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Directions for Canadian Energy Policy in the Medium Term

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What are the key questions faced by Canadian energy policy-makers and what are the desirable directions for energy policy, especially as it applies to the hydrocarbon sector? In highlighting some of those questions and proposing some policy directions, I wish to argue in this paper that the issues addressed are interrelated, that this inter-relationship can and should be exploited by policy-makers, and that, while government intervention seems inevitable, the form of the intervention is subject to significant choice.

The three issues discussed here will be of great importance to Canada's energy economy over the next five to ten years: linkages between energy and the environment, the time horizon of policy, and the security of energy supplies. In the closing section of the discussion I will emphasize common aspects of possible policy responses to these questions.

The discussion is obviously not intended to be comprehensive in relation to all of the issues relevant to Canada's complex energy sector. Nor is it intended to be theoretically rigourous — the arguments presented below do not seek to identify optimal policy moves. It is rather an exercise in political economy, in which the tools of economics are applied to real-world policy questions,

around which considerable uncertainty remains.

Energy and the Environment

The Problem

Current market prices of coal and oil products underestimate the social costs of their consumption

In the present context it is most useful to think of the environment as a common-property resource which, under current arrangements, is undervalued by market forces. A key linkage between energy and the environment operates through the consumption (or demand) side: the use of coal and oil products as fuels results in certain undesirable combustion gases (e.g., CO_2, NOx, and SOx) being emitted into the atmosphere. These observations suggest that current market prices of coal and oil products (i.e., the private costs of consuming these fuels) underestimate the social costs of consumption, which include the costs of any resulting degradation of environmental quality. Therefore, existing market conditions are such as to generate an outcome where emissions of combustion gases are too high. There is thus scope for some form of government intervention to improve the allocation of resources.

Consumption of Coal and Oil Products in Canada

Figure 1 shows the evolution of the Canadian consumption of coal in energy uses and for electricity generation between 1970 and 1989.[1] During most of the period under consideration, there is a sharp upward trend in total coal consumption for energy-related purposes; almost all of this increase is due to the use of coal for electricity generation, especially by utilities.[2] By 1989, for example, Canadian coal consumption for energy-related purposes amounted to 48.1 million tonnes (Mt), 95.4% of which was used by utilities to generate electricity. In 1970, by comparison, electric utility usage amounted to 74.1% (13.8 Mt) of a total consumption of 18.7 Mt. Even though problems of low rainfall (and thus a reduced capacity to generate hydroelectricity) are responsible for a portion of the increased use of coal by utilities in the second half of the 1980s, such uses still accounted for more than 92% of all Canadian coal consumption in energy uses between 1970 and 1989.

1/ The sources for Figure 1 are, for the 1970-1975 period, Statistics Canada, *Detailed Energy Supply and Demand in Canada*, catalogue no. 57-207, and, thereafter, Statistics Canada, *Quarterly Report on Energy Supply-Demand in Canada*, catalogue no. 57-003. Excluded from the calculations are losses and adjustments, and consumption by energy supply industries.

2/ Over the entire 1970-1989 period, coal used for electricity generation by industry amounts to less than 1% of that used by utilities.

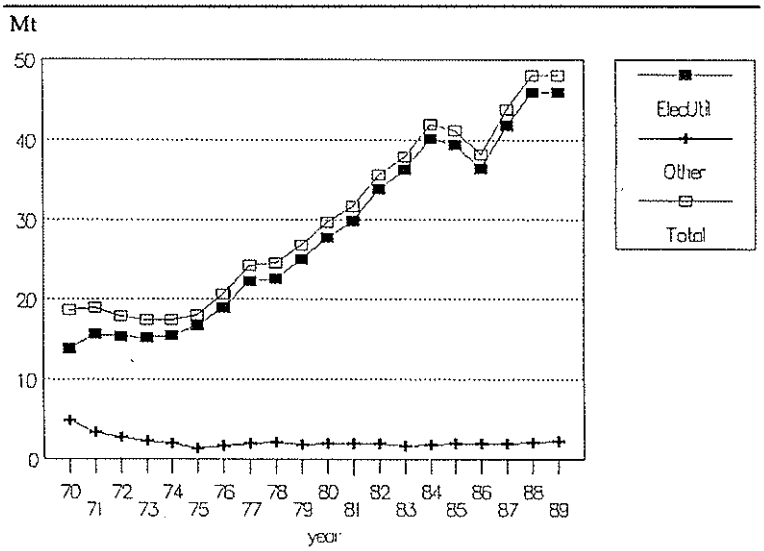

Figure 1: Consumption of Coal in Energy Uses, Canada, 1970-1989

Figures 2 and 3 show a sectoral breakdown of the Canadian consumption of oil products between 1970 and 1989.[3] While total consumption is lower in 1989 than in 1970, sustained decreases in consumption levels only followed the sharp increases in Canada's controlled crude oil prices, which were first felt toward the end of the 1970s. An examination of sectoral consumption trends reveals that between 1970 and 1989, industrial use and aggregate consumption in the agricultural, residential, and commercial sectors fell both absolutely and as a share of total usage. The opposite, however, is true for electricity generation and transport: consumption volumes are up, as are shares of total usage. The significance of these trends can most clearly be seen in the transportation sector. In 1970, 47.1% (35.7 million m^3) of all oil products consumed in Canada was used for transportation purposes. By 1989, this proportion was up to 62.5% (47.4 million m^3). As Figure 3 shows, the volumes used by utilities in electricity generation are much smaller. The trend toward increased use in this sector is much more pronounced since the mid-1980s, a period during which, as noted earlier, low rainfall created problems for hydroelectricity generation.

3/ The sources for Figures 2 and 3 are the same as for Figure 1, described in footnote 2. "Oil products" are defined to include liquefied petroleum gases, still gas, motor gasoline, diesel fuel oil, light fuel oil, heavy fuel oil, petroleum coke, aviation gasoline, and aviation turbo fuel. Calculations again exclude losses and adjustments, and consumption by energy supply industries.

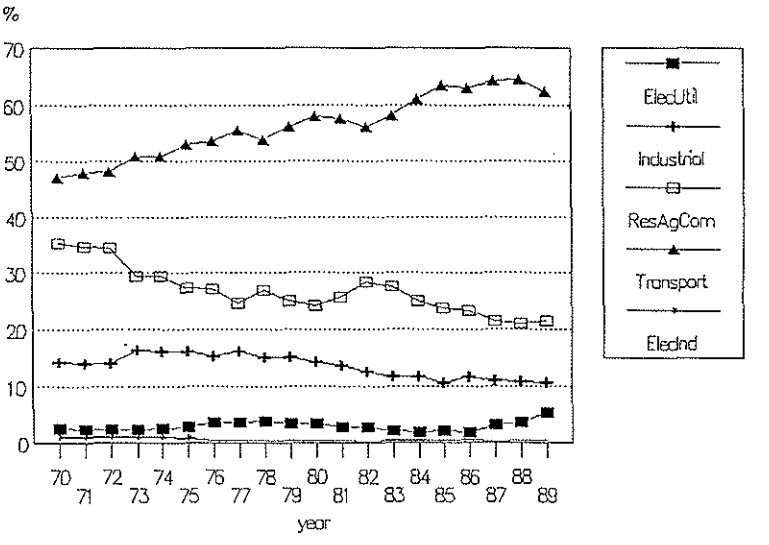

Figure 2: Shares of Oil Product Consumption Canada, 1970-1989

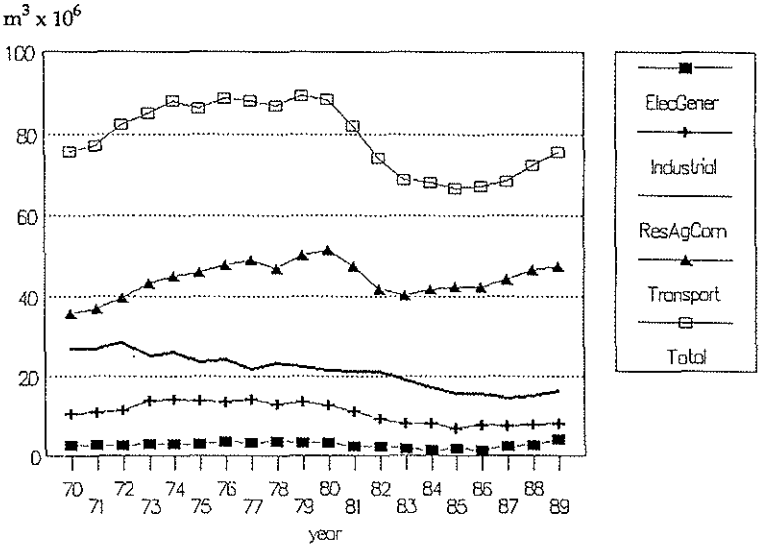

Figure 3: Consumption of Oil Products Canada, 1970-1989

Policy Implications

The above suggests that policy initiatives to deal with the environmental consequences of energy consumption are most urgently needed in electricity generation and transportation.

Although there is growing scientific evidence linking environ-

mental degradation and energy consumption, it is clear that we do not yet fully understand the linkages.[4] Thus the environmental costs of energy use are subject to considerable uncertainty. At this stage, two broad approaches to dealing with energy-environment linkages suggest themselves.

The first approach, that adopted in Environment Canada's (1990) *Green Plan*, consists of invoking the uncertainty on the cost side to emphasise the need for additional research, and to justify reliance on broad statements of principle combined with avoidance of specific policy initiatives. The second approach, and the one that I favour, has been proposed by, among others, David Pearce. He starts from the premise that the environment is undervalued in current-day market transactions to justify the adoption of specific policy measures aimed at increasing its valuation in economic decisions.[5] The idea is simply to increase the effective price of the use of the environment and thus to reduce the effective quantity utilized.

Increase the "price" of the environment and reduce the "quantity" demanded

Given all of the remaining uncertainty, any policy measures introduced to implement this approach should be perceived as temporary. As research proceeds and the nature and consequences of energy-environment linkages become increasingly better understood, these measures should be modified in consequence.

The approach advocated by Pearce is also implicitly adopted in work on environmental issues recently completed under the aegis of the C.D. Howe Institute.[6] This work emphasizes the use of market-based mechanisms to help solve environmental problems. In particular, a case is made for relying on transferable permits to deal with undesirable emissions and effluents.[7] The role for government in such a system is to determine limits on aggregate pollution volumes and then issue permits. Market forces would then determine the prices of these permits on secondary markets. Tietenberg (1985; 1990) provides evidence that, in certain well-defined cases, this approach has led to situations where reductions in emissions were achieved at a lower cost than would likely have been the case under the usual command-and-control alternatives, such as the imposition of standards for each source of pollution. This is part of a growing body of evidence suggesting that market-based mechanisms are more cost-effec-

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4/ On this, see Kierans (1990).

5/ See Pearce *et al.* (1989).

6/ See, for example, the volumes edited by Doern (1990a; 1990b) and Kierans (1990).

7/ See, in particular, McFetridge (1990). A discussion of a tax-based approach to regulating emissions and effluents is contained in Dewees (1991).

tive ways of attaining some environmental objectives.[8]

It seems clear that an approach based on transferable permits would be quite appropriate for dealing with the environmental consequences of large-scale uses of coal and oil products in thermal electricity generation. The role of the government here would be much as that envisaged in the work published by the C.D. Howe Institute: to set limits on aggregate emissions of a relatively small number of combustion gases, and issue transferable pollution permits to large-scale users. Since there are relatively few such users (but not few enough, I hope, for a collusive solution to emerge on the secondary market for permits), enforcement and monitoring costs would not be excessive.

In the transportation sector, however, I would argue that an approach based on transferable permits is unlikely to be nearly as useful, for two main reasons. First, there are simply too many sources of pollution and, second, these sources are too heterogeneous. Even if we were to focus exclusively on road transport, it is important to remember that there were almost 12.1 million automobiles and 3.7 million trucks registered in Canada in 1988.[9] This stock of vehicles is far from homogeneous in its energy efficiency. Further, it would be very difficult, within a transferable permit system, to control for the differing intensities with which this heterogenous stock of vehicles is used. This suggests that, in the transportation sector, the enforcement and monitoring costs of a system based on transferable permits would be prohibitively high.

In light of the above, a multi-level approach of the type outlined below would appear to be more appropriate. Public authorities should address the characteristics of the stock of vehicles. The overall objective here would be to increase the fuel efficiency of the capital stock in the transportation sector, and thus reduce emission volumes for a given size of vehicle stock. Given the overwhelming importance of automobiles and trucks, the federal government should thus legislate tougher efficiency standards for these two types of vehicles. Such standards could be either absolute, in the sense that no exceptions would be allowed, or could function as benchmarks, whereby a tax would apply to newly-produced vehicles that did not meet the legislated standards. The federal government could also encourage the

The federal government should legislate tougher energy efficiency standards for cars and trucks

8/ See, for example, the papers in Doern (1990b) and in the Spring 1990 issue (volume 6, number 1) of the *Oxford Review of Economic Policy*. Pearce and Turner (1990, chapters 6 to 8) is also of interest on this score and the subject is treated in the opening paper of this issue of *Energy Studies Review* by Erik Haites (see above, p.1).

9/ Registrations for 1988 of all other types of road vehicles (e.g., buses and motorcycles) amounted to less than 550,000 units. See Statistics Canada, *Road Motor Vehicles*, catalogue no. 53-219, 1988 issue.

provinces to adopt differential license fees, with gas guzzlers being charged higher fees than more fuel efficient vehicles.

The first proposal is aimed at ensuring that, as the stock of vehicles turns over, new arrivals are more fuel efficient than the vehicles they replace. The second proposal seeks to increase the turnover rate of the vehicle stock, by encouraging owners of less fuel efficient vehicles to replace them with newer, more efficient models.

Neither of these proposals, however, addresses the issue of the intensity of vehicle use. On this front, the objective would be to reduce the intensity with which the stock of vehicles (given its size and fuel-efficiency characteristics) is used, thus reducing emissions of combustion gases. The introduction of a tax on motor fuels (specifically, motor gasoline and diesel fuel oil) is likely to be an effective, but politically unpopular, way of addressing this issue. The empirical evidence suggests that increased consumer prices would indeed decrease the consumption of motor fuels for any given a stock of vehicles,[10] which, on its own, would act to reduce emission levels.

Opinion polls suggest that Canadians are very concerned about environmental degradation. Given that, a means of making motor fuel taxes more palatable might be for the government to create a special "environment fund" into which all revenues from such taxes would flow. This fund could then be used as an explicit source of financing for projects designed to improve environmental quality:[11] the "undesirable" taxes could thus be seen to support desirable outcomes. In addition, to dampen the detrimental effects of these consumption taxes on the living standards of low-income Canadians, the federal government could increase refundable income tax credits to ensure that individual tax burdens are more closely linked to the ability to pay.

All of these measures, of course, are not substitutes for further research into energy-environment linkages. We must acquire both a better understanding of the nature of these linkages and a deeper appreciation of their economic implications. Government support for both basic and applied research in these areas is needed. As noted earlier, however, the existing uncertainty along these dimensions of the problem should not be used as a pretext to do nothing on the policy front.

10/ As Bohi (1981, chapter 5) shows, both short- and long-run price elasticities of demand for oil-based fuels by the transportation sector are well above zero (in absolute value). Evidence specific to Canada is presented in Economic Council of Canada (1985, chapter 7), and is compatible with that presented in Bohi.

11/ Similar types of suggestions can be found in Crabbé (1990) and Olewiler (1990).

The Time Horizon of Policy

The recent conflict in the Persian Gulf and the resulting perturbations of world oil markets led, for a time, to sharp increases in crude oil prices. In turn, these higher crude prices were reflected in higher consumer prices for petroleum products, which led to public calls for the imposition of some form of price controls.[12] This time, the government rejected the calls for intervention, and chose instead not to constrain the operation of market forces. This was not always so.

In 1973,[13] consumer groups argued that domestic crude (and product) prices were rising without any increases in production costs, and exerted pressure on the federal government to intervene. Less than one month before the events that triggered the first world oil price shock, the federal government acquiesced to these demands and announced, in September 1973, a temporary freeze of the price of all crude oil produced in Canada. This "temporary" policy initiative by the federal government was the prelude to almost twelve years of controls on the price of Canadian crude oil production,[14] pitting producing against consuming regions, and creating severe strains in federal-provincial relations. This recollection of a past phase of Canadian energy policy provides an illustration of the first two points relating to the time horizon of policy that I wish to develop.

Reputation Effects

First, it is important for the government to avoid acquiring a reputation that it will intervene whenever the private interests of some consumer or producer group are seen to be threatened. Intervention aimed at protecting the interests of a given group invites investment, on the part of *all* stakeholders, in manipulating the policy process to serve their own best interests. Such activities are wasteful (from the point of view of society as a whole) and contribute to making the operating environment, for both energy consumers and producers, even more uncertain than it already is.

It is, therefore, important for the government to take into account, in assessing the effects of proposed policy initiatives, the signals that these would give to stakeholders about the nature of

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12/ See, for example, Carlisle (1990).

13/ For a more detailed discussion of Canadian oil policy in the 1970s and 1980s, see Helliwell et al. (1989, chapter 3).

14/ A number of provincial governments followed suit and introduced price controls on key oil products, such as gasoline. It is worth noting that in some provinces (e.g., Nova Scotia) some of these price controls continue to this day.

The government must not acquire the reputation that it will regularly intervene on behalf of groups disadvantaged by market phenomena

the policy process. Temporary measures taken in response to market disturbances that threaten the interests of a given group will encourage all groups to believe that intervention to protect (or enhance) their own interests would be forthcoming if only public authorities can be convinced that these interests are threatened. In such a situation, expenditures aimed at convincing the government that specific interests are indeed threatened are individually rational, even if socially wasteful.

An effective way of reducing the incentives to invest in such socially undesirable activities is for the government to announce an energy policy package, and then resist the temptation to respond to short-term market disturbances. Demands for self-serving changes in policy will decrease as it becomes clear that the government will not allow the policy-making process to be manipulated by stakeholders.

Temporary Measures Are Not Meant To Be Permanent

Temporary policy measures favourable to the interests of a specific group of stakeholders will also tend to create, within the group, a feeling of entitlement over these benefits. As a result, the larger the group, the more difficult it is politically to prevent "temporary" measures from becoming "permanent". In the illustration described above, the relative sizes of producer and consumer groups, and sustained higher world oil prices meant that the "temporary" price freeze acquired a more permanent nature. Consumers, as a group, exerted political pressure to protect the benefits that price regulation had conferred upon them. Only some twelve years later, after a period of bitter federal-provincial conflict and in the presence of softening world oil markets, did it become politically acceptable to deregulate Canadian crude oil prices.

As a number of studies have argued,[15] the efficiency costs of Canadian oil price regulation were very high. The political benefits, on the other hand, were clearly positive, at least in the short term. The minority Liberal federal government was returned to power with a majority in the House of Commons in the general election of July 1974. However, these political benefits came at a cost. The Liberal government's interventionist approach to energy policy resulted in an increased polarization of Canadian voters, with those in the eastern consuming regions continuing to support the governing party and voters in the western Canadian oil-producing regions shunning the Liberals.

This brings me to two related points. First, governments should avoid adopting economically costly "temporary" measures that would prove politically difficult to abandon. Second, if, despite

15/ See, for example, Helliwell (1979; 1981).

the undesirable reputation effects, the government still wishes to intervene to protect a group of stakeholders from bearing the full impact of developments on energy markets, then its choice of policy instrument should take into consideration the economic costs of attaining a given level of political acceptability.

In the example outlined above, it seems likely that a policy combination of allowing market forces to determine oil prices and instituting an income tax credit to compensate for the effects of price increases on the consumers' standards of living would have been economically less costly, while likely having a similar degree (though a broader distribution) of political acceptability. Further, the tax credit scheme could have been designed so that credits were only available in the event of high or sharply increasing energy prices. Thus, a set of "permanent" policy measures could have delivered "temporary" benefits to the stakeholder group that government wished to shelter when conditions were particularly adverse to the interests of that group.

Permanent policy instruments designed to deliver desired temporary benefits can have lower economic costs

Stability of the Policy Framework

The tax credit scheme outlined above allows responses to price hikes without any change in the underlying policy measures and would thus enhance the stability of the entire policy framework. The desirability of a stable policy framework was an argument frequently made by participants in the *Energy Options* process.[16] Throughout most of the 1970s and the 1980s, this argument goes, the policy measures themselves were frequently altered, an undesirable state of affairs since it increased uncertainty in the operating environment of energy decision-makers. This increase in uncertainty was, to a large extent, avoidable and would have been held in check had government not chosen to respond so frequently to developments on world markets.

All of the arguments made in this section point in the same direction: energy policy should be aimed at the medium term. The government should set down a clear framework for energy policy, and should resist temptations to modify it when short-term disturbances affect the distribution of the benefits and costs of energy-related activities. It should also be clear, however, that the future is uncertain, and thus that policy measures adopted today may be totally inappropriate for the energy marketplace of, say, 1995. Policy should thus not be cast in stone. Rather, government should retain some flexibility to adjust the policy framework as the underlying trends of energy markets change markedly in ways that were unexpected at the time the measures were initially adopted.

It is in this sense that policy should be aimed at the medium

16/ See Energy, Mines and Resources Canada (1988), especially pp. 83-87.

term: a short-term focus will yield a policy framework that changes too frequently, while a long-term focus may prevent desirable responses to unexpected developments from occurring.

Security of Energy Supplies

The recent conflict in the Persian Gulf has also rekindled concerns over the security of energy supplies in most oil-importing countries. This was noticeable in Canada when an unpublished report by the National Energy Board (NEB), stating that foreign supplies of light and medium crude oil would play an increasingly important role in meeting Canadian demand, became front-page news in the financial press.[17] This increased concern should come as no surprise, since similar reactions followed both the world oil price shock of 1973-74 and that of 1979-80.

Given the relative abundance of other energy forms from domestic sources, concerns about the security of energy supplies in Canada have tended to be focused on crude oil. Over the years, "security of energy supply" has thus been understood to mean "security of oil supply". The present situation is no different. Furthermore, as Canada becomes increasingly dependent on foreign sources of crude oil, concerns about the security of oil supply will become more important on the public policy agenda.

Without further justification, let us assume that oil security indeed reflects a legitimate concern of Canadians. Prior to describing policy options to deal with this problem, we must first define what is meant by "security of supply". The following example should clarify these questions.

Assume that Canada becomes a net importer of oil, and that Canadian governments do not intervene on domestic oil markets. There would thus be no volume restrictions on trade, and no price controls on Canadian-produced oil or on imports. Here, security of supply simply requires that domestic demand be equal to supply (from domestic and foreign sources) at market-determined prices. If this were the case, then market forces would operate such that no Canadian willing to pay the world price would go without oil. Since Canada is a small producer (relative to the rest of the world), it cannot affect world prices, and there would thus be no clear role for government intervention to enhance the security of domestic oil supplies. These supplies would be forthcoming on world markets at prices unaffected by actions undertaken in Canada.

It is possible, however, that some groups of energy stakeholders will not always like the outcome of such market-based

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17/ See, for example, Morton (1990). What these reports did not say was that *all* similar NEB reports issued during the 1980s made the same point. See, for example, NEB (1984, pp. 83-85) and NEB (1986, pp. 101-105).

practices. Specifically, it seems likely that consumers will at times deem prices to be too high, and will seek protection from the full impact of such developments. Further, domestic producers would likely seek government intervention to encourage the discovery and production of additional reserves of crude oil, thereby reducing Canada's dependence on foreign sources of oil. I would argue that this is precisely what most people have in mind when they talk about the security of oil supply: supplies, mainly from domestic sources, abundant enough to meet demand at prices below those prevailing on world markets when these prices are high, or at least, rising rapidly.

If this is indeed what security of supply is understood to mean, then achieving such a goal would require government intervention, at a minimum, to control domestic prices and to encourage activities related to the discovery and production of domestic oil reserves. Even though we know that the Canada-US free-trade agreement (FTA) makes controlling the price of domestically-produced crude oil even more costly than was the case during the 1970s and early 1980s,[18] let us assume that the Canadian government still chooses to do so.

On its own, the fact that domestic prices would be below world-equivalent levels in this scenario would tend to generate excess demand in Canada. Activity incentives aimed at increasing domestic production may not, especially in the short run, bring about a sufficient supply response to eliminate the excess demand entirely. In such a situation, the government might choose to subsidise the cost of imported oil. In any case, the basic form of this solution is to eliminate all excess demand by expanding oil supplies available for domestic consumption.[19]

Link between demand-side policies and security of supply should be better recognized

A simple question now poses itself: why the fixation with solving supply/demand imbalances by focusing exclusively on the oil supply side? Given that government intervention would extend to financial disbursements, why not consider incentives to activities aimed at reducing oil demand, such as fuel-switching, alternative technologies, or conservation? This type of approach was indeed adopted during the 1970s and early 1980s, but has since been dropped.

An argument in favour of considering such options is that, as a result of Canada's participation in a number of international agreements (e.g., the FTA and the International Energy Program), increases in domestic oil supplies would, under certain circumstances, be subject to sharing with other countries, or could make domestic price regulation even more costly to implement.[20] On

18/ On this, see Plourde (1990).

19/ Indeed this was the basic approach to energy policy adopted during most of the period between September 1973 and March 1985, when Canada experimented with domestic oil price regulation.

the other hand, any decrease in domestic oil supply/demand differentials obtained as a result of a reduction in demand cannot be alienated — Canada does not have to share the results of a fall in domestic oil consumption with others.

To the extent that the security of oil supply is a legitimate concern of Canadians, and that government intervention is inevitable, the above arguments suggest that an exclusive focus on measures to enhance oil supplies would be misguided. Supply/demand imbalances can also be corrected by measures aimed at reducing domestic oil demand.

Conclusion

The government should work on a medium-term policy framework — a statement of principles and a set of specific measures

The arguments presented in this paper suggest that Canadian energy policy should have a medium-term focus. In practical terms, this means that the federal government should adopt and implement a basic energy policy framework, consisting of a broad statement of principles and specific policy measures. Since the future is inherently uncertain, policy measures that might now appear quite desirable could well prove singularly inappropriate in five or ten years' time. When government chooses to intervene in the energy marketplace, it should do so fully cognizant of the fact that some policy initiatives will prove themselves to be mistakes, and will need to be modified or scrapped entirely. The framework should thus be flexible enough to allow desirable policy changes to occur in response to major unanticipated developments. The government should, however, resist the temptation to make frequent and arbitrary changes to its policy stance. To do otherwise would encourage stakeholders to invest in activities aimed at manipulating the process in ways that would serve their own interests. Not only are such activities socially wasteful, but they also contribute to making the operating environment for all energy decision-makers even more uncertain.

In my view, the key element in this policy framework should be the relationship between energy and the environment. Even though there is much that we do not know about energy-environment linkages, I favour an approach to policy that includes the implementation of specific measures aimed at increasing the value assigned to the environment in everyday energy-related decisions. Wherever feasible, market-based mechanisms should be used to implement policy objectives in this area. My main concessions to the uncertainty characterising the relationship between energy and the environment would be to encourage public investment into research aimed at unlocking the puzzle, and to avoid overzealousness in designing and implementing specific policy measures. The motor fuel taxes that I have in mind,

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20/ For a more detailed discussion of this point, see Plourde (1990).

for example, would be measured in cents and not in dozens of cents per litre.

Given the existing uncertainty, environmental objectives could be well-served by a medium-term energy policy framework. It would make consumers recognize that energy use can contribute to environmental degradation and give them incentives to modify their behaviour in consequence. It would also be flexible enough to allow for policy measures to be changed as research proceeded, and key aspects of the relationship between energy and the environment became better understood.

To the extent that the security of oil supply is a legitimate concern of Canadians, and that government intervention to address this concern is inevitable, it would appear that measures aimed at increasing the price of services provided by the environment could also be beneficial to some aspects of this problem. Reductions in combustion gas emissions would result from, among other things, improvements in oil-burning efficiency and from outright reductions in the volumes of oil products consumed. Both of these outcomes would also serve to reduce Canadian dependence on foreign sources of oil.[21]

Security of supply could also be enhanced, this time mainly through the supply side, by an approach to energy policy that assigned more importance to stability. A medium-term focus that would discourage frequent and arbitrary policy changes would also provide a more stable operating environment, and could well bring about higher levels of oil exploration and production activities, without any additional government incentives.

In sum, two underlying themes of this paper are that important aspects of the issues addressed are interrelated, and that there are advantages to exploiting this inter-relationship in the design and implementation of energy policy. In addition, it has been argued that uncertainty should no longer be used as a rationale for doing nothing on the policy front. The ball is in the politicians's court.

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21/ Note, however, that motor fuel taxes are not as easily reconciled with the assumed desire of Canadian consumers of oil products to see domestic prices lower than world-equivalent levels, when the latter are high or rising rapidly.

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