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TABLE RONDE NATIONALE SUR L'ENVIRONNEMENT ET L'ÉCONOMIE

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DISCUSSION PAPER

ELECTRIC UTILITIES AND THE ENVIRONMENT INDUSTRY IN CANADA: FOSTERING NEW PARTNERSHIPS FOR SUSTAINABLE ENERGY DEVELOPMENT

FOR

NATIONAL ROUND TABLE ON THE ENVIRONMENT AND THE ECONOMY

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ELECTRIC UTILITIES AND THE ENVIRONMENT INDUSTRY IN CANADA: FOSTERING NEW PARTNERSHIPS FOR SUSTAINABLE ENERGY DEVELOPMENT

TABLE OF CONTENTS

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CDB:gmc

1.0 INTRODUCTION

1.1 Objective

The objective of this discussion paper is to identify the critical strategic issues currently faced by the Canadian electric utilities and the role that the Round Table can play in stimulating opportunities for the Canadian environmental industries to assist utilities to improve their environmental sustainability.

1.2 Background

1.2.1 The Utilities

The existing major utilities in Canada are either provincial Crown corporations, investor-owned utilities, municipal utilities or industrial generating plants. Of Canada's total electrical generating capacity, public utilities account for 86.6%, private utilities produce 6.8% and industrial producers supply 6.6%.[1] Generally across Canada, the generation and supply of electricity has been a monopoly of the provincial and municipal utilities. Exceptions occur in Alberta, where 3 utilities share the right to provide electricity to the Alberta Interconnected System, and in Nova Scotia, where Nova Scotia Power has been privatized. The majority of the utilities with generating capacity and some of the electric distribution utilities belong to the Canadian Electrical Association (CEA). The CEA, with a core membership of 36 corporate utility companies, represents Canada's electrical utilities who together have assets of $141 billion.

In the mid to late 1980's, independent power production emerged as a potentially less costly, more flexible approach to building and operating new supply. Independent private sector producers sell their power under negotiated contracts to the utility responsible for the wholesale transmission of electricity in their respective province. Many of these producers belong to IPPSO, the Independent Power Producers Society of Ontario. IPPSO comprises over 80 independent power manufacturing companies with the purpose of promoting and developing independent power production in Ontario and Canada. The generation facilities operated by independent power producers are generally of newer and smaller capacity than the utilities belonging to CEA.

The utility sector is currently in an oversupply situation because of new capacity that was brought on line in the late 80's and early 90's; because of competition from lower-priced sources such as gas, and energy efficiency measures on the part of customers. The sector is undergoing major changes as a result of the worldwide move to open competition and privatization. Electricity is changing from being a monopoly to a commodity. Among the many challenges faced by Canadian electric utilities are pressures to reduce environmental impacts and improve

environmental management systems while also reducing capital and operating costs. To compete successfully, they need new ideas, new approaches, new thinking.

1.2.2 The Environment Industry

The Canadian environment industry can be characterized in a number of different ways. One definition includes firms that produce pollution abatement equipment and a range of goods and services for environmental protection, pollution prevention and management. The broad range of services and products can be divided into 3 categories: consulting services; environmental control products and waste management operations.[2] The federal government's Canadian Environment Industry Strategy[3] refers to the industry as 'dynamic, knowledge-intensive, with a vital role to play in enhancing wealth creation and helping Canadians make significant progress towards sustainable development'.

The companies in this sector range from large and well established companies such as Laidlaw to smaller, recently established companies such as Halozone Recycling Inc. While many of the companies included in this sector have been established since the mid 60's, others have emerged more recently. Some have grown rapidly both domestically and internationally, e.g. Zenon Environmental - others are fledgling companies, needing help to commercialize and demonstrate their technologies and to gain access to international markets. Many environmental services are offered by medium or large companies as part of more extensive services, e.g. environmental departments in large consulting engineering companies and in accounting and management consulting firms.

The Canadian Environment Industry Association represents the interests of hundreds of member firms in this industry sector. The Association is a federation of provincial chapters with a national office in Ottawa. The members of the provincial chapters include private sector companies as well as major crown corporations including electric utilities. Individual company member interests are represented through their provincial chapters at the national level.

A recent study by Altech Environmental Consulting[4] comments that the environmental industry is at a critical stage of development. Taken as a whole, the environment industry is viewed as an emerging (sunrise) industry - innovative and entrepreneurial.

2.0 STUDY APPROACH

A literature search was undertaken for information on: the utilities and the critical issues they are facing; reports on their activities in sustainable development and the environment; and partnership initiatives currently underway with companies in the Canadian environment industry and others. Information was also sought on: the Canadian environment industry and the issues it is facing; the volume and nature of work carried out by the industry for the Canadian electric utility sector; examples of the successful introduction of new environmental technologies to electric utilities and barriers to the introduction of new technologies.

Extensive information was found on environmental and sustainable development initiatives underway by the utilities. Little quantitative information was found on the current volume of environmental work or its breakdown by type of service or technology sold by the Canadian environment industry. Some anecdotal information on successful partnerships between individual utilities and environment industry companies was found.

In parallel with the literature search, informal conversations were held with leaders in utilities, environment industry companies, the industry associations and two members of the Task Force on Environmental Technologies. Ideas for issues that could be explored by the Round Table were tested. This report is based on the information found in the literature, anecdotal information, personal experience and discussions with the individuals referred to above. Examples referenced are for purposes of illustration and are not intended to be all-inclusive.

3.0 CURRENT TRENDS

3.1 The Utilities: Towards Sustainable Development

The structure of the electric production sector is moving from the central planning and monopoly model to the decentralized decision-making of the marketplace.[5] The question is how far and how fast. Cambridge Energy Research Associates[5] has identified 6 uncertainties in the U.S. market as follows: 1) open access transmission- will access be defined broadly or narrowly, and how will pricing be determined? 2) restriction on the independent power business - can financing be obtained without fixed-priced power-purchase agreements? 3) air-pollution restrictions - will tighter standards for NO_x emissions and air toxics jeopardize continued operation and repowering of aging power plants? 4) premature nuclear plant closures - will the most costly plants be shut down for economic reasons or will cost cutting succeed? 5) management of risks in long-term natural-gas contracting and 6) a transformation of demand side management programs to be compatible with a competitive market. While these uncertainties are generally

applicable to the Canadian scene, it is likely that change will occur more slowly in Canada than in the U.S.

In the midst of the rapid restructuring underway to meet the challenges of the marketplace, the Canadian utilities continue to face pressures to reduce the environmental impacts of their existing facilities. These pressures include the need to stabilize greenhouse gas emissions, reduce NO_x emissions, manage wastes from coal-fired stations [5], manage impacts of hydroelectric facilities on the natural environment and find solutions for the ultimate disposal of radioactive wastes from nuclear power generation. Utilities have recognized the importance of sound environmental management practises to their business and also recognize that sustainable energy development represents an opportunity to integrate business and environmental considerations. Some utilities view sustainable development as providing a competitive edge to retain their market share and customer loyalty.

Many of the utilities across Canada now publish a public annual environmental report [6,7,8,9,10,11,12,13,14] and have environmental initiatives underway to reduce the environmental impacts of their operations. Ontario Hydro has reduced waste to landfill by finding uses (cement-production and mine backfilling) for over 50% of the flyash generated in coal-fired stations.[11] B.C. Hydro is restoring and enhancing aquatic habitats and fish stocks disrupted by its operations.[7] Both the New Brunswick Power Corporation and Ontario Hydro have recently installed flue gas desulphurization units at one of their coal-fired stations.[10,11] Nova Scotia Power is implementing a new circulating fluidized bed technology which reduces sulphur dioxide emissions by 90%.[14] TransAlta Corporation, through joint venture, is recycling both the wood and preservative oils in used wooden utility poles thus diverting them from landfill.[13]

The member utilities in the Canadian Electrical Association have historically supported extensive research & development programs, including research on environmental effects, controls and sustainable development. They have commissioned studies with universities, environmental companies and have worked in partnership with government, universities, offshore utilities such as Electricite de France and utility associations such as the Canadian Electrical Association and the Electric Power Research Institute in the U.S. In 1994, the CEA spent approximately 25% of its total budget, or $1.54 million on environmental and safety R&D for the electrical utilities.[17] The restructuring occurring in electric utilities and the Canadian Electrical Association, as well as the government, will impact R&D funding, highlighting the need for prioritization, focus and strategic planning of R&D.[18]

Recognizing the imperative to reduce costs while making environmental improvements, the utilities are gradually making the transition from controlling and mitigating environmental impacts to pollution prevention. Many utilities have instituted renewable and advanced energy programs.

They are improving operating and procurement procedures. These initiatives contribute to reductions in emissions to the environment and reduce or eliminate the need for costly end-of-pipe control technologies.[7,8,9,11,12,13] For example, Hydro-Quebec[9] is commissioning 4 wind-power projects, SaskPower[12] is pursuing initiatives in wind generation and B.C. Hydro[7] is investigating advanced technologies such as fuel cells and advanced combustion turbines. Ontario Hydro has instituted a renewable energy program with a commitment to acquire at least 100 MW of renewable energy projects by the year 2000. Many of the utilities support the federal National Voluntary Challenge and Registry on Climate Change and The Accelerated Reduction/Elimination of Toxics programs.

Those utilities that operate transmission and distribution networks have instituted demand side management (DSM) programs as a less costly alternative to the building and/or purchasing of new generation and transmission capacity[1]. DSM programs enlist the customer's cooperation to shape demand. By reducing or shifting peak demand, DSM programs can avoid or delay the building of new capacity.[1] Utility programs may include: consumer information, e.g. literature and public awareness campaigns; rate incentives for users, e.g. interruptible and time-of-use rates; and financial incentives, e.g. rebates for energy-efficient products, incentives for fuel-switching; and direct installation of products such as weatherstripping windows and doors and insulation.

In addition to partnerships on research and development, there are several partnership projects underway involving the utility sector. These partnerships are targeted at: reducing costs and environmental impacts; assisting developing countries to develop their electricity systems in a manner compatible with sustainable development; and improving export opportunities. Examples of these partnerships are given in the next few paragraphs.

Domestically the Canadian Electrical Association is coordinating an initiative among utilities and wire and cable suppliers to standardize from over two hundred reel sizes down to about 20. This would allow utilities to bulk buy, resulting in reduced unit costs. It also would facilitate the return and recycling of reels.[15] The Canadian Electrical Association and some individual utilities are also exploring the establishment of pilot projects involving emissions reduction trading to address greenhouse gas and NO_x emissions.

In 1993, in recognition of both the importance of the utility industry on the economy and the dramatic changes this sector is undergoing, a 'Round Table on Electricity' was formed. The mission of the Round Table is to create a unique forum for Chief Executives representative of Canada's Electrical Industry to provide input to Government Ministers on the major policy issues affecting the industry. The electric power sector includes the utilities as well as its major electrical suppliers. Membership in the Round Table currently includes several utilities,

consulting companies, heavy equipment suppliers, e.g. Asea Brown Boveri, Westinghouse Canada Inc., alternate energy suppliers, e.g. Ballard Power Systems, and federal government representatives from Export Development Corporation, Industry Canada, NRCAN and Foreign Affairs and International Trade. The Round Table consists of a Steering Committee as well as working groups on Technology, Export and Competitiveness. The Round Table on Electricity has been focusing on maximizing opportunities for growth in the Canadian market and achieving effective leveraging of the collective strength in export markets. The Technology working group has undertaken a study of the financing of the commercialization of research and development in the power sector and is preparing a discussion paper for discussion by its members.

In 1992, the chairmen of seven of the world's leading electric utilities jointly formed an international group - the E7 - to cooperate on global issues. Their goal is to "play an active role in protecting the global environment and in promoting efficient generation and use of electricity". Two of the seven founding utilities are Canadian: Hydro Quebec and Ontario Hydro. The group acts as an advisory group on electricity, energy and environmental issues to international institutions and governments in developing and Eastern European countries. Their experience and expertise are provided free of charge. Examples of projects include: the provision of environmental technical assistance for the NPTC (India) power utility and the development of solar photovoltaic systems for Indonesia to demonstrate the potential for large-scale renewable energy projects in remote areas.

Some of the utilities maintain extensive inhouse capability to provide their needed environmental services and environmental technology development. Others maintain a smaller core of environmental personnel and purchase most services and technologies externally. Hydro Quebec, Ontario Hydro and B.C. Hydro have inhouse technology development capabilities. Many of the utilities are seeking to increase revenues by marketing their expertise externally. Hydro Quebec, Ontario Hydro and B.C. Hydro all offer international consulting services. Transalta also sells electricity systems internationally. Saskpower Commercial has been incorporated to market Saskpower's expertise to national and international markets. Frequently the services sold internationally by the utilities include Canadian partners. For example, Ontario Hydro International proposed to design and build a landfill gas/fossil-fired combined cycle generating station in the Philippines. A Canadian, as well as a Philippines-based firm, were included as part of the team.[11]

The utilities face unique challenges when trying to commercialize their own technologies or when investing in technologies developed by others. These challenges result from the need to adapt decision-making processes, developed for investments in large capital-intensive projects such as centralized generating stations, to smaller ventures that have a very short window of opportunity. Labour relation issues also need to be addressed in the case of unionized utilities

that may wish to spinoff ventures based on inhouse technological developments. Utility customers and private sector technology developers have also expressed concerns about commercialization ventures being subsidized by ratepayers.

3.2 The Environment Industry: In Transition

In 1993, under its Green Plan Environmental Technology Transfer Program, Environment Canada established three technology centres across Canada. The centres have been established in partnership with provincial and municipal governments, the environment industry associations, and others. They are available to assist small and medium sized enterprises deliver environmental technologies to markets. They facilitate the successful execution, financing and marketing of environmental technologies in the latter stages of product development.

The utility sector has historically utilized environmental goods and services extensively and utilities currently purchase substantial amounts of environmental goods and services from the environment industry. Examples include design and construction services, monitoring and control equipment, and environmental and socioeconomic studies and assessments. Neither the total volume of environmental business in the utility sector in Canada nor the fraction provided by the Canadian sector are known. Notwithstanding the lack of available information, the size of the market for environmental services in the utility sector has been substantial. Ontario Hydro reported spending of $448 million on the environment in 1993.[11] B.C. Hydro reported environmental expenditures of $41 million in 1994.[7] A substantial portion of this would have been spent inhouse on research and development, operation, maintenance and administration. Nevertheless a significant portion would have been spent externally on studies, design and capital items.

There is no readily available quantitative information on the extent of new environmental technologies, Canadian or otherwise, adopted by the utility sector. Yet there are many examples. Ontario Hydro utilized a new dredge system (the Cable Arm Environmental Clamshell) to successfully dredge near the cooling water intake without any adverse effect on water quality or reactor safety at Pickering B Generating Station and realized $5 million savings from its use.[11] B.C. Hydro used an innovative screen design by an individual from Portland, Oregon to allow more than 99% survival of migrating juvenile salmon and steelhead as they pass the Puntledge River hydroelectric generating station.[7] Edmonton Power is utilizing creative new technology to capture emissions of waste landfill methane to convert to a useful fuel for use in its generating station.[8]

While several examples can be found of utilities buying new and emerging environmental technologies, the traditional barriers to adoption of new technologies as identified by Ernst & Young in 1990[16] remain. These barriers include: users that are reluctant to try a commercially

unproven technology; resistance by engineering firms to specify technologies with which they are unfamiliar; foreign competition from suppliers who have developed new technologies to serve their own domestic markets; alternate technologies that alter processes rather than end-of-pipe control technologies; and lack of financing. In addition to these barriers, utilities are less than eager to pilot technologies which have not been developed in consultation with them. These technologies may add costs without addressing a specific need of the utility. Some independent technology entrepreneurs add to the barriers by expecting utilities to fund or subsidize the demonstration of the technology.

As industry in general, including the utility sector, makes progress towards sustainable development and begins to truly integrate environment and business decisions, the environmental services and technologies needed will change from traditional pollution control and remediation to fundamental process changes. This is evidenced in the utility sector in the move towards energy efficiency and renewable and advanced energy technologies. A need for pollution control and remediation will remain to deal with existing facilities and with cleanups - but the power systems of the future will require fewer of these services. The moves to DSM and the reduction large generating and transmission projects across Canada will also affect the nature and volume of work for firms offering environmental goods and services.

The moves toward voluntary and market-based approaches to meeting environmental objectives will also influence the goods and services needed by industry and government. These approaches will require substantial monitoring, recordkeeping, reporting, auditing and economic support. The environment industry companies will have to be sensitive to the changing needs of its marketplace to survive.

As environmental considerations become better integrated into process economics and market-based-decisions, the lines delineating this industry from others will blur. Is a company that develops and manufactures energy efficient lighting products considered to belong to the environment industry? Is a supplier of solar energy systems considered to be in the energy sector or the environment sector?

3.3 Regulatory Trends

Regulators are currently being pressured to reduce the costs of administering and enforcing environmental regulations and to reduce the costs to society of meeting environmental objectives. Performance-based standards are being advocated, as well as voluntary and market-based approaches as an alternate to regulation. In the utility sector, lengthy and costly environmental approval processes are not uncommon. Overlapping provincial and federal environmental requirements and approvals are a source of frustration.

Government has been addressing these issues by moving to harmonize regulations between jurisdictions, by trying to streamline approval processes and by studying economic approaches such as emissions reduction trading and pollution taxes. Pollution prevention programs and voluntary programs such as ARET have been introduced.

Many industries support these voluntary approaches, seeing the opportunity to meet environmental objectives at lower cost than the costs to comply with traditional 'command and control' regulations. Other industries view the costs of voluntary approaches as being difficult to pass on to the consumer. Many environmentalists are suspicious of voluntary approaches as potentially being less stringent than regulation. The environment industry sector is split on this issue. Some environment industries support initiatives that are seen as helping reduce costs and increase competitiveness of their customers. Other environmental companies see lost business in the absence or moderating of strict environmental regulations that are based on specific control and cleanup technologies.

4.0 ISSUES AND CHALLENGES

4.1 "The combined effect of a decreasing rate of growth in the North American demand for electricity and increasing competition resulting from deregulation is a much reduced need for 'big power' facilities, which utilities have been accustomed to operating and suppliers have been accustomed to building. A correspondingly greater need for advanced technologies of transmission and distribution control has emerged. The reduction in demand for 'big power' facilities has also tended to create opportunities for emerging generation technologies to provide increased flexibility through distributed generation systems and to meet an increasing demand for 'green' power."[18]

4.2 At the same time as the changes from 'big power' to 'green power' and 'smart grids' are creating needs to address new technological problems on both the supply and user end, the restructuring underway in the utility sector and government is jeopardizing the level of funding historically available for R&D in this sector.

4.3 Initiatives on the part of the utilities to sell inhouse environmental services externally and to develop and commercialize environmental technologies developed inhouse can be viewed as opportunities for partnerships with the environment industries and/or as competing with environmental technologies and services that could be offered by private sector environmental companies, both domestically and internationally.

4.4 The environment industry sector will have to reorient itself to serve changes in the size and nature of markets as utilities move towards pollution prevention, demand side management and 'green power', and as regulatory requirements move from traditional 'command and control' to voluntary and market-based approaches. The distinction between the environmental industry and other sectors is blurring as pollution prevention measures involve fundamental changes to all aspects of industrial processes.

4.5 The utilities face substantial challenges to manage the environmental effects of operation of their existing facilities, including, for example, greenhouse gas and NO_x emissions, byproducts from coal-fired and nuclear generation, as well as the effects of large hydroelectric developments on the social and natural environments.

4.6 Little quantitative information has been documented on the volume and types of services and technologies currently being supplied by Canadian environment industry firms to Canadian utilities. No documented forecasts on future services and technologies have been found.

4.7 Both utilities and environmental firms are attempting to develop and commercialize environmental technologies. The public sector utilities face difficulties as a result of their bureaucratic decision-making processes, concerns expressed by ratepayers about subsidizing such ventures in noncore business areas and labour relations issues associated with spinning off ventures. The environmental firms face difficulties in accessing capital and markets and finding locations to demonstrate their technologies.

5.0 ROUND TABLE OPPORTUNITIES

Based on the issues and challenges identified above, the Round Table could undertake a number of different initiatives to stimulate the formation of partnerships between environment industry firms and electric utilities. The Round Table could also commission studies to fill identified gaps in knowledge. Some potential initiatives are discussed below and some of the stakeholders are identified.

Option 1 - Privatization/Outsourcing of Environmental Services

As utilities trim costs there may be opportunities for environment industry firms to provide environmental services currently performed inhouse. For example, environmental monitoring networks around generating stations could be operated by the private sector, if lower costs and acceptable quality resulted. These environmental monitoring services could be extended to

incorporate networks operated by various levels of government. There may also be opportunities to consolidate utility and regulatory monitoring networks.

The unbundling or outsourcing of noncore utility activities is a controversial issue which will have to be faced as electricity becomes more of a commodity. Issues of labour relations and public acceptability would have to be addressed. The challenge for the Round Table would be to stimulate the development of win/win opportunities from this controversial issue. A potential benefit from the establishment of public/private sector partnerships to provide environmental monitoring and other services domestically would be the establishment of a base to market similar services internationally.

Stakeholders and potential partners in the development of such public/private sector partnerships would include environment industry firms, utilities and regulators, utility customers, labour and NGO's. The centres of environmental technology advancement and the industry associations could assist with the development of consortia. The Round Table could assemble the stakeholders to develop guidelines for private sector operation and reporting of monitoring activities.

While this initiative could result in savings to taxpayers and ratepayers, environmental improvements would not immediately be apparent. Economic gains would accrue to the environmental firms. If this service were marketed internationally, economic benefits, as well as an improvement in understanding of environmental quality issues in developing countries, could result.

Option 2 - Partnerships for Commercialization of Technologies

Both the utilities and environmental firms are interested in commercializing technologies. Each sector faces difficulties in commercialization for different reasons. There may be some opportunities to overcome some of these difficulties through partnerships between firms in the two sectors. For example, in return for providing an opportunity to demonstrate a new technology, could the utility acquire an equity interest in the company with the technology? Could the international marketing arm of the utility then market this technology internationally?

Examples of successful utility/environment industry partnerships could be researched and the factors contributing to their success analyzed. The Round Table could explore the issues that would need to be addressed, develop generic approaches that would be acceptable to ratepayers, utilities, labour, government and environmental firms. Development of some model or pilot partnerships could be encouraged.

In addition to the environment industry firms and utilities, participants in the development of partnerships to commercialize and market environmental technologies could include representatives from financial institutions and the environmental technology transfer centres, as well as venture capital and investment fund representatives.

Successful partnerships resulting from this initiative could deliver significant environmental and economic benefits. The magnitude of the benefits would depend on both the degree to which the new technology could improve the environment and on the success in the marketplace.

Option 3 - Short term needs of utility sector in sustainable development

The Round Table could address the changes anticipated in the volume and nature of environmental technologies and services needed by the utility sector over the next 3 to 5 years. Stakeholders could include: CEA members, independent power producers, the utility sector's traditional suppliers, environment industry firms, utility customers, government, NGO's and labour.

Environment industry firms would be given an opportunity to describe the technologies they are developing. Perspectives of the issues in environment and sustainable development faced by the utilities could be provided by NGO's, regulators, labour, academics and other stakeholders. Such an interchange of ideas would help the environment industry understand its targeted customer needs and help the utilities learn about emerging issues in sustainable development and environmental goods and services under development. The formation of partnerships to address the identified needs could result from such an initiative.

Significant environmental and economic benefits could result from successful partnerships to address the utility needs. The utilities would benefit from the new goods and services to meet their needs, the environment industry firms would benefit from improved sales and the environment would benefit from the successful commercialization of these new goods and services.

Option 4 - Define and Develop More Sustainable Energy Technologies

To prevent further deterioration of environmental quality while supplying energy to an increasingly industrialized and growing world population presents a daunting challenge. The Round Table could address the leaps in technology needed to supply clean power to generations 20 years from now and beyond. Participants in such an initiative could include international experts, academics, research organizations, regulators, environment industries, international funding agencies, utilities, customers and NGO's.

This initiative could result in significant environmental and economic benefits to Canada and the world in the long term. The Round Table and Canada could gain significant international recognition for such an initiative. A long term 'Canadian' multisectoral plan to develop the energy technologies of the future would be one possible outcome.

Option 5 - A Pilot Project in Joint Implementation and/or Emissions Reduction Trading

The use of emissions reduction trading and/or emission credits for transfer of technologies that result in improved energy efficiencies and environmental performance in the developing world have been under discussion since the 1980's. Many studies have been carried out identifying the potential cost and environmental effectiveness of these measures. Several organizations and associations, including the (North American) Commission on Environment Cooperation, the Canadian Electrical Association and individual utilities are actively working on developing pilot projects to test their practicality.

The Round Table could provide a credible and neutral forum for articulating and addressing the issues, and creating a plan for a pilot project. Stakeholders would include utilities, regulators, developers of emerging environmental technologies, developing country representatives, international funding agencies, NGO's, the Commission on Environment Cooperation and others. One key element of the plan might involve the transfer of a new Canadian environmental technology to a developing country with help from a utility in return for emission credits.

Another possibility would be to develop a binational pilot project on NO_x emissions reduction trading between southeastern Canada and the Northeast U.S.

Emissions reduction trading would be of greater immediate benefit to the utilities than to the environment industry. If a pilot project were considered feasible, the challenge for the Round Table would be to foster partnerships by ensuring utilities incorporate Canadian environmental technologies when trading for emissions credits. Perhaps Option 2 could be considered in conjunction with Option 5 as a suitable proposal benefitting both utilities and environment industry.

The establishment of a successful pilot project in emissions reduction trading or credits could result in significant environmental and economic benefits in the medium to long term.

Option 6 - Fill in Information Gaps

The Round Table could commission and publish studies to address gaps in information on the volume and nature of Canadian environmental technologies and services purchased by the Canadian utility sector.

This initiative would improve the knowledge base. No direct environmental or economic benefits would necessarily ensue. The information could be obtained by other agencies without Round Table involvement.

Option 7 - Will Open Access and Privatization Affect the Environment?
The Round Table could host a conference or workshop on the environmental implications of allowing open access to transmission systems and on privatization of the Canadian utilities.

This initiative would improve the understanding of this issue, but would not necessarily result in any easily measurable environmental or economic benefits.

6.0 "ROUND TABLE" PROCESSES

Depending on the option or options selected for further elaboration, different stakeholder formats would be appropriate. Alternative approaches that might be considered include:

- 'invitation only' workshops with opening and closing plenary sessions and breakout groups to identify specific issues and report back to closing plenary. Careful advance preparation would be required to select participants, identify topics for breakout sessions and anticipate potential outcomes. Breakout groups would be facilitated, with rapporteurs identified to report back to the main group.

- 'Gordon' style conferences
  Gordon Conferences[19] were initiated by Dr. Neil E. Gordon in the 1920's. Small groups of highly qualified participants are formed as a means of establishing good, direct communication. The conferences are held in secluded locations away from distractions of daily work and large scientific meetings. Conference guidelines emphasize that sessions are to be informal, off-the-record and open to all conference registrants. Meetings are held in the morning and evening, with afternoons available for small, informal discussion groups or recreation. Conferences are advertised. Applications to participate are received and carefully selected to assemble a scientifically excellent and diverse group. Potential outcomes depend on the right chemistry to occur among the participants and are less predictable than more structured workshops and conferences.

- Open conferences
  The Round Table could sponsor a widely advertised conference with a planned program with invited speakers. Again, issues for parallel sessions could be identified, with rapporteurs to provide conclusions. Conferences could be cosponsored by major stakeholders such as the

Canadian Electrical Association, Round Table on Electricity, the Canadian Environment Association and the Centres for Technology Advancement.

- Round Tables
  A small number of selected leaders could meet over a protracted period such as months or years to develop ideas and working papers on an issue (similar to the process used to develop the discussion paper on sustainable forestry practises).[20]

7.0 NEXT STEPS

The Round Table's choice of option depends on the members' priorities. Important progress could be made by proceeding with any of the seven options identified. To assist the Round Table in selecting options a matrix of decision criteria has been developed and a qualitative and arbitrary assessment of each option is shown in Table 1. The first three columns in Table 1, Potential Environmental Benefit, Potential Economic Benefit and Value Added by Round Table Involvement were considered to be the most important factors for choosing the best option. The Results column is also an important indicator of the time frame in which environmental and economic benefits might be realized.

Each Option was also judged on whether ongoing Round Table involvement would likely be needed, how much profile and international recognition the Round Table might receive and how controversial the Option might be.

The Round Table could make a significant contribution by selecting Option 4 - long term needs. However, environmental and economic benefits would only be realized in the long term. Selection of Option 5 - Pilot Project in emissions reduction trading could help make progress in the relatively short term on an issue that has been the subject of considerable debate. Concentrating on the factors of value added by Round Table involvement, potential environmental and economic benefit would eliminate Options 6 and 7 from further consideration.

Options 4 and 5 have 'high' ratings in the 3 most important categories; Option 3 has 2 'highs' and 1 'medium'. On this basis, Options 3, 4 and 5 would appear to offer the best suggestions for fostering new partnerships between electric utilities and the environment industry in Canada. In informal discussions with members of some utilities, Options 3, 4 and 5 attracted the most interest.

The next step would be to have Round Table Task Force members review the suggested options, decision matrix and preliminary ratings. Discussion of these options could lead to

additional suggestions and/or consolidation of ideas. Using a decision matrix revised to reflect the Round Table member values, the number of options should then be narrowed down to about three.

A small number (6-10) of key stakeholders could then be invited for an informal discussion of the selected options and of the process to be used to address them. Some preliminary thoughts on process are that Option 4, Sustainable Energy Technologies for the Long Term, is well suited to a Gordon style conference; Option 5, A Pilot Joint Implementation Scheme, could be addressed in a workshop of invited participants; and a widely advertised conference with some invited papers and rapporteurs to sum up each session would suit discussion of Option 3, Short Term Needs.

Table 1: Decision Matrix for Rating Options

Option	Potential Environmental Benefit	Potential Economic Benefit	Value Added by Round Table Involvement	Results	Time Commitment from Round Table	Round Table Profile	Degree of Controversy	Potential for International Recognition
1	Low	Medium	High	Medium Term	Medium	High	High	Low - Medium
2	Medium	High	Medium	Short - Medium Term	Low	Medium	Medium	Low
3	Medium	High	High	Short Term	Low	Low	Low	Low
4	High	High	High	Long Term	Medium	Medium	Low	Medium - High
5	High	High	High	Short, Medium, Long Term	Medium	High	Medium	High
6	Low	Low	Low	Short Term	Low	Low	Low	Low
7	Unknown	Unknown	Medium	Short Term	Low	Medium - High	Medium	Medium

Option 1: Privatization/outsourcing of environmental services
Option 2: Partnerships for commercialization of technologies
Option 3: Short Term Needs of Utility Sector in Sustainable Development
Option 4: Define and develop more sustainable energy technologies
Option 5: A pilot project in joint implementation and/or emissions reduction trading
Option 6: Fill in information gaps
Option 7: Will open access and privatization affect the environment?

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