounts for only 0.004% of the planned expenditures.

The government does offer rebates to users of conventional energy systems for maintenance and upgrades but there are no such rebates for a solution that would actually eliminate both the peak power demand and the GHG altogether. The government is stepping up the Building Code requirements to stretch out the conventional energy supply but has made no provision for an alternative that would eliminate the problem, and that could handle any foreseeable growth in demand for building heating and cooling.

A proposal to the Conservation Fund to install some ground heat exchange systems was declined on the grounds that it is first necessary to demonstrate the principle that using a cold heat sink for AC will work (!!!!!)

The Ontario plan does not anticipate the extra demands for air conditioning that will result from global warming, which may amount to 4 to 6 degrees in the populated parts of Ontario, and will increase the intensity, duration and breadth of the demand for air conditioning, and hence for electrical power. The federal regulations limiting the use of fossil fuels in industry will further exacerbate the demand.

Any move to replace air travel with a high speed train in the eastern corridor, or to move to light rail, or to move to electric or plug-in hybrid cars will further increase demand, making the assumption that power demand will decrease highly unlikely.

Renewable energy:

Apart from hydro power the only significant renewable energy source in the OPA plans is for wind power. However, the use of nuclear power for baseload power effectively eliminates the potential for employing wind power successfully. Since a nuclear power station cannot modulate its output to compensate for the fluctuations in wind power the potential is reduced from as much as 18% (currently achieved in Denmark) to only a few percent, relying mainly on the continued use of fossil fuels because natural gas and coal generators can react to the wind power fluctuations. Moreover, that small Ontario contribution would be very expensive because of the difficulties encountered in using wind power only

for peak power Wind power and atmospheric energy sources are highly compatible, and those two sources, together with Canada's existing hydro power resources could readily replace both the use of both fuels and nuclear power. However, the OPA has ruled that atmospheric energy is not considered to be an eligible renewable energy source because it was not specified in the directives under which they are acting. None of the reports on this subject have been made public by the OPA or the Ministry, and they have declined to mention it in their own reports.

Coal:

Coal is a particularly noxious energy source because of the many pollutants (some of them lethal) that coal-fired power plants produce, plus the GHG produced. With the existing energy mix it cannot be replaced by nuclear power because of the fixed load limitation of that source, it cannot be replaced by wind power as noted above, and it cannot easily be replaced by natural gas because that resource is running out, its costs are rising, and because of the need to replace fossil fuels. Moreover, the replacement of most of the existing nuclear plants will extend the supply uncertainty that the nuclear program has historically contributed because of construction delays, plants being periodically refurbished or maintained, being prematurely taken out of service, etc., and the direct consequence is likely to be a continued, and possibly an even greater use of coal. It is the cheapest energy source so there is always a temptation to use coal as the stop gap measure.

Atmospheric energy systems address exactly the need for which coal is applied - the provision of power for the summer demand peak in particular, and also for the winter peak. To retire the coal-fired plants would only require the installation of enough atmospheric systems to provide the required amount of conservation and generation. Such systems can be installed very quickly so this could be achieved in the near future. Ontario is an ideal location for using atmospheric systems because we have hot summers and cold winters so it is the natural location for such an innovation. That has an important international implication. The coal-fired power plants in other countries like the US and China are wreaking havoc with respect to both global health and global weather patterns. If Ontario leads the way we will reap even greater benefits from the foreign use of this technology than we will for the domestic use.

Natural gas:

Canada's reserves of natural gas have almost run out, and it is questionable whether the little that remains can be reserved for Canadian uses in the face of US demand, including the exploding demand for producing tar sands oil for export. Even the untapped Mackenzie Valley natural gas will be used exclusively for extracting tar sand bitumen that will go to the US. The continued use of natural gas for low grade applications like home heating is clearly irresponsible. Our natural gas and any imports of LNG should be used for a high grade application like producing electric power, and it should be used in cogenerators that can more than triple the efficiency (and commensurately reduce the carbon dioxide production)

Nuclear power:

The often-cited premise that nuclear power is essential is wrong.

Renewable energy could replace it completely, and would be much more sustainable, safer, cleaner and less expensive. Consequently the Nuclear Liability Act should be repealed, and special deals with companies that guarantee their profits are improper. The cost of uranium has abruptly increased by an order of magnitude and the rate of increase is still accelerating, and that is only one factor that demonstrates that this source of energy will not survive for long. High uranium prices will encourage production from low grade ores, but the amount of fossil fuels that would be consumed in production negates any possible air quality advantage.

Nuclear power is an ultra high risk source of energy, not only because of the dangers of operating nuclear reactors, of encouraging international instability, and of handling the waste products, but also from a business point of view. Virtually all of the world's operating reactors are very old, including some of the Chernobyl type, so major accidents are highly probable. Any such accident would probably terminate the industry.

Nuclear power is not cost competitive. In Ontario, the cost of nuclear power is 7.1 cents per kWh compared to an average cost of 4.9 cents, which means that the competing energy sources are delivering electricity at 2.7 cents. Moreover, in our hydro bills the costs are doubled by adding on various costs associated with the use of central generation and grid costs. Such costs would be eliminated in communities that use distributed energy sources like cogeneration, which would efficiently deliver both heat and electricity at a small fraction of the nuclear cost.

Renewables:

The primary renewable energy sources that are available are hydro, wind and atmospheric energy. Hydro accounts for 57% of Canada's electricity production but accounts for only 22% of consumption in Ontario. The obvious need is for Ontario to import more electricity from Quebec and Manitoba, and that is being done to some extent, but not on a scale that would displace either fossil fuel or nuclear generation. However, the use of nuclear power as the baseload energy source virtually rules out the use of wind power because the nuclear stations cannot compensate for the wind supply variations. Wind could at best supply about 3% of the electric energy need if it is coupled with fossil fuels for needs above the baseload, but at an excessively high price. That leaves atmospheric energy as the only viable alternative renewable source that might be used in conjunction with nuclear power (or without the nuclear component).

Energy from waste:

Our cities, industries and farms will continue to generate waste products that can be (and to a small extent are) used for generating power. They are thus a source of renewable energy that will grow as the population grows. In the present wasteful Ontario energy mix the amount of energy produced from wastes would be inadequate to meet our needs, but in a scenario that uses renewable sources of energy like atmospheric energy such sources could be used in the cogenerators and it becomes possible to achieve permanent sustainability without the need to put caps on the amount of energy being used.

Atmospheric energy:

Atmospheric energy can be used for both home heating and electricity, and since the heat is stored it can react to load changes, or to the supply variations encountered in conjunction with wind power. Distributed energy supply via cogeneration could meet both the baseload and peak load needs without requiring any expansion of the power grid. It would be much less expensive than nuclear power and installations could start immediately. It offers a clean, permanently sustainable, expandable source of energy. The storage systems have an extremely long lifetime and are very stable and reliable. There are hundreds of seasonal storage systems currently in use so the basic principle is well established, and there are tens of thousands of GSHP systems that also make use of the principle less directly.

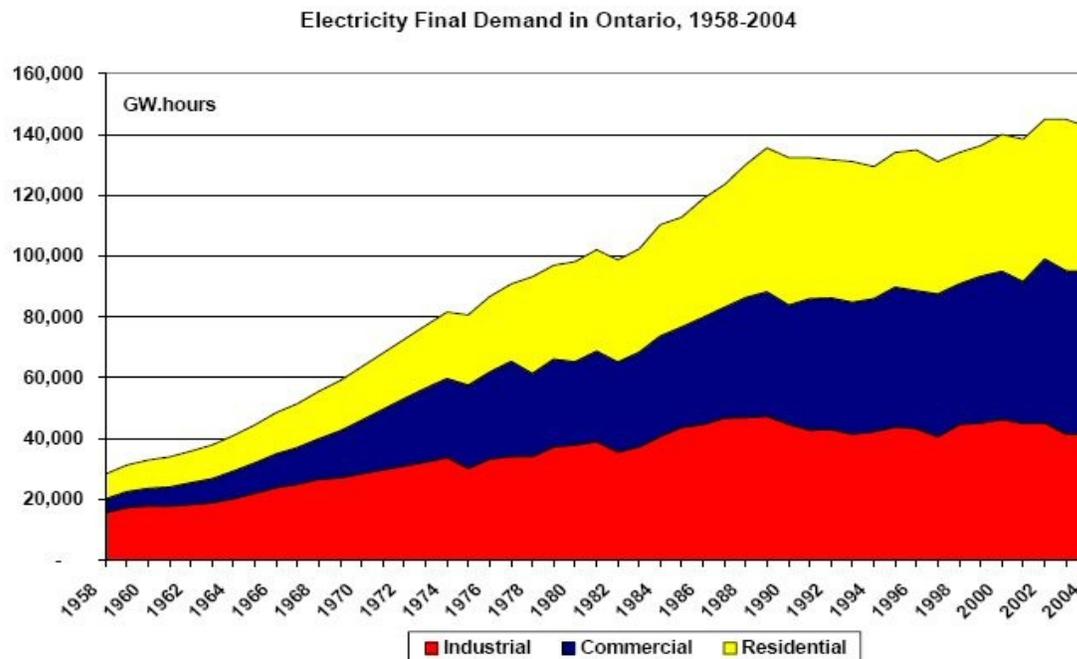
There is no mention of the use of atmospheric energy in the Ontario Ministry reports and web site, and the OPA also makes no mention of it, and does not include the submissions on this subject in its public reviews. Is this option being deliberately suppressed?

Ron Tolmie

The following was the written response.

The only thing I can say is that the Ministry is technology neutral - there are hundreds of technologies not cited on the Web site. After we met, I was at the OPA and your storage idea was mentioned as a good idea with some interest from builders in Pickering.

The following is the past growth pattern for electricity demand in Ontario:



And here is the OPA's projection of future power demand:

