Sustainable Development: Its Implications for Energy Policy in Canada

by

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0. Introduction*

In recent years, international and Canadian policy-makers have recognized the need to rethink how economic growth can be reconciled with the need to protect the environment and conserve natural resources. While the history of efforts to reconcile these apparently conflicting goals is a long one, the most recent attempt is encompassed under the rubric of "sustainable development", particularly as enunciated by the World Commission on Environment and Development (the Brundtland Commission). Since the concept of sustainable development has gained a degree of, at least rhetorically, political acceptance, considerable efforts are now being devoted to attempting to discover what it means and what its implications are for various sectors of society. The first major effort to analyse its implications for Canada's energy sector was the work of the Energy Options Advisory Committee (the Kierans Committee).

The purpose of this paper is to analyse the Brundtland and the Kierans concepts of sustainable development and their implications for Canadian energy policy.

The paper is divided into the following sections. The first section will briefly trace the history of sustainable development thought. The second and third sections will explore the generic implications of Brundtland's and Kierans' concepts of sustainable

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* We are indebted to Anne Powell for her constructive comments and criticism. Nevertheless, all opinions and remaining errors of fact are the authors responsibility.

development respectively. The fourth section will analyse the implications of their concepts of sustainable development for the objectives of Canadian energy policy. Their proposed ways and means of achieving their energy policy objectives will be discussed in the fifth section. The sixth section will use Ontario Hydro as a case study to examine the implications of Kierans' concept of sustainable development for Canada's publicly-owned electric utilities. The seventh section contains the conclusions of the paper.

The paper's general thesis is that the Brundtland Commission's concept of sustainable development is much broader and more radical than that of the Kierans Committee. However, even the Kierans Committee's concept of sustainable development would require major reforms for our publicly-owned electric utilities, such as Ontario Hydro.

1. History of Sustainable Development Thought

Sustainable development is a concept that links the goals of human development and environmental quality. The concept arose from the widespread recognition that current development patterns could not be continued into the future because of their increasingly significant environmental repercussions. The concept recognizes that development and environment are not in conflict but are mutually reinforcing. This part reviews the evolution of the concept and describes its major elements.

1.1. Early Notions of Sustainability

In its most rudimentary form, the notion of sustainability is not new. The concept of a sustainable economy was proposed by John Stuart Mill in his 1857 work, Principles of Political Economy[1] and Thomas Malthus predicted widespread shortages of food and other resources if population growth was left unchecked. The biological sciences have employed such terms for decades (for example, the use of the terms steady state and homeostasis).

The 1972 "Blueprint for Survival" published in the Ecologist noted that "The principal defect of the industrial way of life, with its ethos of expansion is that it is not sustainable..."[2]. The concept also appeared in various books and papers[3]. The 1972 Declaration on the Human Environment (Stockholm Declaration), suggested a balance had to be struck between "economic development" and "environmental protection" through pollution control strategies and mitigation of the obvious adverse impacts of resource exploitation practices. The consequence of this approach, however, was that environmental concerns were treated as "add-on" considerations once development decisions were made.

Following the Stockholm Conference, the United Nations Environment Programme (UNEP), non-governmental organizations, and academics made some gains in furthering the concept. These early efforts treated the concept expansively and laid the foundation for a broad ethical or philosophical approach which drew together ecological, economic, political, social and cultural components into a coherent, although fairly vague, framework of thought.

Sustainable development suggested more than a "balancing" of economic and environmental goals. It recognized that the goals are ultimately not in conflict, but that long-term economic and social development depends on environmental quality. It also demanded practices that marry the two goals into ecologically sound development practices.

UNEP's "ecodevelopment" concept is a good example of the attempts to articulate a coherent development framework that went beyond just "balancing" supposedly conflicting social, economic, and environmental goals. One of the central themes of ecodevelopment was equity: a recognition of the need for a more equitable distribution of wealth on a global basis. This theme is evidenced in a number of documents by UNEP, the findings of the Report of the Independent Commission on International Development Issues, North-South: A Program for Survival (the Brandt Commission), statements in the context of the New International Economic Order, the United Nations' International Development Strategy for the Third Development Decade, among many other documents, declarations and pronouncements. Another theme was equity between generations. As expressed in a 1978 document, sustainable development means that "the needs of present and future generations must be reconciled."[4]

1.2 The New Synthesis

By the 1980s, therefore, the general principles relating to a new development framework were emerging. This framework was

supplemented by such initiatives as UNEP's sponsored World Conservation Strategy[5], the World Charter for Nature, and other international instruments, which continued to link the interdependence of humans and their environment and the fragility of that relationship. The aim of World Conservation Strategy (WCS), for example, is to advance international and national strategies for the conservation of living resources. According to the Strategy, sustainable development can only be achieved by

> (1) maintaining essential ecological processes and life-support systems;
>
> (2) preserving genetic diversity; and
>
> (3) ensuring sustainable utilization of species and ecosystems.

The emerging development framework was, therefore, a synthesis of many, heretofore assumed disparate, principles requiring a fundamental re-thinking of various social, economic, political and ecological values and priorities. The establishment and work of the United Nations's World Commission on Environment and Development represented an attempt to flesh out and propose ways to achieve this new vision for development. The result, in its report Our Common Future, was not the invention of the sustainable development concept, but a synthesis and renewal of it. Since then, governments and individuals have been attempting to grasp its full implications.

2. Brundtland's Concept of Sustainable Development

The World Commission on Environment and Development's 1987 report, Our Common Future, (the Brundtland Report) defines sustainable development as follows:

> "Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs."[6]

For the purposes of this paper, this concept of sustainable development has at least four important implications.

First, it is a rejection of the maximization of the production of market-traded goods and services or Gross National Product (GNP) as the single goal of human activity. According to the Brundtland Report economic growth is necessary but it is only legitimate if it is subservient to immediate and long-term human needs. Thus a rise in GNP is not desirable if it increases inequality, if it reduces sustainability, or if it conflicts with our enjoyment of life. The Report states:

> "Sustainable development involves more than growth. It requires a change in the content of growth, to make it less material- and energy-intensive and more equitable in its impact. These changes are required in all countries as part of a package of measures to maintain the stock of ecological capital, to improve the distribution of income, and to reduce the degree of vulnerability to economic crises...
>
> Income distribution is one aspect of the quality of growth,...rapid growth combined with deteriorating income distribution may be worse than slower growth combined with redistribution in favour of the poor...
>
> Sustainability requires views of human needs and well-being that incorporate such non-economic variables as education and health enjoyed for their own sake, clean air and water, and the protection of natural beauty."[7]

Second, development must be directed toward meeting the essential needs of all the world's people. This cannot be accomplished unless there is greater equity in access to resources and in the distribution of costs and benefits between rich and poor and between men and women. Thus, "Development involves a progressive transformation of economy and society."[8]

Third, sustainable development means that we must give greater priority to the needs of future generations:

> "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."[9]

Fourth, sustainable development requires that our decision-making processes must become more democratic. Increased effective participation in the decision making-process will, according to the Brundtland Report, lead to decisions that are more compatible with sustainable development:

> "An industry may get away with unacceptable levels of air and water pollution because the people who bear the brunt of it are poor and unable to complain effectively."[10]

In addition, increased citizen participation will help gather political support for sustainable development policies:

> "Making the difficult choices involved in achieving sustainable development will depend on the widespread support and involvement of an informed public and non-governmental organizations, the scientific community, and industry. Their rights, roles, and participation in development planning, decision making, and project implementation should be expanded."[11]

Brundtland's definition of sustainable development is a moral imperative from which the above implications flow. Moreover, in addition to a concern for global and inter-generational equity, a fundamental tenet of sustainable development thought is the belief that there are ecological limits to growth. The Brundtland Report shares this concern:

> "Growth has no set limits in terms of population or resource use beyond which lies ecological disaster. Different limits hold for the use of energy, materials, water, and land. Many of these will manifest themselves in the form of rising costs and diminishing returns, rather than in the form of any sudden loss of a resource base... But ultimate limits there are, and sustainability requires that long before these are reached, the world must ensure equitable access to the constrained resource and reorient technological efforts to relieve the pressure."[12]

3. Kierans' Concept of Sustainable Economic Development

From the perspective of Canadian energy policy, a second important interpretation of sustainable development is the one provided by the Energy Options Advisory Committee. The Advisory Committee was established in 1987 by the federal Minister of Energy, Mines and Resources, the Hon. Marcel Masse, to "review and

assess Canada's energy prospects and options into the twenty-first century."[13] The vast majority of the Committee's members were business persons from the energy sector and the Committee's chairman was Tom Kierans, an investment banker. The Energy Options Advisory Committee's Report, Energy and Canadians: Into the 21st Century (the Kierans Report or Kierans) was published in 1988. It has been tabled in the House of Commons and is awaiting detailed consideration by a committee.

According to the Energy Options Report, the operative concept is "sustainable economic development" which is the obligation to manage:

> "all of our existing resources to enhance Canada's options, thereby favouring future generations with the capital, educated labour force, technology, environment and resource base that will generate the potential for per capita economic prosperity at least as great as that enjoyed today."[14]

Thus, the Kierans Report's view of sustainable economic development recognizes that the environment, like labour, technology and capital, is an important factor in the production of economic goods and services. It also notes that, in addition to being an important factor of production, the quality of the environment has intrinsic importance for our quality of life or living standards broadly defined. The Report states that:

> "future Canadians should have a quality of life, environment and economic well-being equal or superior to what is currently enjoyed."[15]

In other words, the definition of sustainable economic development in the Kierans Report explicitly acknowledges that our

level of well-being is a function of the quality of our environment as well as our standard of living. The Kierans Report also states the belief that sustainable economic development can be achieved:

> "within the context of a market-oriented economy by elevating environmental objectives to the same status as such goals as growth in per capita income and distributional equity."[16]

Despite the above statements of principle with respect to the equality of environmental and economic objectives, the spirit of the Kierans Report is that the goal of Canadian economic policy should be to pursue economic growth subject to certain environmental and other constraints:

> "It [sustainable economic development] means development, but not at any cost: development that does not poison the atmosphere, destroy the environment, deal arbitrarily with people, or waste resources, thereby precluding future generations from realizing economic opportunities similar or superior to those enjoyed today." [17]

Thus Kierans' concept of sustainable economic development is a refinement of our post-war status quo economic policy, namely, that the nation should maximize its per capita GNP subject to a number of constraints - reasonable price stability, a low level of unemployment and an equitable distribution of income. Kierans, therefore, has just added one more constraint: acceptable environmental impact.

In short, the fundamental difference between Brundtland's and Kierans' concepts of sustainable development is that the former's goal is to meet global human needs whereas the latter's is to

perpetutate Canada's economic prosperity subject to certain environmental and other constraints.

4. The Implications of Sustainable Development for the Objective of Canadian Energy Policy

Having reviewed the different interpretations of sustainable development found in the Brundtland and Kierans Reports, the next question is: what are the implications of those interpretations for the objectives of Canadian energy policy.

4.1 The Brundtland Report

According to the Brundtland analysis, there are a number of fundamental problems with respect to the level and distribution of global energy consumption. First, the present level of energy consumption is ecologically unsustainable. For example, the carbon emissions that result from fossil fuel combustion are causing the global warming of the planet, known as the "greenhouse effect". This problem is especially serious since there is no technology available at this time that can reduce carbon dioxide emissions. The sulphur dioxide and nitrogen oxide by-products of fossil fuel combustion contribute to acid rain and smog. In addition with the above emissions, the carbon monoxide and particulate by-products of fossil fuel combustion are responsible for toxic air pollution.* The Brundtland Report also reveals serious concerns about the use

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* "Between 1950 and 1979, fossil fuel use worldwide quadrupled." Lester Brown, State of the World: 1980 (New York: W.W. Norton and Co.; 1988), p.11.

of nuclear power to generate electricity. These concerns relate to the release of radiation as a result of a nuclear accident; the long-term storage of nuclear wastes; and the relationship between nuclear power, nuclear terrorism, and the production of nuclear bombs. The Brundtland Report states that:

> "the generation of nuclear power is only justifiable if there are solid solutions to the unsolved problems to which it gives rise. The highest priority should be accorded to research and development on environmentally sound and ecologically viable alternatives, as well as on means of increasing the safety of nuclear energy."[18]

The second fundamental problem with the pattern of global energy consumption, according to the Brundtland Report, is that it is grossly inequitable. The developed nations are consuming more than their fair share of the world's energy resources. As Brundtland notes, per capita energy consumption in Western industrialized nations is more than 80 times greater than in sub-Saharan Africa.[19]

The above facts combined with the principles of ecological sustainability and an overriding commitment to the "essential needs of the world's poor" lead to the Brundtland Commission's conclusion that the developed nations must substantially reduce their consumption of non-renewable energy. According to the Brundtland Report, a significant reduction in non-renewable energy consumption by the developed world could permit the developing nations to increase their energy consumption and living standards in a context that is globally sustainable.[20]

The Brundtland Report does not specifically address the

issue of the appropriate level of non-renewable energy exports by industrialized nations such as Canada. But its conclusion that developed nations must reduce their energy consumption in order to allow developing countries to increase their energy consumption in a context that is globally sustainable does have implications for Canadian energy exports.

If the developed nations that import energy from Canada reduce their energy consumption in response to the Brundtland Report, then presumably Canada's energy exports to them will decline. But if they do not reduce their energy consumption sufficiently, does Canada have an obligation to reduce its energy exports to them? One could argue that Canada does, since the importing countries' high level of energy consumption will, at least in part, be due to Canada's relatively low cost energy exports (which reduces their incentive to conserve energy and use it more efficiently). On the other hand, increased energy exports to developing nations would be consistent with the Brundtland Report's recommendations.

4.2 The Kierans Report

The conclusions of the Kierans Report with respect to the appropriate objectives of Canadian energy policy are diametrically opposed to those of the Brundtland Report. Instead of concluding that the level of non-renewable energy consumption should be reduced, the Kierans Report suggests that a deliberate policy objective of energy conservation or 'hoarding' is bad. On the contrary, the Advisory Committee recommends that the level of

energy consumption should be determined primarily by market forces:

> "The Advisory Committee sees greater risk to present and future Canadian living standards from artificially constraining development and use of our energy resources than from developing and using them." (emphasis added)[21]

The rationale for this position follows logically from two of the fundamental premises of the Kierans Report, namely, that the prime objective of development is to ensure a high standard of living for Canadians into the future, and the belief that this will occur if economic decisions are made primarily by market forces.

In addition, the validity of the Kierans Report's conclusion that a conservation policy would artificially constrain development depends on its implicit rejection of the notion that the biosphere places absolute limits on our ability to consume energy. Instead of absolute limits to growth, the Kierans Committee used the concept of "scarcity" which means that as supplies decrease, prices increase and alternatives come on stream. The usefulness of this concept was challenged by Dr. David Brooks, a member of the Energy Options Advisory Committee, who commented as follows:

> "...it is my view that sustainable development will ultimately be seen to preclude any increase in energy consumption, and thus any need for a larger energy industry. As the earth's atmosphere is now telling us, there are limits to growth, at least to growth as represented by materials throughput." [22]

Needless to say, the Kierans Report is also opposed to any restrictions on energy exports. It recommends that energy exports, like domestic energy consumption, should be guided by market forces

in order to enhance Canadian living standards:

> "...approaches based on retarding the rate of development, trade and use of energy resources would not only limit present prospects and options but also limit those of the future. In contrast, developing trade and using our resources, guided by economic considerations and the operation of market forces, will increase the number of choices available both now and tomorrow...".[23]

5. The Ways and Means of Achieving Sustainable Development

This section discusses and compares the proposed ways and means of implementing a sustainable pattern of energy consumption in Canada found in the Brundtland and Kierans Reports. , The discussion of the means to achieve energy sustainability will be divided into the following sections: the integration of economic and environmental decision-making and public participation, pricing, and public awareness and information.

5.1 Integration of Economic and Environmental Decision Making and Public Participation

5.1.1 The Brundtland Report

According to the Brundtland Report, government agencies that are responsible for economic decision-making must also be responsible and accountable for the ecological consequences of their decisions. As the Report states:

> "... the major central economic and sectoral agencies of governments should now be made directly responsible and fully accountable for ensuring that their policies, programmes, and budgets support development that is ecologically as well as economically sustainable."[24]

Citizen participation in the decision-making process is also necessary to ensure that development is equitable and that it is in the common interest. Furthermore, participation is also necessary to gain public support for sustainable development policies. According to the Brundtland Commission, citizen participation can be best achieved by decentralized decision-making:

> "This is best secured by decentralizing the management of resources upon which local communities depend, and giving these communities an effective say over the use of these resources. It will also require promoting citizens' initiatives, empowering people's organizations, and strengthening local democracy."[25]

For large scale projects with a significant environmental impact, the Brundtland Report notes the need for public hearings where citizens have the resources to participate effectively. Indeed, when the environmental impact is especially high there may be a need for a referendum:

> "When the environmental impact of a proposed project is particularly high, public scrutiny of the case should be mandatory and, wherever feasible, the decision should be subject to prior public approval, perhaps by referendum."[26]

5.1.2 The Kierans Report

Like the Brundtland Report, the Kierans Report calls for the integration of economic and environmental decision-making. The proposed means of achieving this goal are twofold. First, it supports the recommendation of the National Task Force on Environment and Economy for the establishment of a national,

multisector roundtable on the environment and the economy to provide advice on the environment to the federal cabinet. In the Kierans Committee's opinion, such an initiative would make Canada "a world leader in integrating environmental with social and economic objectives."[27]

Second, it states that energy regulatory boards should take full account of environmental costs when making their decisions. In addition, it endorses public participation at environmental assessment and electric utility regulatory hearings. On the other hand, it believes that there could be less need for environmental assessment in the future if environmental standards are raised.[28]

5.2 Pricing Policy

5.2.1 The Brundtland Report

According to the Brundtland Report, the key to achieving energy efficiency is high energy prices:

> "There is general agreement that the efficiency gains achieved by some industrialized countries over the past 13 years were driven largely by higher energy prices, triggered by higher oil prices. Prior to the recent fall in oil prices, energy efficiency was growing at a rate of 2.0 per cent annually in some countries, having increased gradually year by year.
> It is doubtful whether such steady improvements can be maintained and extended if energy prices are held below the level needed to encourage the design and adoption of more energy-efficient homes, industrial processes, and transportation vehicles."[29]

Not surprisingly, one of the most significant tools proposed in the Brundtland Report for promoting sustainable development as it relates to energy policy is conservation pricing. Conservation

pricing* means setting the price of the various energy types at the levels which will ensure steadily increasing reductions in the consumption of non-renewable energy.[30]

5.2.2 The Kierans Report

According to the Kierans Report, energy prices should be determined by market forces (the laws of supply and demand):

> "Because the energy economy is dynamic, with constantly changing supply and demand conditions, flexibility and resilience must characterize energy policy. Market mechanisms provide the information that makes it possible to anticipate and accommodate change, and allow the most efficient or least-cost energy choices."[31]

But the Kierans Committee recognizes that market forces will only lead to economically and environmentally appropriate energy production and consumption if the costs of environmental protection are internalized and if energy development is constrained by environmental standards and regulations. Furthermore, the cost of achieving these standards must be borne by energy consumers. The

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* The conservation price would presumably equal the pre-tax price plus a conservation tax or surcharge. The conservation tax, in turn, would presumably be a function of the pollutant content of the fuel,i.e., the dirtier the fuel the higher the tax. This would encourage consumers to put greatest emphasis on reducing their consumption of relatively dirty fuels. This could be achieved by energy efficiency investments and/or by the substitution of relatively clean fuels (e.g., natural gas) for relatively dirty fuels (e.g., coal, oil).

According to Article 903 of the Canada-U.S. Free Trade Agreement a tax can be imposed on the export of an energy good to the U.S. if the tax is also imposed on the domestic consumption of the energy good. Thus, conservation pricing can be used to reduce our energy exports.

Report notes:

> "The Advisory Committee acknowledges that environmental costs are not always quantifiable and that market mechanisms on their own do not adequately account for environmental and social impacts of a project. But when these costs are known and quantifiable, they should be paid by the beneficiaries in an appropriate and timely manner.
>
> The Advisory Committee favours the use of performance standards whenever necessary, noting that many well-considered standards are embodied in existing laws and regulations. By instituting standards, government establishes the rules to guide industry and consumers in their decision-making. Industries can either develop technology to meet the standards in an economically efficient manner, or cease or reduce the act which is causing the problem. By setting standards, the government causes the environmental impacts of development and use to be internalized in market decision-making."[32]

Unfortunately, the Kierans Report provides no guidance as to how costs are to be accounted for and how standards are to be determined, other than to recommend that the federal government take the lead and that standards should be consistent across the country.[33]

5.3 Public Awareness and Information

Both the Brundtland and Kierans Reports strongly support proper energy pricing as a tool for achieving sustainable development. But proper pricing will only be fully effective if consumers have information about the energy efficiency of homes, cars and appliances. As a consequence, both Reports support efforts to make energy efficiency information widely available, including mandatory appliance efficiency labelling.[34] It is worth

noting that, while electrical appliances (e.g., stoves, refrigerators, dryers) are subject to mandatory energy efficiency labelling (Energuide), there is no requirement for energy efficiency labelling for gas appliances sold in Canada.

6. Ontario Hydro: A Case Study of the Implications of Sustainable Economic Development

6.1 Introduction

In previous sections we have noted that Brundtland's and Kierans' concepts of sustainable development and their energy policy recommendations are radically different. Nevertheless in the case of Canada's publicly-owned electric utilities*, the implementation of Kierans' proposals, at least in the short run, would promote Brundtland's energy policy objectives. That is, there would be increased emphasis on conservation and renewable energy and the substitution of natural gas for coal-generated electricity.[35] The harmony between Brundtland and Kierans in the electricity sector is due to the fact that, at the margin, economically rational electric policies are also environmentally acceptable.

To analyse the implications of Kierans' electric utility reform proposals we will use Ontario Hydro as a case study. Ontario Hydro, in terms of assets, is Canada's largest non-financial corporation.[36] Its assets exceed $34 billion and its

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* Canada's publicly-owned electric utilities supply over 90 per cent of Canada's electricity needs.

annual sales exceed $6 billion. Hydro wholesales power to over 300 municipal electric utilities. It sells power directly to over 800,000 rural customers and to more than 100 large industrial customers.

Ontario Hydro's generation mix in 1993 will be 61% nuclear, 22% hydro and 17% coal. According to Hydro, its existing facilities and its committed new supply and demand management programs will enable it to meet Ontario's electricity needs on a reliable basis until 1996. However, Hydro predicts that by 2010, given its most likely load growth, it will require another 8,000 megawatts (MW) of demand or supply resources. 8,000 MW is equivalent to approximately 40% of Hydro's existing peak load. Assuming Hydro's high growth load forecast, the additional requirement would be approximately 22,000 MW, or more than 100% of the existing peak load.[37]

Since large scale coal and nuclear generation stations have a lead time of ten to fifteen years, the important public policy question facing Ontario Hydro and the Government of Ontario is whether to order a new large scale coal or nuclear generating station or to put greater reliance on alternative supply sources (e.g., small scale hydro, gas) and/or energy conservation.

Kierans' fundamental critique of Canada's publicly-owned electric utilities is that they are not operated in a sufficiently business-like fashion. To be specific, Kierans proposes that electric utilities should:

1. Adopt least-cost planning principles;

2. Ensure that their rates fully reflect their costs of service; and

3. Be regulated by independent regulatory boards.[38]

In the case of Ontario Hydro the achievement of the first two objectives, least cost planning and full cost pricing, is frustrated by government subsidies, the Power Corporation Act and/or Hydro's interpretation of the Power Corporation Act.

6.2 Least-Cost Planning

According to the Power Corporation Act, Hydro's mandate is to produce power at cost.[39] Hydro has interpreted power at cost to mean that it must select the generation and energy conservation options which minimize its financial costs. Unfortunately, Hydro's financial costs are less than the true economic costs of power generation. As a consequence, the Power Corporation Act creates artificial biases in Hydro's generation selection process. In addition, the Power Corporation Act artificially limits Hydro's demand management options. These biases will be discussed below.

6.2.1 Capital Intensive Bias

Ontario Hydro's required rate of return on its assets or capital is less than that of a private corporation. This is due to the facts that its debt is guaranteed by the Province of

Ontario*, its liability in the event of a nuclear accident is limited to $75 million by the Nuclear Liability Act, it is not required to pay dividends, and it is exempt from federal and provincial corporate income tax. Thus the financial cost to Ontario Hydro of obtaining a dollar of capital (the interest rate on its bonds) is less than the economic cost to society of transferring the capital from the private sector to Ontario Hydro (foregone output in the private sector).**

Since Hydro's financial cost of capital is lower than the true cost to the economy, capital intensive generation options***, will appear to be more attractive than they really are. As a consequence, Hydro's generation selection process is biased in favour of capital intensive generation options. Thus, the nuclear option is artificially favoured over coal; and coal, in turn, is artificially favoured over gas.

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* The benefit to Ontario Hydro of the debt guarantee has been reduced by the May 17,1989 Ontario Budget which levied an annual debt guarantee fee, equal to one-half of one per cent of Hydro's total outstanding debt, on Ontario Hydro.

** According to Glenn Jenkins the average real rate of return on capital of Canada's publicly-owned electric utilities between 1965 and 1973 was 3.46 per cent whereas the average real rate of return on capital in the private sector was 10 per cent between 1965 and 1974. G.P. Jenkins, Capital in Canada: Its Social and Private Performance 1965-1974,(Ottawa: Economic Council of Canada; 1977), pp. 73, 138-140.]

*** A capital intensive generating option is one where capital costs as a percentage of the total costs of generating a kilowatt-hour of electricity are relatively high. For example, nuclear and hydro are the most capital intensive generating options; coal is less capital intensive and more fuel intensive; natural gas, in turn, is more fuel intensive and less capital intensive than coal.

6.2.2 Ontario Hydro Generation Bias

Ontario Hydro will only buy power from a privately-owned generating station if the cost of the private power is less than or equal to the annualized cost to Hydro of building a new generating station. As already noted, the financial cost of capital to Ontario Hydro is less than its true economic cost to the economy as a whole. Thus, the financial cost to Hydro of building a new generating station is less than its real economic cost. Consequently, the maximum rate Hydro will offer for private generation is less than the true incremental cost of a Hydro owned and operated generating station. Since privately-owned generating stations are primarily small hydro dams and natural gas-fired generation, the consequence of this bias is that too much of Ontario's electricity is generated by coal and nuclear energy.

6.2.3 Energy Supply Bias

There are two fundamental ways of meeting a rise in the demand for electrical services. The first is to increase one's generation, transmission and distribution capacity. The second is to reduce existing customers' need for the electricity. When the latter occurs, the existing customer's supply can then be dedicated to the new customer or the new demand.

Hydro's mandate was changed in 1981 to include the promotion of energy conservation. Unfortunately, the legislated scope of the energy conservation mandate is unnecessarily restrictive. For

example, according to section 56b(3) of the Power Corporation Act, Hydro is not allowed to meet an increase in the demand for electricity by providing financial assistance for the conversion of electrically heated homes to an alternative supply option (e.g. gas).

6.3 Full Cost Pricing

According to Kierans, electricity rates should reflect the cost of electricity service in order to encourage economically rational energy efficiency investments and to prevent excessive electricity consumption:

> " - To the extent that regulated prices understate the real market costs of energy, they encourage excessive energy use.
> - This also weakens the incentives to use more energy-efficient processes or to substitute less costly energy sources, leading to sluggish adaption and inefficient energy use in the economy."[40]

According to section 75 of the Power Corporation Act, Hydro is required to sell power at cost.* Hydro has interpreted power at cost to mean that it must set the price of electricity equal to its average financial costs. This interpretation of the Power Corporation Act implies that Hydro's rates will understate the true economic cost of electricity supply for two reasons. First, as was noted in the Least-Cost Planning section, since Hydro's capital costs are subsidized its financial costs will understate the

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* The obligation to sell power at cost is distinct from previously noted obligation to produce power at cost.

economic cost of power supply. Second, average cost pricing means that high cost incremental supply (coal and nuclear) is rolled-in with the low cost hydraulic generating stations built before 1960. As a result the price of electricity does not even equal the full financial cost of incremental supply.

The full economic cost of power supply could be included in the price of electricity by amending the Power Corporation Act to require Ontario Hydro to earn a rate of return, on its incremental supply investments, equal to that of a comparable private sector corporation. Hydro's resulting increased revenues could be used to finance dividend payments to its owner, the Government of Ontario.

Full economic cost pricing as defined above is equivalent to marginal cost pricing and appears to be consistent with the thrust of the Kierans Report. However, the Report does contain the cryptic statement, that, "strict marginal cost pricing...could be damaging at the present time."[41] The caveats "strict" and "at the present time" can be interpreted to mean that Kierans believes that electricity rates should be gradually raised to their marginal costs.

6.4 The Need for Regulation

Kierans' third major proposal for publicly-owned electric utilities is that they should be regulated by independent regulatory boards:

> "A more appropriate approach would be to impose or strengthen regulatory control, with the aim of making

> the utilities more responsive to market forces and separating their regulated mandates from other government influences."[42]

This recommendation is especially appropriate for Ontario Hydro as a brief review of its regulatory framework, namely, the Ontario Energy Board Act, the Power Corporation Act and the Environmental Assessment Act, will reveal.

According to section 37 of the Ontario Energy Board Act (OEB Act), Ontario Hydro cannot raise its rates before its proposal has been reviewed by the Ontario Energy Board (OEB). Unfortunately, in every review hearing but one, the OEB has been directed, by the Minister of Energy under section 37(2) of the OEB Act, not to examine the main cause of Hydro's rising rates, that is, its system expansion program.

The Board in its September 1987 Report with respect to Hydro's rate proposal for the 1988 year stated that this restriction may be ultra vires:

> "The Board's concern is that a reference under subsection 37(2) containing restrictions by the Minister may invalidate, in law, the Board's Report in that the directions of the Minister may be ultra vires."[43]

Furthermore, the OEB only reviews Hydro's rate proposal. It does not regulate Hydro's rates. After the OEB has held its review and issued its recommendations, Ontario Hydro can ignore all of the Board's recommendations and set its rates at whatever level it pleases. This state of affairs has led the OEB to question the value of the review process. It noted:

> "In recent times the Hydro hearings have involved in excess of 8,000 person-hours by this Board and its staff

alone, and aggregate costs in excess of $3,000,000 including the direct and indirect costs of Hydro and the intervenors.

In recent Reports the Board has made important recommendations concerning, among other things, the inappropriateness of Hydro's pricing policies, in particular: its failure to include the full cost of equity in net income and its propensity to defer recovery of other costs; its inability to control costs generally, the inappropriateness of the moratorium on rate design; and its tardiness in making public its system development plans.

Hydro has, in the main, rejected these recommendations and, as a consequence, the Board is seriously concerned whether the hearings are any longer cost effective." (emphasis added)[44].

The lack of a regulator with teeth will be a barrier to sustainable development if Ontario Hydro's management is biased against the options which are most consistent with sustainable development, namely, energy conservation, small scale hydro and gas-fired generation. Unfortunately this appears to be the case. As the OEB has noted with respect to Hydro's conservation program:

"The external evidence is not consistent with Hydro's claim to a commitment to conservation. The Board is particularly concerned that Hydro is taking an inordinately long period of time to screen, test market, and implement its conservation programs."[45]

The Report of the Electricity Planning Technical Advisory Panel to Ontario's Minister of Energy has reached similar conclusions:

"...we believe, Hydro tends to understate the full potential of demand options. No doubt there is an institutional aspect to this. Experience suggests that the development and execution of demand options require different structures, different skills, different attitutes, perhaps different people, than the marketing side of a generation-oriented utility. Conservation represents something that has never previously been a

> central thrust of the organization, and there is a contrast in mindset between selling electricity and promoting conservation." [46]

The OEB also noted that there is opposition within Ontario Hydro to the development of independent or parallel generation:

> "However, the Board also heard evidence by Mr. Palmer, of Hydro, that other departments are not always willing to help in the process and that there is a certain amount of "internal opposition" to the development of parallel generation by some groups within the Corporation. Additional constraints imposed by other groups within Hydro are unnecessary and undesirable impediments to the effective development of parallel generation in the Province."[47]

Finally, a well-accepted principle within the context of sustainable development is that a preventive approach to environmental protection is imperative. In the context of Ontario Hydro, there is a statutory framework, the Environmental Assessment Act, that takes such an approach. According to the Environmental Assessment Act (EA Act)(R.S.O. 1980, c. 140), all new undertakings by Ontario Hydro, including all generating and transmission projects, are subject to approval under the Act. Yet, since the Act was proclaimed, all of Hydro's generating projects have been exempted from the application of the Act. Because of this exemption process, there has been no regulatory public review of Hydro's generating projects; no regulatory forum to discuss the need or alternatives to these undertakings; and no opportunity for the public to test and challenge the assumptions and findings used

by Ontario Hydro in arriving at its decisions.* On the other hand, according to section 51 of the Power Corporation Act, Ontario Hydro must receive approval from the Lieutenant Governor in Council in order to borrow money. Since Ontario Hydro's capital expenditures are primarily financed by debt, section 51 gives the Ontario Cabinet control over Hydro's system expansion programme. Unfortunately this type of regulation does not allow for public participation in the decision making process.

In addition to the above noted specific weaknesses of the OEB and EA Acts, there is an obvious lack of integration of economic and environmental regulation. So-called environmental decisions (when reviewed) are considered by the Environmental Assessment Board and/ or the Ontario Municipal Board while so-called economic or financial decisions (which often have environmental impacts) are reviewed by the OEB. Hence, some thought should be given to a more comprehensive and coherent regulatory structure. The Kierans Report suggests that one regulatory authority be established with respect to all environmental matters:

> "The Advisory Committee believes that the Environmental Assessment Review Process should be streamlined. In cases of joint mandates and jurisdictions, only one review should be conducted, taking into account the requirements of all the affected jurisdictions"[48]

7. Conclusions

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* In 1974 the OEB reviewed Ontario Hydro's system expansion programme; however, as already noted, the OEB's recommendations are not binding on Ontario Hydro.

In its First Annual Review, in 1964, the Economic Council of Canada identified five basic economic and social goals for the Canadian economy:

"- full employment
- a high rate of economic growth
- reasonable stability of prices
- a viable balance of payments, and
- an equitable distribution of rising incomes".[49]

While the Economic Council of Canada considered all of the above goals to be important it would appear that it put prime emphasis on a high rate of economic growth. In other words, the aim appears to have been to maximize economic growth subject to the constraints of achieving reasonable success in fulfilling the other goals:

> "Success, on the other hand, would bring great benefits. The increase in total output to 1970 would be almost double the rate of the last seven years. The improvement in average personal incomes would be even larger."[50]

It is submitted that Kierans' concept of sustainable economic development is a refinement of the 1964 goals of the Economic Council of Canada. That is, G.N.P. should be maximized subject to the 1964 constraints plus the added constraint of maintaining a reasonably healthy environment.

A fundamental difference between the Kierans Report, on the one hand, and the Brundtland Report and the mainstream of sustainable development thought on the other, is that the latter

do not view economic growth as an end in itself but merely as a means to the fullfilment of human needs. In addition, the Brundtland school of thought believes that there are ecological limits to energy consumption; whereas Kierans implicitly at least does not. A commitment to human needs implies a commitment to equity since the needs of the poor take priority over the wants of the rich. A concern for human needs also implies a concern for the welfare of future generations. This concern when combined with the knowledge that the biosphere places limits on our ability to consume material and energy resources leads to a rejection of growth mania. As Herman Daly has written:

> "Growth chestnuts have to be placed on the unyielding anvil of biophysical realities and then crushed with the hammer of moral argument. The entropy law and ecology provide the biophysical anvil. Concern for future generations and subhuman life and inequities in current wealth distribution provide the moral hammer."[51]

Implementing the Kierans Report's concept of sustainable economic development would be relatively easy since it is fine tuning the status quo. But will it lead to development that is consistent with global sustainability? Furthermore is Kierans' concept of sustainable economic development more desirable than Brundtland's concept of sustainable development? The Brundtland Report claims that its vision of sustainable development can be attained but, as it notes, it will require significant changes in public values and institutions:

> "A safe, environmentally sound, and economically viable energy pathway that will sustain human progress into the distant future is clearly imperative. It is also possible. But it will require new dimensions of

political will and institutional co-operation to achieve it."[52]

However, even the Kierans Report's concept of sustainable economic development implies significant changes for Ontario Hydro's regulatory framework. To be specific, implementing sustainable economic development would require, at least as a first step effort, the following Ontario Hydro reforms:

1. Amending the Power Corporation Act to require Ontario Hydro to provide electric services at the lowest long-term economic cost, consistent with safety, flexibility, reliability, and acceptable environmental impact;

2. Amending the Power Corporation Act to require Ontario Hydro to sell electricity at a price equal to its marginal economic cost; and

3. Subjecting Ontario Hydro to comprehensive binding public regulation by one or more independent regulatory boards.[53]

Furthermore, if the above institutional reforms are made, Ontario's incremental electric service needs for many years to come will be provided by a combination of energy conservation, small scale hydro and gas-fired generation; not the status quo options of coal and nuclear generation.

1 J.S. Mill, Principles of Political Economy, Vol. II, London: John W. Pouker, 1857, pp. 320-326.

2 (1972), 2 (1) The Ecologist.

3 Such as Dennis Meadows' Alternatives to Growth I: A Search for Sustainable Futures [1977] and James Coomer's Quest for a Sustainable Society [1979], background papers, such as the 1971 Development and Environment Report (Founex Report) [Founex, Switzerland, June 4 - 12, 1971], which was a working paper prepared for the Stockholm Conference, and numerous official documents.

4 United Nations Environment Programme, Review of the Areas, Environment and Development, and Environment Management, (Report No. 3, 1978).

5 International Union for Conservation of Nature and Natural Resources, World Conservation Strategy: Living Resources Conservation for Sustainable Development (1980).

6 World Commission on Environment and Development, Our Common Future, (Oxford: Oxford University Press; 1987), p. 43.

7 ibid., pp. 52,53.

8 ibid., p. 43.

9 ibid., p. 8.

10 ibid., p. 46.

11 ibid., p. 21.

12 ibid., p. 45.

13 Energy Options Advisory Committee, Energy and Canadians: Into the 21st Century, (Ottawa: Minister of Supply and Services; 1988), Appendix A-3.

14 ibid., p. 12.

15. Ibid.

16 ibid., p. 59.

17 ibid., p. 60.

18 Our Common Future, pp. 14,15.

19 Ibid., p. 14.

20 Ibid., pp. 173, 174.

21 Energy and Canadians, p. 24.

22 ibid., p. 121.

23 ibid., p. 33.

24 Our Common Future, p. 314.

25 ibid., p. 63.

26 ibid., p. 64.

27 Energy and Canadians, p. 64.

28 Ibid., pp. 63, 78.

29 Our Common Future, p. 200.

30 ibid., pp. 200, 201.

31 Energy and Canadians, p. 65.

32 Ibid., pp. 60, 61.

33 ibid., p. 63.

34 ibid., p. 102; Our Common Future, p. 197.

35 Our Common Future, pp. 176,177.

36 The Financial Post 500, (Summer 1989), p. 84.

37 Ontario Hydro, Meeting Future Energy Needs: Draft Demands/Supply Planning Strategy, December 1987, pp. S3, 5-6.

38 Energy and Canadians, p. 78.

39 R.S.O., Chapter 384, sections 56 and 75.

40 Energy and Canadians, p. 67.

41 ibid., p. 78.

42 ibid., p. 78.

43 Ontario Energy Board, H.R. 16, Report of the Board, p. 1/6.

44 Ibid., pp. 1/7, 1/8.

45 Ibid., p. 5/7.

46 Electricity Planning Technical Advisory Panel to the Minister of Energy, Review of Ontario Hydro's Draft Planning Strategy, (Toronto: Minister of Energy;1988), p.27.

47 Ibid., p. 6/11.

48 Energy and Canadians, p. 63.

49 Economic Council of Canada, First Annual Review, (Ottawa: Queen's Printer, 1964), p.1.

50 Ibid., p.5.

51 Herman Daly, ed., Economics, Ecology, Ethics: Essays Toward A Steady-State Economy, San Francisco: W.H. Freeman and Company, 1980, p. 11.

52 Our Common Future, p. 202.

53 Virtually the same reform recommendations have been made by the Electricity Planning Technical Advisory Panel. See their report, Review of Ontario Hydro's Draft Planning Strategy, pp. 7, 32, 49.