



CANADIAN INSTITUTE FOR ENVIRONMENTAL LAW & POLICY

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**Sustainable Development: Its Implications for the Canadian Natural Gas
Industry**

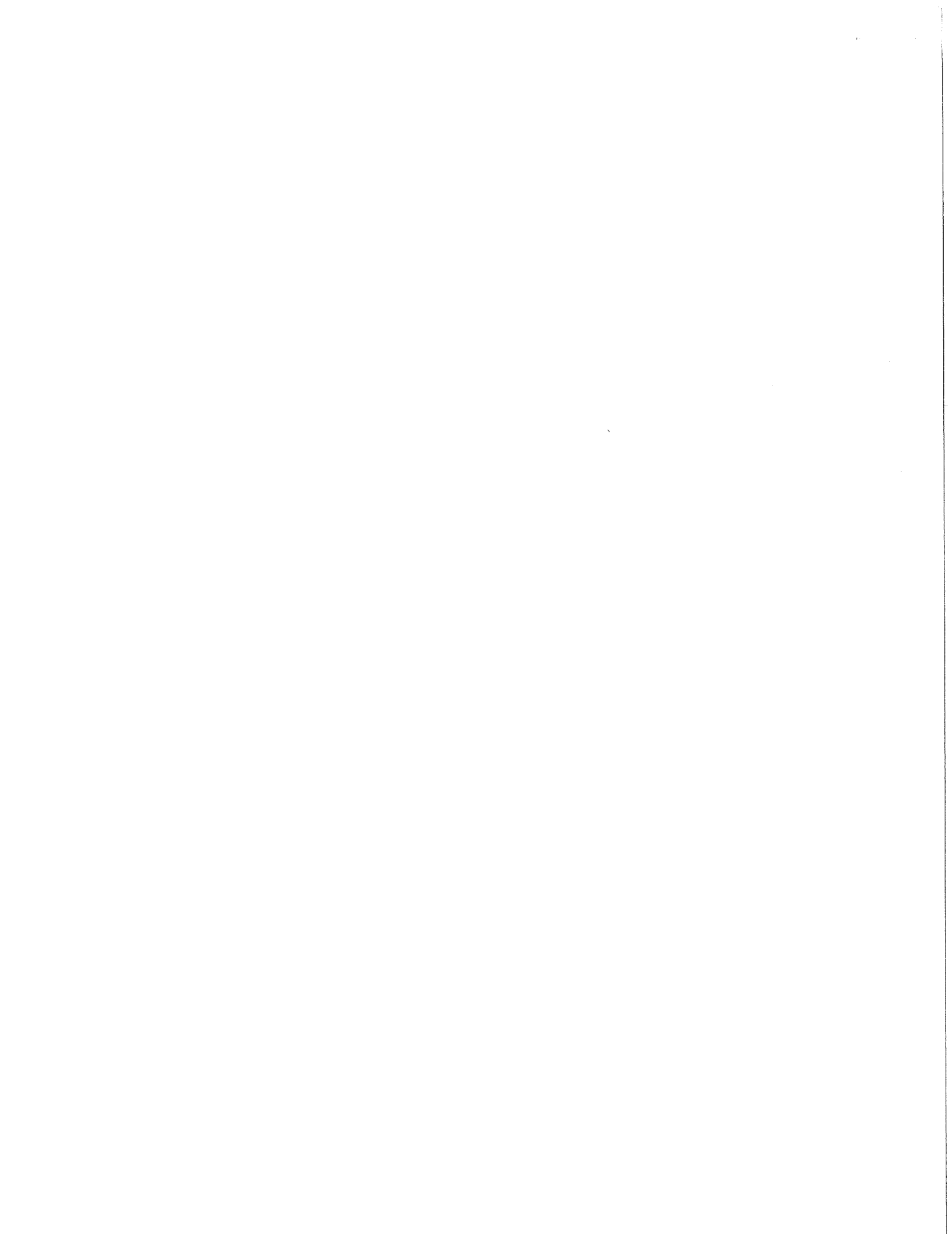
by

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for

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Introduction

In May of this year the Canadian Institute asked me to speak to you about: "Policy Responses to Global Warming: Implications for the Natural Gas Industry". However as a result of the election of a New Democratic Party (NDP) government in Ontario the scope of my address must be expanded if I am to fully address the implications of environmental issues for the Canadian natural gas industry. This is due to the fact that the Ontario NDP (ONDP) is committed to phasing out nuclear power as well as reducing Ontario's contribution to global warming. Thus the topic of my speech is now: "Sustainable Development: Its Implications for the Canadian Natural Gas Industry".

What is Sustainable Development?

The concept of sustainable development has been popularized by the United Nation's World Commission on Environment and Development's 1987 report, Our Common Future (the Brundtland Report). According to the Brundtland Report sustainable development is:

"development that meets the needs of the present without compromising the ability of future generations to meet their own needs."¹

At a minimum, the Brundtland Report's concept of sustainable development implies that governments should intervene in the marketplace to achieve the following policy objectives:

1. an equitable distribution of income and wealth; and
2. an optimal scale of resource use.

The first public policy objective is a widely recognized goal of governments and is not uniquely identified with the concept of sustainable development. The second public policy objective however is unique to the concept of sustainable development. The optimal scale of resource use is a level of resource use that does not deplete our ecological capital or jeopardize the ability of future generations to meet their needs.

According to the Brundtland Report the world's current rate of consumption of many natural resources exceeds the optimal or sustainable scale:

"Many present efforts to guard and maintain human progress, to meet human needs, and to realize human ambitions are simply unsustainable -- in both the rich and poor nations. They draw too heavily, too quickly, on already overdrawn environmental resource accounts to be affordable far into the future without bankrupting those accounts. They may show profits on the balance sheets of our generation, but our children will inherit the losses. We borrow environmental capital from future generations with no intention or prospect of repaying. They may damn us for our spendthrift ways, but they can never collect on our debt to them. We act as we do because we can get away with it: future generations do not vote; they have no political or financial power; they cannot challenge our decisions.

But the results of the present profligacy are rapidly closing the options for future generations. Most of today's decision makers will be dead before the planet feels the heavier effects of acid precipitation, global warming, ozone depletion, or widespread desertification and species loss.²

According to the Brundtland Report, sustainable development has the following implications for global energy policy. First, in order to reduce global warming, acid rain and toxic urban air pollution, the industrialized world must substantially reduce its consumption of fossil fuels.³ Second, the use of nuclear power is "only justifiable if there are solid solutions to the unsolved problems to which it gives rise."⁴

From an energy and environmental policy perspective the election of a NDP government in Ontario is of significance because the ONDP understands and has endorsed the Brundtland Report's concept of sustainable development.⁵

The ONDP's Energy Policies

The ONDP's conclusions with respect to the implications of sustainable development for Ontario energy policy are identical to those of the Brundtland Report. To be specific, the ONDP believes that Ontario should suspend plans for more coal-fired and nuclear electric generating stations until "all environmental and economic questions about both energy sources are completely resolved." Furthermore, the ONDP has called for the phase out of nuclear power as "conservation, small-scale production and soft-path alternatives are implemented."⁶ In addition, the ONDP has called for a substantial reduction in Ontario's carbon dioxide emissions. That is, a 20% reduction in carbon dioxide emissions (from 1988 levels) by 2005 and a 50% reduction by a later date.⁷

In short, at a minimum, the ONDP's stated energy policy objectives for the next 15 years are a moratorium on the construction of new nuclear reactors and a 20% reduction in carbon dioxide emissions. In my opinion, these policy objectives are an essential first step on the road to sustainable development. Moreover, we have an obligation to our children and our grandchildren to achieve these goals.

However, I know and you know that the NDP's energy policy objectives will not be achieved if the cost includes brownouts, blackouts and plant closures across Ontario. We will not achieve our long run sustainable development objectives by freezing in the dark in the short run. As the Brundtland Report has stated sustainable development is development that meets the needs of the present as well as future generations. Thus the key question is: are the NDP's energy policy objectives compatible with the principles of sustainable development? That is, can we place a moratorium on nuclear reactor construction, achieve a 20% reduction in carbon dioxide emissions and maintain a prosperous and fully employed economy?

What is the Sustainable Energy Pathway for Ontario?

In my opinion the NDP's sustainable development goals can only be achieved if we:

1. substitute natural gas for coal, oil and coal-fired electricity; and

2. use natural gas and other energy sources as wisely and efficiently as possible.

As you know natural gas is the cleanest fossil fuel. The carbon dioxide emissions per unit of energy for natural gas are 30% less than those of oil and 50% less than those of coal. Thus if we substitute natural gas for coal, oil and coal-fired electricity and if we use natural gas, electricity and oil as wisely and efficiently as possible we will be able to put a moratorium on nuclear reactor construction, reduce our carbon dioxide emissions by 20% and meet the energy service needs (light, heat and power) of Ontario.

I would now like to discuss in a little more detail the potential for fuel substitution and how the natural gas industry can promote energy efficiency and conservation.

Ontario Hydro generates approximately 25% of its electricity from coal.⁸ As a result, in 1988, Ontario Hydro was responsible for 21% of Ontario's fossil fuel related carbon dioxide emissions.⁹ These emissions can be reduced dramatically by substituting natural gas for coal in the production of electricity and by substituting natural gas for electricity for many energy end-uses (e.g., space heating, water heating, cooking, drying).

For example, if a natural gas cogeneration facility displaces the output of an Ontario Hydro coal-fired generating station then carbon dioxide emissions per kilowatt-hour (kwh) could fall by 70%.¹⁰

However the economic and environmental benefits of substituting natural gas for electricity at the customer level can be even greater. In 1981 I estimated that the marginal economic cost of using coal-fired electricity for space heating is 2.7 to 5.8 times greater than the marginal economic cost of using natural gas.¹¹ Furthermore the substitution of natural gas for electric space heating can reduce a home's space heating carbon dioxide emissions by more than 80%.¹² Needless to say, I am pleased to note that Mr. Robert Franklin, the President and Chief Executive Officer of Ontario Hydro, also believes that natural gas is the economically and environmentally preferable option for space heating:

"Besides the economic factors, electric space heating has relative disadvantages from environmental and efficiency

perspectives -- particularly when natural gas is an alternative."¹³

Furthermore, it is important to note that coal is Ontario Hydro's incremental electricity source approximately 90% of the time¹⁴ and that the combustion efficiency of its coal-fired electric generating stations is approximately 35%. Thus the substitution of natural gas for an electric load will virtually always lead to a significant percentage reduction in carbon dioxide emissions.

Another potential area for fuel substitution is in the transportation sector since the carbon dioxide emissions of natural gas per gigajoule (GJ) of energy are 30% than those of gasoline. However natural gas is approximately 98% methane and when methane is leaked directly into the atmosphere it is a much more potent greenhouse gas than when it is combusted and converted into carbon dioxide. Thus if the methane leakage rate during the production, transmission, distribution and consumption of natural gas exceeds a certain threshold level then the substitution of natural gas for gasoline will not reduce global warming. This point has been recently made by one of the natural gas industry's major competitors, Imperial Oil:

"... Imperial and affiliated companies have carried out some analyses of the greenhouse gas emissions from various alternatives to gasoline and diesel as fuels for motor vehicles. These alternative fuels included methanol, compressed natural gas (CNG) and liquified petroleum gas (LPG), largely propane. The analyses considered the emissions of greenhouse gases over the full cycle of production and consumption of each fuel. Once consideration is given to the energy requirements for fuel manufacturing and possible losses of methane, with its greater heat-trapping effect in the atmosphere, alternative fuels which appear to produce much less carbon dioxide per unit of energy than conventional oil-based fuels, could in fact contribute as much or more to any potential warming effect in the atmosphere."¹⁵

The rate of methane leakage, from drill bit to burner tip, per unit of natural gas consumption is clearly a public policy question of prime importance.

The Canadian natural gas industry should commission a comprehensive scientific study to answer this question as soon as possible. Furthermore, the Canadian natural gas industry should investigate all its options to reduce the rate of methane leakage.

Subject to the above noted caveats, sustainable development implies that natural gas' market share should rise. Whether the absolute level of natural gas consumption should rise or fall depends on the cost of reducing greenhouse gas emissions by substituting natural gas for coal, oil and coal-fired electricity versus investing in energy efficiency and conservation. Needless to say, whether the absolute level of natural gas consumption does rise or fall will be heavily influenced by government policy. However, it is important to note that a rise in the absolute level of natural gas consumption is compatible with a significant reduction in overall carbon dioxide emissions. In 1988 natural gas consumption was responsible for approximately 26% of Ontario's fossil fuel related carbon dioxide emissions.¹⁶ Thus a 20% reduction in carbon dioxide emissions would be compatible with a 200% increase in natural gas consumption if natural gas displaced all coal and oil consumption in Ontario. Furthermore, a 50% reduction in carbon dioxide emissions would be compatible with a 80% increase in natural gas consumption if natural gas displaced all coal and oil consumption in Ontario.

As I have indicated above, the achievement of our sustainable development objectives will also require that we use natural gas as wisely and efficiently as possible. Unfortunately Ontario's and Canada's level of expenditures with respect to the conservation and efficient use of gas is substantially below the socially desirable level. There are at least three reasons for this state of affairs.

First, the price of natural gas does not include its environmental costs (e.g. greenhouse gas emissions).

Second, energy consumers do not have full information about the availability, reliability and price of their energy efficiency and conservation options.

Third, whereas public utilities are willing to accept a payback period for energy supply investments that is equal to their expected economic life, energy end-users demand payback periods for energy efficiency and conservation investments that are substantially shorter than their expected life. For example, energy consumers typically demand payback periods of 2 to 5 years or less for energy efficiency and energy conservation

investments; whereas gas utilities are willing to accept payback periods of up to 55 years for energy supply investments. Furthermore, the different payback rules do not reflect the relative social risks of energy supply, efficiency and conservation investments.

Fortunately these barriers to the wise and efficient use of natural gas can be overcome by converting Ontario's natural gas utilities (Consumers' Gas, ICG Utilities, Union Gas) into conservation utilities as well as natural gas distribution utilities. As conservation utilities, they would aggressively promote energy efficiency and conservation by:

1. providing their customers with information about how they can conserve natural gas;
2. providing their customers with financial incentives (cash rebates, low interest loans, low rental rates) to purchase or rent super-efficient gas equipment (e.g., furnaces, water heaters, stoves and dryers);
3. by financing and/or installing energy conserving products (e.g., energy conserving showerheads, windows, doors and insulation); and
4. entering into agreements with natural gas equipment manufacturers which would lead to the production and marketing of natural gas equipment that is more energy efficient than the best products that are currently available in the marketplace.

The creation of conservation utilities could lead to a significant reduction in the consumption of natural gas and hence carbon dioxide emissions. For example, a high efficiency gas furnace uses approximately 30% less energy to heat a home than a conventional gas furnace.¹⁷ Gas-fired heat pumps, which are expected to be available in two to three years, will use approximately 60% less energy to heat a home than a conventional gas furnace.¹⁸ Finally, high-efficiency natural gas hot water heaters use approximately 25% less energy than conventional water heaters.¹⁹

The creation of conservation utilities would also provide the following indirect benefits to the people of Ontario and Canada.

First, it is ONDP policy to introduce a carbon tax in order to reduce carbon dioxide emissions.²⁰ The aggressive promotion of energy efficiency and conservation by Ontario's natural gas utilities would increase the political acceptability of such a tax by reducing its impact on energy bills. For example, a 100% carbon tax might not raise a homeowner's energy bill if a conservation utility reduces the home's energy consumption by more than 50%. Furthermore, the political acceptability of such a tax would be further enhanced if some or all of the revenues are used to subsidize the conservation utilities energy efficiency and conservation programmes.

Second, the aggressive promotion of energy efficiency and conservation by Ontario's natural gas utilities will mitigate the impact on the Ontario economy of a market-driven rise in the price of natural gas at some future date. As a result such an event would be less likely to lead to demands for the re-introduction of a regulated natural gas commodity price. Thus the aggressive promotion of energy efficiency could reduce Ontario/Alberta conflicts.

Third, since conservation utilities will increase Ontario's energy security, eastern Canadian opposition to western Canadian natural gas exports to the U.S. might be reduced.

Fourth, the promotion and/or procurement of energy-efficient natural gas equipment by Ontario's conservation utilities could lead to the development of a world class high-efficiency natural gas equipment manufacturing industry in Ontario.

How Can We Make Sustainable Development A Reality?

I have suggested to you that the Ontario NDP's energy policy objectives can be achieved by a large scale substitution of natural gas for coal, oil and electricity and by the aggressive implementation of energy conservation and efficiency measures. Needless to say, an equally important question is how can the Government of Ontario make fuel substitution and the aggressive implementation of energy conservation and efficiency a reality? In my opinion, the achievement of these goals will require three policy initiatives. First, the Government must adopt full cost pricing policies for Ontario Hydro. Second, the Province of Ontario must introduce a carbon tax or a system of tradeable carbon quotas. Third, the Ontario Energy Board must reform its principles of natural gas

regulation.

Full Cost Pricing for Ontario Hydro

The previous provincial government established the Ontario Round Table on Environment and Economy to develop a sustainable development strategy for Ontario. This summer the Round Table released a policy paper which identified six guiding principles for achieving sustainable development. The second principle is full cost pricing. According to the Round Table the prices of all natural resources should equal their full costs:

"To prevent overuse and exploitation, all prices ideally should incorporate environmental, social, and resource depletion costs. This will provide economic incentives for wise resource use...

This principle demands that natural assets be fully valued to ensure proper use and allocation, and to make certain that the beneficiary of the activity pays the full price including the cost of any environmental damage and resource use."

The Round Table went on to note that:

"Subsidies and incentives that encourage non-sustainable forms of economic activity should also be removed."²¹

Unfortunately the price of electricity in Ontario does not equal its full economic, not to mention its economic and environmental, cost. There are a number of reasons for this state of affairs. First, Ontario Hydro receives large indirect subsidies from the federal and provincial governments. For example, (1) Ontario Hydro is not required to pay federal and provincial corporate income tax; (2) it is not required to pay dividends to its owner, the Government of Ontario; (3) its debt is guaranteed by the Province; (4) the hydro rental rate (the royalty Hydro pays for the use of the province's water to generate power) is set below market value; (5) the Nuclear Liability Act limits Ontario Hydro's liability in the event of a nuclear accident to \$75 million.

If the first three subsidies were eliminated, Hydro's rates would rise by at least \$2.1 billion or 32 per cent.²² If the fourth subsidy were eliminated, Hydro's rates might rise by an additional \$1.3 billion or 20 per cent.²³ Abolition of the fifth subsidy would also raise Hydro's rates.

In short, full cost economic pricing would raise Ontario Hydro's rates by 50% or more. Needless to say, it would not be appropriate to introduce full cost pricing overnight. However, the Government of Ontario could phase in full economic cost pricing for electricity over a 10 to 15 year period by:

1. raising Ontario Hydro's debt guarantee fee;
 2. raising the hydro rental rate;
 3. requiring Ontario Hydro to reduce its debt load;
 4. requiring Ontario Hydro to pay a dividend to the Treasurer of Ontario; and
 5. increasing the buy-back rate for non-utility generation;
- and
6. abolishing the declining block rate structure for residential and commercial electricity customers.

A Carbon Tax

While rising electricity rates will eliminate the need for more nuclear reactors they will not reduce Ontario's carbon dioxide emissions by 20% by 2005. In order to achieve the latter goal the Government of Ontario must introduce a carbon tax or a system of tradeable carbon quotas.

A carbon tax is a fossil fuel tax which is directly related to the fuel's carbon content. Thus if the carbon tax for natural gas is \$1 per gigajoule, then the carbon taxes for oil and coal would be \$1.40 and \$1.95 per gigajoule respectively.

A carbon tax would reduce carbon dioxide emissions in four ways. First, since the carbon tax will raise the price of coal the most, it will encourage the substitution of oil and natural gas for coal. Furthermore, it will encourage the substitution of natural gas for oil. As a result, even if the total level of fossil fuel consumption remained constant the level of carbon dioxide emissions will fall.

Second, by raising the price of all fossil fuels the carbon tax will encourage all individuals and firms to invest in energy efficient

technologies and/or to purchase non-fossil fuels in order to reduce their energy bills.

Third, a carbon tax will have a greater impact on the prices of carbon intensive goods and services (private car and motorboat trips) than on less carbon intensive activities (e.g., using public transit, sailing). As a result, people will reduce their consumption of carbon intensive goods and services and increase their consumption of non-carbon intensive ones. Once again the result will be a decline in carbon dioxide emissions.

Fourth, the carbon tax will increase the price of virgin carbon intensive primary products (e.g., aluminum, steel, pulp and paper). As a consequence, re-cycling activity will be encouraged and carbon dioxide emissions will fall.

Furthermore, by increasing consumer demand for energy efficient products, a carbon tax will stimulate manufacturers to develop and market increasingly energy efficient products. For the manufacturers who are most successful at developing and marketing these products will increase their market share and hence profits. As a result the cost to consumers and firms of reducing their carbon dioxide emissions will decline over time.

In order to achieve a 20% reduction in Ontario's carbon dioxide emissions by 2005 it might be necessary to introduce a carbon tax which would raise the average price of fossil fuels by 100% by 2005. However, the impact of carbon taxes on energy prices would vary widely across consuming sectors (i.e., residential, commercial, industrial and transportation) as well as by fossil fuel type. In general, residential, commercial and transportation prices will rise less than industrial energy prices. This is due to the fact that a relatively high proportion of the former prices consist of taxes (e.g., the federal and provincial gasoline taxes) and/or delivery and administration mark ups. On the other hand, these costs constitute a much smaller proportion of industrial energy costs and hence prices. As a consequence, a carbon tax will have a much larger impact on industrial energy prices. For example, a carbon tax which would raise the average price of fossil fuels by 100% would raise the price of gasoline by approximately 51%. It would raise residential electricity, natural gas and home heating oil prices by approximately 40%, 86% and 86% respectively. On the other hand, it would raise industrial electricity, natural gas, oil and coal prices by approximately 48%, 200%, 310% and 430% respectively.

A carbon tax which would raise the average price of fossil fuels by

100% could be phased in over the next 15 years. Under this scenario the Government of Ontario's carbon tax revenues in 2005 would be approximately \$11 billion. \$11 billion is equivalent to 25% of the Government of Ontario's total budget revenues for 1990.

Conservation Utilities

Finally, in order to ensure that the ONDP's energy policy objectives are achieved at the lowest possible social, political and economic cost it will be necessary to transform Ontario's natural gas utilities into conservation utilities as well as natural gas distribution utilities. However, this will only occur if the Ontario Energy Board (O.E.B.) makes two fundamental changes to its principles of natural gas regulation. First, the O.E.B. must rule that the mandate of Ontario's natural gas utilities is to meet their customers' energy service needs (e.g., space heating, water heating) at the least social (economic and environmental) cost. That is, the O.E.B. must agree that the promotion of energy efficiency and conservation is just as important a part of a natural gas utility's mandate as the sale and distribution of natural gas.

Second, the O.E.B. must make the aggressive promotion of energy conservation and efficiency in the economic self-interest of Ontario's natural gas utilities.

At the present, the short run profits of Ontario's natural gas utilities are directly linked to their natural gas throughput volumes. That is, the more gas they distribute the higher are their profits and vice versa. Thus under the status quo regulatory regime the aggressive promotion of energy efficiency and conservation is never in the short run financial self-interest of our gas utilities if it reduces their throughput volumes.

At its 1989 annual convention the National Association of Utility Regulatory Commissioners (NARUC) passed a resolution with respect to utility least-cost planning. The resolution stated that linking a utility's profits to its throughput volumes frustrates "efforts to provide low-cost energy services for consumers and to protect the environment". NARUC urged its member commissions to establish rate making mechanisms that will ensure that the implementation of cost-effective conservation measures (least cost planning) is a utility's "most profitable course of action".²⁴

The O.E.B. could sever the link between a utility's throughput volumes and its profits by establishing a deferral account. As many of you are no

doubt aware, the National Energy Board has already severed the link between TransCanada PipeLine's throughput volumes and profits by means of deferral accounts. In addition, the O.E.B. should establish a system of financial bonuses for utility executives and/or shareholders that are directly related to their companies success at achieving energy savings for their customers.

In 1991 the O.E.B. will hold a hearing to determine whether Ontario's natural gas utilities should be converted into conservation utilities and if so what should be the rules of the game. Needless to say, I hope that all members of the Canadian natural gas industry will support the transformation of Consumers' Gas, ICG Utilities and Union Gas into conservation utilities as well as natural gas distribution utilities.

Conclusion

In conclusion, I believe that the Ontario NDP's sustainable development goals are in the public interest and achievable. However, these goals can only be realized with the active support and cooperation of Canada's natural gas industry. I hope that you and your colleagues will seize the challenge and help make sustainable development a reality. If you do you will earn the gratitude of your children and all future generations.

Endnotes

1. World Commission on Environment and Development, Our Common Future, (Oxford: Oxford University Press; 1987), p.43.
2. *ibid.*, p. 8.
3. *ibid.*, pp. 169-174.
4. *ibid.*, p. 14.
5. Ontario New Democratic Party, Greening The Party, Greening The Province: Environment, Resources and Energy Policy for the Ontario New Democratic Party (Policy adopted by Provincial Council, June 1990).
6. *ibid.*, p. 6.
7. *ibid.*, p. 5.
8. Ontario Hydro, Statistical Yearbook 1988, p. 15.
9. Ontario Ministry of Energy estimate.
10. Ontario Hydro, Task Force On Greenhouse Effect, Report 678 SP, (November, 1989), p. 8.
11. Jack Gibbons, Electric Heating: Does It Make Sense For Ontario?, (Toronto: Energy Probe; 1981), p. 4.
12. Electricity for space heating is typically produced by coal-fired generating stations. The carbon emissions (millions of tons of carbon per exajoule) of conventional gas, conventional oil, and coal are 13.8, 19.7 and 26.9 respectively. Coal-generating stations have a combustion efficiency of approximately 35% whereas gas furnaces have a combustion efficiency of approximately 63% to 96%. Hence the relative carbon emissions per unit of space heating for electricity and gas are 77 (26.9/.35) and 14 to 22 (13.8/.96 and 13.8/.63) respectively.
13. Letter from Robert Franklin to Glenn Thompson, Deputy Minister of Housing, August 29, 1990.
14. Ontario Hydro, Demand/Supply Plan Report, p. 16-7.
15. Imperial Oil, A Discussion Paper on Potential Global Warming, (March, 1990), p. 23.
16. Ontario Ministry of Energy estimate.
17. Ontario Energy Board, E.B.R.O. 462, Exhibit J2, Tab 1, Schedule 2, p. 3.

18. *ibid.* and telephone conversation with John D. Ryan, Program Manager, Building Equipment Division, Office of Buildings and Community Systems, Conservation and Renewable Energy, U.S. Department of Energy; December 18, 1989.

19. Ontario Energy Board, E.B.R.O. 462, Exhibit R4, Question 4, p. 1; American Council for an Energy Efficient Economy, The Most Energy-Efficient Appliances - 1989-90 Edition, (Washington, D.C.: American Council for an Energy Efficient Economy; 1989), p. 11.

20. Ontario New Democratic Party, Greening The Party, Greening The Province: Environment, Resources and Energy Policy for the Ontario New Democratic Party, (Policy adopted by Provincial Council, June 1990), p.7.

21. Ontario Round Table on Environment and Economy, Challenge Paper, (Queen's Printer for Ontario, 1990), p. 6.

22. If Ontario Hydro was required to earn a rate of return on its assets comparable to that of a similar privately-owned utility, then its rate of return on capital would be greater than that of Consumers' Gas (since Hydro's investment mix and capital structure entails greater shareholder risk exposure than the investment mix and capital structure of Consumers' Gas.) In a decision with respect to rates for Consumers', the Ontario Energy Board awarded Consumers' a pre-tax rate of return on capital of 14.8%. The Board's recommended return on capital for Ontario Hydro for 1990 is \$2.646 billion or 8.3%. If Ontario Hydro's rate of return on capital were equal to that of Consumers' then its return on capital would be \$4.726 billion (\$31.935 billion x 14.8%). That is \$2.08 billion (\$4.726 billion - \$2.646 billion) more than the Ontario Energy Board's recommended return. A \$2.08 billion rise in Ontario Hydro's revenue requirement would raise its rates by 32% (\$2.08 billion/\$6.579 billion) above the Ontario Energy Board's recommended level for 1990. See Ontario Energy Board, E.B.R.O. 452 Decision with Reasons, Schedules 1,2 & 4; and H.R. 18 Report of the Board, pp. 24, 249.

23. Ontario Hydro's water power rental charge for 1990 is \$106 million. However, it has been estimated that the true market value of this charge was \$753 million in 1979. Adjusting for inflation, using the implicit price index for GDP, \$753 million in 1979 is equivalent to \$1.287 billion in 1989. See Ontario Energy Board, H.R. 18 Report of the Board, p. 24; Richard Zucker and Glenn Jenkins, Blue Gold: Hydro-Electric Rents in Canada, (Ottawa: Minister of Supply and Services; 1984), p.32; Statistics Canada Catalogue 13-001.

24. NARUC, 101st Annual Convention, Convention Resolution No. 1, (Adopted November 15, 1989).

