

# ***Nuclear Power in Ontario – Future Conditional***

presented by

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to the

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I will cover three topics in my comments this morning. First of all, I'll reflect on the present public acceptance of the nuclear industry. I will also talk about the status of planning of the electricity power system in Ontario. And then I'll speculate briefly on what the next steps might look like for nuclear power in Ontario.

Many of you are old enough to recall the 1950s or 1960s, which was really when the nuclear power industry in Ontario began and where some of the seeds of the public perception of nuclear power are rooted. In the '50s, there were comic books that featured visionary cities of the future with 100 storey buildings and flying-saucer vehicles that moved around with no visible means of propulsion. I think they were nuclear powered – it was certainly implied they were anyway.

Then we got into the '60s and nuclear became more real. That was the time when the promise of nuclear power was first actually fulfilled in physical form, particularly here in Ontario. The very aptly-named CANDU reactor became operational at the Pickering generating station. And that station and that reactor technology were absolute world beaters in terms of safety and reliability. This “peaceful use of atoms” was a source of justifiable pride for Canadians.

This could probably be considered the “honeymoon era” for nuclear power in the public perception. However, as with any relationship, honeymoons do not last forever and the subsequent decades have certainly seen some ups and downs in the public's perception of nuclear power. You have probably studied the “downs” more than I have, but what the public remembers is:

- cost and schedule overruns on all projects,
- large debts built up by Ontario Hydro – often called "nuclear debts",

- no clear consensus on the safe disposal of nuclear waste,
- and the need, even when the private sector does get involved, for the government to continue to absorb risks – I am speaking here about the lease of the Bruce site by Bruce Power and, indeed, the more recent contracts that have been signed for the refurbishment of some of the Bruce units.

Right or wrong, these are factors which the public sees, hears and understands. They are very powerful arguments in the hands of anti-nuclear advocates. They are easily used in public messaging that reinforces an underlying concern about the safety and efficacy of nuclear power in the public mind. The public is ready to be both skeptical and concerned due to ongoing links in their minds with atomic weapons, rogue states, and global security resulting from nuclear proliferation.

And yet, the reality of nuclear power performance in the past four decades in Ontario, and indeed the western world, is quite positive when evaluated objectively against a number of very important criteria:

- Safety is the most obvious one. In more than four decades of nuclear power operations in Canada, no member of the public has been harmed as a result of a radiation leak from a plant or storage facility. On a life-cycle basis, nuclear is a much safer source of electricity than is coal and probably any other hydrocarbon source.
- Environment – in an era of growing anxiety about greenhouse gas emissions, nuclear power should be the energy source of choice for those concerned about global warming.
- Costs – even its critics admit that nuclear is one of the lowest cost sources of electricity when used for base-load supply.
- The proven nature of the technology – there are several alternative nuclear technologies, each with an extensive record of successful commercial operation and available in the global market.
- Indigenous sources of fuel – Canada is the world's largest uranium producer, and Saskatchewan contains the world's richest deposits of uranium.
- And there has been progress on dealing with spent nuclear fuel – Ken Nash from the Nuclear Waste Management Organization (NWMO) is speaking later in this conference and I am sure he will be talking about that.

These positive factors are important considerations in the debate about the future role of nuclear energy in Ontario's electricity supply. In fact, the Ontario public seems to be responding to information about nuclear energy by becoming more positive about the role it can play.

Polling is showing an "up-swing" in terms of support for nuclear power. More than 60 percent of adult respondents to a recent poll said that they support nuclear power as a source of electricity for Ontario. This is a number that has been climbing over recent years. Current opinion polls also reflect that the public has some considerable lack of confidence in the alternatives for nuclear power.

However, these positive polling results are no reason for complacency. The same poll also shows that support for nuclear power is at the lowest level of any power source other than coal. Solar and wind had a 95 percent approval rating, hydro was at 92 percent, and natural gas was at 79 percent – all compared to nuclear at 60 percent. Nuclear power also had the largest percentage of those who were strongly opposed to it (at 21 percent) and the smallest percentage of those who strongly support it (at 19 percent).

Polling professionals might describe this level of support as “soft”. So given the fragile state of public support for the role of nuclear in future electricity supply, I believe that those who advocate its use should nurture this growing acceptance thoughtfully and with great care. This will require moderation in how things are said – no more exaggerations like “power so cheap, it’s not worth metering”. Some of you will probably remember that statement. What is needed is positive, factual information about society’s need for safe, reliable and affordable solutions for tomorrow’s electricity challenges.

Now let me turn to the supply mix report that the OPA delivered to the Ontario Minister of Energy late last year. I’ll also talk about the Integrated Power System Plan, or IPSP, which we are now preparing. These two activities form the framework within which nuclear power in Ontario will be considered and roll forward.

I should stress, first of all, that the supply mix advice we provided to the Minister is just that – “advice”. A final decision on what the supply mix will be, in legislation, is the prerogative of the government and we expect that they will exercise that prerogative. So everything I say is conditional on the Ontario Government accepting the advice that we have given the Minister, and I am in no way assuming that that will happen.

I have characterized the supply mix as being a pie chart that simply shows the proportions of requirements, net of the contribution that conservation can make. The proportions of requirements for supply are from various primary sources of energy. Like any pie chart, the supply mix advice has no information on specific infrastructure. So with regard to nuclear power, as for any other of the primary energy sources, it does not cover site locations and it does not cover specific technology. The IPSP will cover, among other things, the infrastructure needed to implement the supply mix. I will get back to the IPSP in a minute, but first let me talk about the supply mix advice.

The supply mix was developed in response to a request from the Ontario Energy Minister that we received last May. That request was prompted by the recognition of some of the pressing electricity problems that Ontario is facing in the near term. Ontario’s electricity system currently has less supply capacity today than it did 12 years ago. At the same time, the population continues to grow. Canada welcomes more than 200,000 immigrants a year – a majority of them choose Ontario as their home and the majority of them locate in the Greater Toronto Area.

Ontario is also Canada’s major manufacturing and financial centre, with all the resulting demands on electrical supply that that creates. But growth in demand is not the only

problem. In fact, it's not even the biggest problem. The electricity sector must replace a major part of its generating infrastructure within the next few years. As the members of this audience are undoubtedly aware, most of the province's nuclear capacity will reach the end of its design life over the next 10 to 20 years, and all of our coal-fired capacity is also scheduled to cease production by 2009.

Together, the combination of demand growth and generation retirements would create a gap of about 24,000 megawatts of capacity in twenty years time. Putting that in perspective, it is about 80 percent of Ontario's current generating capacity and about twice the size of Alberta's current generating capacity. Filling this gap is an enormous challenge.

So the OPA was asked to develop some recommendations for redressing the situation – and in developing this advice, we were asked to recognize three government policies that already have been established as priorities:

- the creation of a conservation culture – it is simply no longer practical or economic to build supply to meet demand at whatever rate demand happens to occur,
- a preference for renewable sources – we have to make greater use of primary sources of energy that are renewable, and
- the replacement of coal-fired generation for environmental and health reasons.

We consulted very widely in putting together the supply mix advice, both with the general public and with stakeholders in the industry. And there were some very consistently and broadly held views and opinions that were recognized coming from that consultation. And one of those was that reliability is by far the most important concern of stakeholders and the general public, when it comes to tomorrow's electricity supply. Certainly stable rates and environmental considerations ranked highly, but reliability ranked the highest. So within the framework of reliability, stable rates and environmental constraints, and given the urgency of the problem, we set out to put together supply mix advice to meet the requirements of the province.

First of all, we identified that conservation and demand management can play a role in the overall plan. We also confirmed that renewable sources offer considerable potential, especially over the longer term. In fact, together, conservation and new renewable resources can more than meet all of Ontario's projected demand growth for electricity.

That still leaves the other critical supply problem that we face – replacing the loss of capacity from the retirement of existing sources of supply.

We concluded that natural gas-fired generation can play a critical role – it can be built quickly, located to relieve transmission bottlenecks and used for district energy and cogeneration applications. The speed of construction and low up-front capital costs are undoubtedly the major reasons why virtually all of the new generating capacity being added in North America today is gas-fired. Operating and cost characteristics make it an

ideal partner to firm up supply reliability in a system that is aiming to make greater use of renewable supplies. One of the most promising renewable energy sources is wind power, but it is inherently not “dispatchable”. This means that you don’t always get the choice of using power when you want it, but rather only when the wind is blowing. That’s why backing up renewable supplies is a very important role that natural gas can play.

However, increasing reliance on natural gas generation is clearly a case of “pay now or pay later”. Natural gas prices have increased four-fold in the past five years and are expected to remain high and volatile. The main reason for these price increases is simply that supplies of natural gas in North America are tight and are expected to get tighter.

Supplementing North American supplies with imported liquefied natural gas (LNG) entails serious difficulties. First of all, the public opposes construction of new terminal facilities that are required to land the LNG from overseas, and secondly, geopolitical risks result from the fact that LNG is supplied and procured in a global marketplace.

Overall, therefore, gas-fired generation isn’t a very good choice for base-load generation because of its cost-availability risk profile. However, used appropriately natural gas can enhance the contribution that is possible from renewable energy sources.

We could use coal for base-load generation if new clean coal technologies are developed, and I have no doubt that they will be developed for several reasons. Firstly, from the perspective of global supply reserves, North America is to coal what Saudi Arabia is to oil. We have the world’s largest proven reserves of coal in the North American continent – about 40% of the global total. Secondly, there is a growing concern about the role of geopolitical tensions on security of energy supply, so indigenous resources are increasingly attractive. And thirdly, witness the massive spending on the development of clean coal technology both south of the border and in Alberta.

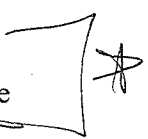
However, as we stand today, clean coal technologies have some considerable distance to go before they can be considered as viable commercial alternatives to the more mature technologies of natural gas and nuclear generation.

That leaves our final available conventional source of new capacity – nuclear generation. We concluded that nuclear could play a continuing role in meeting the base-load needs of Ontario's electricity users. In fact, nuclear power could continue to supply about the same proportion – approximately 50 percent – of the province’s total power needs in the future as it does today.

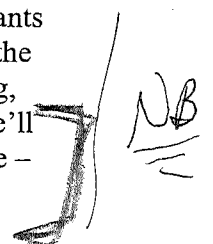
Our analysis indicates that, on a life-cycle basis, nuclear plants have less overall environmental impact than gas-fired capacity and are lower cost for base-load needs. The increased involvement of private capital in Canada’s nuclear power sector along with the increase in sophistication and diversity of capital markets over the past few years make it possible to better manage the major risks of nuclear construction – cost overruns and delays.

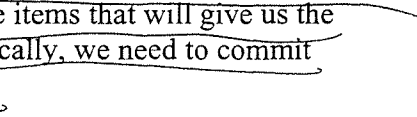
We have no preconceived notion about how nuclear power would continue to supply base-load needs in Ontario. It could be any combination of refurbishing existing units, rebuilding on existing sites or undertaking new greenfield development.

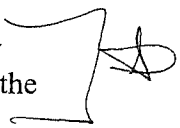
So the results of our supply mix study – despite the urgency of the situation – are actually very encouraging from the perspective of consumers. Projected growth in demand to 2025 can be met by conservation and new renewable sources such as wind and hydro imported from neighbouring provinces. Coal can be replaced by renewable sources and the addition of natural gas generation for peak demand situations. Nuclear power could play a role – about the same as it currently does – in meeting base-load demand.

Now let me turn to the Integrated Power System Plan or IPSP. As I said before, this will look at the infrastructure implications of whatever supply mix the government does choose. Like the supply mix, it looks 20 years into the future, and legislation requires that it be repeated every three years. So it is really a three-year action plan set in a 20-year context. What happens in the 20th year of the plan will be revisited six times before we ever get there. 

The IPSP, therefore, will have details focused only on the first three years. It will include action on infrastructure that is needed to be in service during that initial three-year period. It will also include action on infrastructure needed beyond that three-year time period that has lead times that extend back into the immediate three-year period. Clearly, this latter item includes action on building new nuclear generation capacity – subject of course, as I've said previously – to the Government's decision on including nuclear capacity in the supply mix. 

However, it's also quite clear that we will not have a detailed assessment on which plants will be refurbished, or what and when new construction will be required. That being the case, we will have to assume that each of the plants, when it comes up for refurbishing, may result in a decision to build new plants. In short, for planning purposes today, we'll have to assume the need for new nuclear capacity in something less than 10 years time – the time when the first of the existing nuclear units reaches the end of its design life. 

This does not mean that we need to commit to new construction today, but it does mean that we need to make decisions on starting the long-lead-time items that will give us the option of proceeding with new construction later on. Specifically, we need to commit today to obtaining approvals for new nuclear construction. 

The IPSP won't specify the location of every last generating station, transmission line or transformer station, but it will provide details on major items such as nuclear generation. From a system-wide perspective, nuclear site locations are heavily influenced by the transmission system, and the layout of the future transmission system is heavily influenced by the layout of the existing transmission system. Since the lead time for developing new transmission is comparable or even longer than the lead time for new nuclear plants, I expect that options for nuclear sites would include only those where the transmission system as seen 10-years hence will support a nuclear plant. From an 

electricity system perspective, therefore, there are four existing nuclear sites in Ontario – Pickering, Bruce, Darlington and Rolphoton. Other possibilities from the perspective of the electricity transmission system include Nanticoke, the site of North America's largest coal burning plant, and Wesleyville, a site just east of Darlington, which was selected for major generation, but was never fully developed by the then Ontario Hydro.

Other factors may narrow the choice of sites, but I don't see much prospect on the basis of electricity system requirements for broadening these choices. It is probably going to be prudent for the IPSP to identify more than one site, even if one site is superior to the others from an electricity system perspective. Doing so will provide the assurance that if the preferred site does not fare well in the licensing and approvals process, there will be one or more alternatives. This approach would ensure that it would be possible to build a new nuclear plant somewhere that can be economically accommodated from the perspective of the electricity supply system.

I do not expect that the Integrated Power System Plan will provide any guidance on what specific nuclear technology might be used for a new nuclear build in Ontario – CANDU or one of the other major alternatives available on the world market. And I can assure you that the IPSP will not provide any guidance on who will build, own and operate any new nuclear plant. These items of technology and ownership are not within the scope of the IPSP for any power system infrastructure – nuclear or otherwise.

So where does this leave us, once the IPSP is completed, with respect to the approvals process for nuclear new build? Later on at this conference Linda Keen of the Canadian Nuclear Safety Commission will be making some comments, so I will certainly defer to her for any specifics with regard to the approvals process. What I would like to do, however, is provide the perspective of electricity customers and what process would best serve their interests. Let me also be clear that while OPA might be involved in the procurement of a new nuclear plant if and when a decision is made to proceed with building one, it is not at all clear that OPA need be involved in the approvals process leading up to that decision.

My understanding is that there are three basic components in an approval application – qualified applicant, site and technology. Firstly, I don't believe that OPA could or should be the qualified applicant. We are not qualified and we have no intention of actually building, owning or operating a nuclear plant, so it would appear to be a very tall order for us to become a qualified applicant. At most, we could play the role of contracting on behalf of the public for somebody else to undertake that application. Since we have a responsibility for the public interest, the best tool we have at our disposal to deliver on that responsibility with respect to selecting an applicant is to have a competitive selection process. One approach then would be to select a proponent for pursuing licensing approval for a new nuclear plant through a competition run by the OPA.

I'm not saying we should necessarily do this because there are other approaches. One of them would be to allow an entity which falls under economic regulation by the Ontario Energy Board to become the applicant on a cost-recovery basis.

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Regardless of which of these or any other approaches is used, the decision has to be made as to whether the party undertaking the licensing application is also the party that proceeds with building, owning and operating the plant. I understand that licenses are not transferable between applicants, but such a transfer could effectively be achieved through a new application where site and technology are identical to an existing license and only the applicant is changed.

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As I said earlier, since the objective in applying for a license in the first place is to create an option for building a new nuclear plant, it seems from the perspective of the public interest to be appropriate to reserve judgment on who builds, owns and operates the plant until such time as the decision is made to actually undertake construction. In short, it would seem useful to initiate an approvals process that does not presume that the applicant will be the builder, owner and operator. This clearly would give us a greater choice of applicants, although it would also clearly create a greater challenge to the approvals process itself.

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A similar argument might be made for the technology chosen. Since no commitment to build is being made when the approval process begins, it will be in the best interest of electricity users to leave open the choice of technologies. Again, this will not necessarily be what happens, since there are many other broad social and general economic issues related to the choice of technology. As a result, the choice may not be made on the relatively narrow perspective of electricity users alone. But if that were the case, there are advantages to an approvals process that would allow the choice of technology to be deferred.

So overall, if the OPA were to be involved in the near future, a process along the following lines could be the starting point for our planning:

- a qualified applicant moves forward with obtaining licensing approvals,
- the applicant is selected either through a competitive bidding process or is designated as falling under OEB economic regulation,
- in either case, the resulting licenses are held for the public benefit until a decision is made on proceeding with the construction of a new plant,
- at such time, the licenses would be made available to the proponent selected to build, own and operate the plant,
- again, that selection would be made either through a competitive process or by an entity subject to OEB economic regulation,
- the licensing approval would allow the choice of technology to be made at some future date,
- that technology choice could be made in a number of ways, including as part of the process of selecting the builder-owner-operator,
- licensing approval would be sought for more than one site, if for no other reason than to provide assurance that one site will be acceptable for licensing.

From the perspective of the OPA then, this is a multi-site, multi-technology approval process being pursued by an entity that is not necessarily the one who will ultimately build, own and operate the plant. Furthermore, this approval process will begin without a commitment to proceeding past the licensing stage and going into construction.

This is clearly a very challenging set of parameters, but it's an approach that will protect the interests of the electricity users of Ontario – and they are the ones who will be paying either directly or indirectly for both the approvals process and the new construction. It will be a challenge for everyone involved – owners, operators, regulators and certainly, insofar as we are involved, the OPA.

In conclusion, I want to emphasize some of the points that I have made. Firstly, that we are at a very critical juncture in the future of nuclear energy in Ontario. By most objective standards – safety, reliability, cost, environmental performance and security of supply – nuclear power has earned a place in Ontario's electricity future. And there are signs that the public is beginning to agree that nuclear power has a role to play in meeting the supply challenges we face.

However, this is a fragile consensus. To be the basis for implementing a new nuclear power program in Ontario, it requires nurturing from an organization such as the Canadian Nuclear Association, which must be seen as a calm, positive and factual participant in the current debate about future choices for electricity in this province.

I appreciate very much the opportunity of speaking to you today and wish you well in your deliberations.

Thank you.