# NUCLEAR ELECTRICITY - THE AVAILABLE ALTERNATIVE

NOTES FOR A SPEECH BY

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I am honoured by this opportunity to speak to your club to-day. Particularly, as the President of a crown corporation in the energy business, I appreciate the opportunity to be your first speaker since the Federal Election in which energy was a major theme in every party's platform. Let me admit that your President didn't plan it that way - I was just lucky.

In the election the energy question surfaced mainly in talk of oil prices and profits but behind these immediate concerns lay many other deeper and more lasting problems.

In the past year you have heard Mr. Hnatyshyn, Mr. Wilder, Mr. Blair and His Excellency Senor Gomez talk about oil. So, I am sure the message has reached you that there is not an energy crisis but an oil crisis. What may be

less obvious, however, is that the solution is not simply to produce more oil. We must face the reality of dwindling oil supplies and we must make haste to find and develop a range of substitutes.

That message is one that I want to develop with you to-day. When I was asked to speak to you I assumed that your President had asked me because he thought I might know something about nuclear energy and that it is a fascinating and controversial subject. So I thought I should speak about nuclear energy and I divined that you might expect the President of AECL to come out pretty strongly in favour. I shall not disappoint those expectations but there is another area that I want to touch on and that is the connection between economic growth and electricity - the fundamental rationale for the national nuclear programs which every major country is pursuing. I do so with some trepidation in view of the presence of the distinguished guests who are at our Head Table to-day but it is a subject which is of vital

importance to the eight million people who have made the Province of Ontario their home. It is a subject which lies at the very heart of the energy debate here and one in which nuclear power has a vital role to play.

I believe that the development of our electrical resources in the latter part of this century is going to shape the future of the province as surely as did the efforts of Sir Adam Beck and his colleagues at its outset. In the early part of the century, it was hydroelectricity which gave Ontario its industrial strength. That water power, which gave the province abundant electricity was an indigenous resource. By 1990 Ontario Hydro will be generating more than half of its electricity by nuclear energy - a source which will give us stable, economic energy from another indigenous source - uranium. Canada, with 10% of the world's uranium, is in a uniquely favourable position to exploit the potential of that resource.

Can we cope with a technology of such awesome implications? Can nuclear power be produced in a safe as well as an economic way? The accident at the Three Mile Island plant in Pennsylvania almost a year ago rivetted public attention around the world on safety. What have we learned from that event?

Only now, almost a year later are we moving towards a proper perspective on the accident. Both President Carter's Commission of Enquiry and the Special Inquiry Group appointed by the U.S. Nuclear Regulatory Commission have reported their findings and recommendations, and the President has made his decisions on the future regulation of the US industry.

Just how serious an accident was TMI? The short answer is that it was the most serious accident which has occurred in the history of the commercial nuclear power industry and one that has changed the whole course of nuclear development.

The core of the reactor was partially uncovered for extended periods and even to-day no-one has yet been able to enter the containment to assess the damage. Losses to the operating utility are likely to exceed $1 billion. It is still not certain if the unit ever can, or will be permitted, to operate again. The accident was a failure of equipment, of human operators and of institutions and their regulatory procedures.

But Three Mile Island was also another kind of failure. It was a failure of communications. Communications on a technical level failed to provide in a prompt manner the information that the "hydrogen bubble" was never the threat it was perceived to be. Despite the almost incredible series of equipment failures and operator errors which led to the accident, the containment system held and the defence in depth philosophy of multiple, separate barriers to the release of radiation worked. The major health effect of the accident, according to the President's Commission, will be that of mental stress.

The design of Canada's reactors is radically different from those of the United States and there has never been a major accident in a Canadian nuclear power station. Nevertheless all countries can learn from that accident. AECL and Canada's electric utilities are checking the designs, reviewing operator training and, perhaps even most important, ensuring that there is a proper feedback of technical information so that possible flaws in the system are eliminated. We are confident that this work will result in even safer reactor systems.

It is ironic that the practical result of the Three Mile Island accident is that no new plants have been licensed to operate in the United States since that time and this de facto moratorium is likely to continue at least into the spring. At this moment seven new plants totalling 7,300 MW (more than the total capacity of all our Canadian nuclear electric generating plants) have been completed in the US and await a license. While the United States becomes daily more dependent on imported oil these plants stand idle.

Some 16 percent of the electrical generation in the US is from oil-fired stations and using uranium instead of oil is a readily achievable and relatively straightforward method of substitution.

Substitution is the key to our way out of the oil dilemma and it will be our ingenuity and perseverance in finding methods of substitution which will determine our energy future. The use of uranium in electrical generating stations is an obvious form of substitution and the economics of nuclear generation have already been established. In Ontario, where the competition is imported coal, electricity is being produced by nuclear plants at half the cost of that produced by burning imported coal.

In the Province of Ontario, some 45 percent of all the energy used today comes from oil. Of this oil, almost one-third goes in motor gasoline so that it must be regarded as a candidate for substitution in the long term. With this type of substitution, the task becomes more difficult, the benefits less obvious. Despite the very considerable work done on improvement of electric traction, the electric car is by no means close to realization and there remain some doubts about when such a substitute for the gasoline-engine vehicle will make it to the average Canadian's garage.

The internal combustion engine could also be readily adapted to burn other fuels than gasoline. All of these so-called synthetic fuels, methanol, coal-based gasoline, and hydrogen require prodigious amounts of energy for their production, energy which can be supplied by the burning of uranium or thorium which have virtually no other uses rather than burning hydrocarbons to produce hydrocarbons.

The potential for substitution becomes even more attractive when we turn to the non-transportation uses of oil. The inexorable rise in oil prices will continue to place more and more such uses on an economic footing with oil and this trend must be recognized in planning our energy future.

I want to spend a few moments on some of the ways which are being investigated to achieve such substitution. Many of the techniques which can be employed are already well-known. The use of electric commuter vehicles, the electrification of railroads, particularly short high density services such as the GO system, calls for no new technological developments. Electric space heating for homes will also command a larger share of the market particularly as the so-called 'gas bubble' is used up.

Beyond these ready made means of substitution lies a whole range of options, new technological developments and some new ways of looking at old problems. The Institute for Research on Public

Policy in Montreal, for example, has proposed a hybrid space heating system which would use electricity as the base-load heating with an auxiliary system of coal, gas or wood providing the balance. Use of such hybrids on a large scale could improve utilisation of generating plants especially if load control could be applied to avoid peak demand hours.

Greater use of electricity in industrial processes such as pulp and paper manufacturing will also come with the development of electro-mechanical processes. Pulp mills are achieving higher fiber yields from their wood chips by heating them by electricity and then recovering the heat for use in the drying process. Such processes can double the yield of fiber from wood.

None of these will come to pass, however, if we accept the self-fulfilling prophecy technique which seems to have gained such a large measure of political acceptance. Until comparatively

recently, the electric utilities could comfortably base their load growth forecasts on the pattern which had been sustained for over 50 years in Canada of a 6 to 7 percent yearly growth. The slump from this growth level occasioned by the economic slow-down of the last few years seems to have developed into a kind of Dutch auction where Dr. Porter, Mr. Donald MacDonald and the other pundits in the field vie for a slimmer, trimmer electrical future. In this battle of the seers, one is tempted to ask if OPEC's 1980 New Year gift of $30 a barrel of oil, the rise of the Ayatollah Khomeini or the Russian invasion of Afghanistan were to be seen in the crystal balls of the prophets. The knee jerk reaction of slowing electrical utility growth does not of itself represent a solution to the energy problem. Certainly putting the brakes on when your car has a stuck down gas pedal will slow you down but it won't do much for your gas mileage.

In France, a country entirely dependent on imports for its oil supply, a realistic and aggressive campaign is under way by the state electric utility EDF, to seek ways in which industry can electrify its operations. A team of 100 specially trained young EDF engineers is working out in industry to promote the concept and educate industrial engineers. Fifty percent of the new homes being built in France are equipped with electric heating. And this, it should be appreciated, is taking place in a country where electricity is far more expensive than it is in Ontario where the combination of hydraulic with nuclear generation has kept costs down.

The key to France's bid for both self-sufficiency and a high energy society is the pursuit of a strong and highly advanced nuclear power program, which will supply 50% of that country's energy by the end of this century.

The nuclear decision in France has meant that a secure and increasing supply of electricity can be made available, an attraction for many major industries. One result has been that the European aluminum industry will concentrate its plants in France giving that country a new industry with an export market throughout Europe.

It is not only as an electricity producer that nuclear reactors can provide answers to our energy problems. The in-situ extraction of oil from the tar sands calls for huge quantities of steam - a 125,000 bbl per day plant requires something like the entire steam output of one of the Pickering reactors. We have been studying the economics of providing that steam by nuclear power and are close to being competitive with coal. Cheap steam from nuclear reactors is nothing new. At the Bruce Nuclear Power Development near Kincardine the reactors supply steam to the chemical plant which makes heavy water as well as supplying electricity to the Ontario Hydro network. Last year the amount

of heat supplied in this way was equivalent to the heating requirements of about half a million homes and studies are in progress to see how other industries could be attracted to the area by such economical energy supplies.

In the future surplus heat from the Bruce reactors could be used in greenhouses and a fish-farming project built near the plant. The Ontario Energy Corporation and a group of private investors already have a one acre experimental greenhouse in production to demonstrate the feasibility of such a project. This year they will add 35 more acres of greenhouses in anticipation of the building of a hot water pipeline from Bruce. Eventual plans are for 150 acres of greenhouses all heated by surplus nuclear heat.

At the other end of the scale we are looking at the development of "mini-reactors" which could replace oil furnaces in factories, shopping complexes and large buildings. The University of Toronto, like a number of other Universities across

Canada, operates a small research reactor on campus. It operates unattended, is self-regulating and produces only a few kilowatts of heat. It is this type of reactor which we believe can be developed into a replacement for the oil furnace.

Such imaginative projects are pointing the way to a future in which this country can secure a real self-sufficiency in energy without incurring the drastic alterations of life-style that some would have us see as inevitable. The growing evidence around the world is that the economic structure of the advanced nations can survive the ratchetting of oil prices by OPEC and the far more severe disruptions which lie not too far down the road as oil supplies dwindle. We are all too well aware of the disruptive effect which the uneven distribution of our natural energy resources has on provincial relations. The transportation of coal, gas or oil from our western provinces to the industries of the east represents a formidable challenge when compared with a nuclear economy in which a single truck load of

fuel will keep a plant in operation for a whole year. Uranium not only occurs in most parts of Canada but its ready transportability can assist in moving towards equality of energy pricing across the country. The cost of a nuclear kilowatt differs very little whether it is generated in the Maritimes or the heartland of Ontario.

Let me conclude by painting for you two scenarios for the year 1995. In the first, the energy attitudes of the seventies have persisted throught the eighties. Electrical growth has been retarded by policies of restraint. We are importing 800,000 barrels of oil a day which imposes a $9 billion (1980 prices) per year foreign exchange deficit. Economic growth is zero and the line up at the gold counter is almost as long as that at the gas bar.

In the second scenario Canada has vigorously pursued its energy opportunities. Natural gas has been brought to Quebec and the Maritimes. The tar sands have been developed. Electricity

substitution and the stop gap gas bubble have cut our oil imports to zero. Export dedicated electricity plants have eliminated our balance of payments deficit (and I should tell you that our latest estimate for just one nuclear plant the size of Bruce dedicated to export shows a net return of nearly $2 billion by the mid 90's). The growth of the energy industry both in the building of nuclear plants, which are even to-day over 80% Canadian content and in the development of substitutes for oil has stimulated prosperity and employment. Low cost energy has attracted industry into the country, providing export goods to pay for the capital needed in the energy sector.

This is no pipe-dream. The CANDU nuclear power stations built by Ontario Hydro have already saved more than $1 billion in foreign exchange and by 1990 that figure will have grown to $16 billion.

In the CANDU reactor system Canada already has in place the means of achieving a secure energy future. That might be a predictable statement from the President of AECL but it has also been made by such well known scientists as the late international nuclear pioneer Lew Kowarski, and British scientists such as Lord Bowden and Sir Fred Hoyle. In a recent interview with New Yorker magazine Dr. Hans Bethe, Noble Laureate in Physics and world renowned energy expert had this to say of CANDU - "It is a technical wonder. Not only is it very conservative in fuel but it works with a regularity and reliability that are absolutely fantastic".

I do not intend to leave you with the impression that nuclear energy can do it alone. The job ahead of us is one of the greatest challenges which our modern civilization has faced and it will take imaginative development of all forms of energy to meet it.

Nuclear is one of the tools we have in hand right now to do the job. Whether that job is done depends on your will to do it.

It's your choice. It's Canada's opportunity.

Thank you.