

Canadian Energy Policy: Some Economic Questions*

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The word "crisis" derives from the Greek word meaning to decide. It describes a decisive moment, a turning point, or a crucial time. To a doctor, a crisis is "that change in a disease which indicates whether the result is to be recovery or death." To a student of business cycles, it is the "culminating point of a period of business prosperity," and a period of liquidation or recession may follow. Over the past year or two there has been frequent mention of an "energy crisis," and it will be useful to begin our consideration of Canadian energy policy by examining the reasons for this concern. We are accustomed to hearing of new crises practically every week, so we may be excused for wondering if our policy makers and news commentators don't frequently use the more dramatic term when they might simply say "change." Consequently, we will want to identify and evaluate the critical factors in the current situation.

While the problems that comprise the "energy crisis" have perhaps been associated with the large metropolitan areas of Eastern Canada and the United States, they have also been very much on the minds of British Columbians. Two issues, in particular, have aroused controversy: the proposal to dam the Fraser River in order to generate hydro-electric power and the routing of oil tankers from Alaska along the West Coast and into Puget Sound. Rather than discussing particular local issues, however, we will deal with the "energy crisis" in a broader setting. Most of the discussion implies that the problem is a continental, indeed global, one. The policies that are evoked at the federal and international levels will have important consequences for British Columbians and other western Canadians.

At the outset I suggest that in most discussions of the "energy crisis" we can identify two sets of issues. On the one hand, our attention has been drawn to the important question of environmental quality; at the same time, we have been exposed to the fear that we face the prospect of not having sufficient energy available to satisfy ever-increasing demands.

* In revising this paper I have had the considerable benefit of comments by Robert Evans, Anthony Scott, and Ronald Shearer.

These two problems are certainly not independent, but it is a needless source of confusion to lump them together. It is doubtful that the provision of energy to meet North American needs is the principal, let alone the sole, cause of our environmental problems. At the same time, the observed or anticipated energy shortages cannot be attributed just to increased pressures to maintain environmental quality. Consequently, we will resolve the "energy crisis" into two components, an "environmental crisis" and a "supply availability crisis."

Instead of agonizing over whether the point has been reached at which the various problems of maintaining environmental quality constitute a crisis, let us consider where energy fits into the picture. In discussions of energy and the environment one of the most commonly cited sets of figures shows how energy consumption per person varies among countries.¹ In countries with advanced industrial economies, per capita energy consumption is dramatically higher than in less industrialized countries. The casual inference is that the environmental problems of the advanced countries, alleged to be worse than similar problems experienced elsewhere, are somehow caused by the higher energy consumption. Incidentally, since in this context high energy consumption has a bad connotation, it is chastening to observe that per capita energy consumption in Canada is second only to that in the United States.

The fact is that per capita energy consumption correlates very well with G.N.P. per person, and therefore is a useful *measure* of how industrialized a society is. Industrialization and urbanization go hand in hand; together with population growth they have led to increased strain on man's environment. Provision of energy is only a part of the processes of industrialization and urbanization. Would curbing energy use, for example, by making it much more expensive, solve the environmental crisis?

Piecemeal policies to discourage energy use might have perverse results. Dollar-a-gallon gasoline would discourage use of a major polluter, the internal combustion engine in automobiles, but it is not clear how the direct and indirect effects would balance out. The French pay almost that much for gasoline, which apparently influences them to choose smaller and more efficient engines, although it is not clear how much it discourages them from driving. Perhaps such a high price would speed the conversion to battery-powered vehicles. This would probably offer some environmental benefits, even though it would not be likely to dis-

¹ See, for example, Chauncey Starr, "Energy and Power," *Scientific American*, September 1971, 37-39. The relation between energy use and environmental quality was raised repeatedly in this year's H. R. MacMillan Lectures (to be published by the Institute of Animal Resource Ecology, U.B.C.).

courage road construction. Moreover, energy consumption, measured in conventional B.t.u. units, would probably rise, given the efficiencies achieved in generating and using electricity.

Sharply raising the price of all energy would be a very regressive step. It is not clear how substantial the resulting marginal reductions in energy use would be or how great a contribution to environmental quality they would represent. Some people would probably forego air conditioners and clothes driers, and some rather significant changes might be induced in the transportation sector.² However, maintaining environmental quality will certainly require more direct action on such matters as reduction of birth rates, dispersal of population, development of pollution-saving technologies, and substitutions that favour products and processes which are not linked with environmental damage. The latter two considerations would have an important impact on the type of energy sources used. It is certainly not clear, however, that a comprehensive set of environmental quality programmes would lead to a significant reduction in the overall demand for energy, at least in the foreseeable future.

Turning from the demand side of the energy picture, we confront the second alleged crisis, that of supply availability. The concern is that energy supplies will be inadequate to meet forecast demand in the not-too-distant future. There are grounds for caution in assessing projections that imply future shortages. Trend extrapolation is unreliable, since the threat of shortage provides the stimulus to develop new sources of the desired service, in this instance, of energy. The fear of an energy crisis has arisen, however, because in the United States shortages have already appeared, in the form of brownouts in major cities and the inability of some gas distributors to meet the demands of their consumers for additional volumes of natural gas.

In order to put the present shortages in perspective, we need to examine the factors that precipitated them. A shortage is a situation where a potential user cannot have what he wants at the price he is asked to pay. The qualification saves us from worrying about the shortage of 10 dollar ski boots or 10 cent martinis. However, when New Yorkers are told to turn off their air conditioners with the temperature reading 95 and the

² An example of the possible changes can be seen by looking at figures on net propulsion efficiency, defined as the number of passenger miles moved per gallon of fuel. For a highway bus the N.P.E. is about 140; an intercity passenger train manages 100 to 110. On the other hand, for a DC-8 jet airplane the N.P.E. is about 20, the S.S.T.'s are designed to do only about half as well as that, and helicopters are worse yet. See R. A. Rice, "System Energy and Future Transportation," *Technology Review*, January 1972, 31-37.

relative humidity 94, there is clearly a shortage of power. What caused it?³

First of all, there is a lag between planning and completing new power plants. Forecasts of power consumption made in the mid-60's failed to predict a spurt in the rate of growth of demand for electric power, so utilities had underestimated capacity requirements. Several causes have been identified for the unexpected spurt. These include the rapid rate of substitution of electricity for coal and oil for heating homes and commercial buildings and the huge increase in the use of air conditioning. In attempting to meet the increased demand, producers encountered a variety of complications. After years of continuing improvement in the efficiency of use of fossil fuels in power generation, further gains proved hard to achieve as theoretical maximum efficiency was more closely approached. This removed a trend that had previously helped to hold down the investment required to meet demand increases. Startup problems and higher capital costs held up nuclear plants that were on the books. In some instances, conventionally fueled plants were delayed as a result of environmental controversies.

Aside from the shortage of capacity, bottlenecks developed that affected existing generating plants operating with conventional fossil fuels. In the coal industry the prospect of weakening demand, the other side of the optimism over nuclear power, had led to reduced investment in capacity. Fortunately coal stockpiles were large, but at the same time export demand for coking coals was brisk, and this led to a shortage of freight cars for getting the coal to the generating stations. Utilities dependent on fuel oil or natural gas also found some unusual situations. Eastern cities have been placing progressively more stringent limits on the allowable sulfur content of fuel oil because of air pollution problems. Projected desulfurization plants were not yet on stream. To make matters worse, Libya, a major source of low-sulfur crude oil, opted to restrict output as part of its bargaining tactics with the international oil companies; this meant that additional supplies had to be obtained from the Persian Gulf, thus requiring tanker shipments around the Cape of Good Hope. Normally this would have been inconvenient and more expensive, but the situation was complicated when Syria decided to shut down Tapline, a major pipeline for transporting Saudi Arabian crude to the Mediterranean. Now this crude too had to go around Africa, so tankers became very scarce and expensive. The result for Eastern utilities was a price rise that made fuel

³ Discussion in the following two paragraphs relies on the article, "Behind the Energy Crisis," in *Resources*, No. 36 (January 1971) and on a report by National Economic Research Associates as described in *Petroleum Press Service*, July 1971, 257-59.

oil very unattractive. Utilities that might have used natural gas found that they could not obtain additional supplies, a shortage to which we have already alluded.

The shortage of natural gas in the United States can perhaps in part be explained by an unexpectedly rapid increase in demand and by lags in capacity adjustment. Particularly significant was the use of gas for other purposes than as a fuel, for example, as an input in the production of petrochemicals. However, by far the most important reason for the shortage appears to be the price freeze imposed by federal regulation, specifically, the Federal Power Commission's policy of regional price ceilings.⁴ In an unregulated market, price rises until demand is equated with supply; price thus covers the cost of incremental units of output. When price is held down by regulation, additional more costly supply sources are not developed, and when demand increases shortages result.

The upshot of all this, as we have noted, was the pinch of shortage in at least two areas, electric power (on peak) and natural gas (to prospective industrial consumers). Is this the making of a "supply availability" crisis? A remarkable set of events had preceded the shortages. Recognizing that allowances for unforeseen happenings must be made in designing a system, one might still argue that any system that could have absorbed all this without visible effect would have been seriously overdesigned. At any rate, now that we have more perspective it is worthwhile to examine just what changes have taken place. Is there a crisis in the turning point sense or, in the arcane language of the economist, have we observed a few parameter shifts so that now energy markets are seeking new equilibria not far different from the original ones?

I find the latter description more convincing. Some significant changes have taken place, but an important distinction must be made between problems of short-term and of long-term adjustment. For example, at the moment some complicated and expensive arrangements are required among oil refiners to get crudes which can be blended to meet the sulfur specifications required in metropolitan areas. Desulfurization plants are coming on stream and will ease the problem, even though nobody seems quite happy with the available technology. Desulfurizing crude is not likely to make it cheaper, although taking sulfur out of natural gas has proved profitable. Nevertheless, one suspects that everybody will in time become accustomed to the new set of rules, and consumers may at least sniff better smelling air as they pay their slightly higher utility bills. A

⁴ Paul W. MacAvoy, "The Regulation-Induced Shortage of Natural Gas," *The Journal of Law and Economics*, Vol. XIV (April 1971) 167-99.

similar kind of adjustment is certainly likely for the coal industry, although it is very doubtful that the time is yet here for coal to hope to regain its former pre-eminence as an energy source. The natural gas situation is different, but the cause of the current difficulties seems clear. When price adjustment is permitted, the rise is likely to be significant, but customers will be able to obtain service.

Supplying energy to meet North American demand in the next decade or two will involve overcoming problems whose difficulty should not be minimized. Nevertheless, the evidence does not suggest that these problems are of crisis proportions. In the more distant future, global energy needs could present a crisis. This is the perspective in which the "standing-room-only" spectre looms. The implications of this future cannot be ignored, but the present discussion will be restricted to energy policies whose impact is more immediate.

Turning to policy matters, the United States natural gas situation points up the inadequacy of explaining the current energy picture solely through the use of free-market models. In both Canada and the United States government intervention is extensive. Perhaps the foremost example is the American petroleum industry. The Texas system of prorationing of production to market demand was originally established to prevent physical waste and protect property rights where ownership of crude oil was determined by the "rule of capture." Inherent in the method of establishing production quotas is the need for the regulating agency to sanction the price level of crude; the tendency toward establishing too much producing capacity is unrestrained by price, since the agency is able to raise the price when necessary to cover the cost of wasteful excess investment. When imports of foreign crude oil threatened to break this price-setting power, import restrictions were imposed. The rickety system now serves the interests of a very large group of industries and is rationalized as necessary to American security needs. One result is the uniquely high price of crude in the American market, which naturally increases its attractiveness to Canadian exporters. Unfortunately, the regulatory system in Canada has borrowed the essential features of the American one. Wasteful practices have raised the price of crude here too, making Canadian crude unattractive in markets outside North America.

To understand the issues currently being discussed, it is necessary to recognize the crucial role in the energy sector of government, both in Canada and the United States. Government agencies intervene to suppress or stimulate the domestic supply of different fuel resources, to regulate the flow of exports and imports, and to guide the development and

use of new energy sources. It would require a lengthy study to examine all the various instances of government action and to describe the instruments used and the goals sought.

The most urgent policy debate at present in Canada relates to the export of Canadian energy resources to the United States. The issues raised are referred to under the heading of "national resources policy" or "continental resources policy," depending on the speaker's point of view. In broadest outline, the Americans are faced with an increase in the price of energy, largely attributable to the rising costs of crude oil and natural gas. These in turn result from dependence on domestic stocks which are no longer of as high quality as they once were. One means for restraining the rise in energy prices would be to import fuel resources in greater quantity. This poses a dilemma for the Americans, however, because they are very sensitive to the possible insecurity of foreign sources. Two courses seem open by which to escape the dilemma or at least mitigate its consequences. The first is increased importation of crude oil and natural gas from Canada. The second is the achievement of new energy technologies, and was signaled by President Nixon in his "clean energy" message last June. He called, among other things, for greatly stepped-up research on nuclear breeder reactors and for more research on processes for the gasification of coal.

Within this general strategy the Americans would seem to have substantial area for manoeuvre, and the choices they will make are hard to predict. One reason, of course, is that some of their choices are highly dependent on choices we will make, or could make, in Canada. The possibility exists for Canada of a very significant increase in the level of fuel resource exports to the United States. How this trade will develop will be determined, or is being determined, by some very hard bargaining. As this proceeds, it will become apparent that each side has various options, although at the present time I doubt that these are well formulated on either side.

To illustrate alternatives, consider the case of natural gas. Canada could agree that there would be no more foreign sales whatever in order to husband our gas to meet domestic needs for many years. This might appeal to Canadian gas consumers who would expect lower prices as a result. It might appeal to conservationists on principle, as well as to those who desire an anti-American policy line. The "restrict exports" approach might also be attractive to protection-minded industrialists, who would see the opening up of trade as a potential threat to them.

On the other hand, Canada could export natural gas to the United

States in various volumes right up to the maximum that would be achieved under a North American common market arrangement. This would please free traders, many of them economists, who could see the earnings in many different uses: improved social welfare programmes, "buying Canada back," generating new investment funds, or just allowing some people to become richer. The "higher exports" policy would particularly appeal to developers in the West, who always like to see things get bigger.

Between the extremes lies a great range of possibilities. Canada could permit exports but require that markets be diversified. Assuming continued rapid development of liquified gas (LNG) transportation techniques, this course might be feasible, although it would be accomplished at the cost of selling some gas in markets such as Japan which would not be as profitable as the United States market. Canada could choose to export at controlled levels, the amounts and terms of trade being determined by negotiation.

This is heady speculation, and it should not be allowed to blind us to the realization that trading partners usually have options too. The Americans can, first of all, permit the field price of natural gas to rise, an inevitable event anyway. At higher prices their shortage can be expected to ease and perhaps disappear, at least for a time. In the background, of course, is the possibility of an economic process to make synthetic gas, a prospect obviously not lost on the President's energy advisors. The cost of gas from coal can be expected to define a ceiling for the price of natural gas for a long time. Canadian natural gas is certainly attractive to the United States, but it is foolish to perpetuate the fantasy of absolute American dependence on Canada. Autarky can be expensive, but United States policy toward its domestic crude oil industry suggests a willingness to bear extra costs if desired ends are served.

If there are to be negotiations over energy exports, what will Canada seek and what gains are possible? Satisfying all the diverse interest groups is out of the question. Yet, while conceding to the politicians primacy in the role of working out arrangements which successfully compromise group interests, economists can still point to questions that should be tackled as a prerequisite to rational policy making. Simply establishing the purposes of existing government regulatory activities and evaluating the results achieved to date would be a good place to start. Indeed, a look at federal and provincial policies relating to various energy industries reveals some strange situations.

Consider the National Oil Policy, with its line drawn at the Ottawa Valley. East of the Valley, crude oil can be purchased from any seller a

refiner chooses. Everywhere else the market must be supplied by oil produced in western Canada. This policy was put forth in 1961 in response to pressures from producers in Alberta, where a great deal more capacity had been developed than could be utilized. This situation had arisen as a result of the provincial prorationing system, whose rules for assigning output quotas provided incentives to drill far more wells than were required to meet existing market demand. Now, in the 1970's, we might ask whether this producer-rescuing policy promotes such minimal goals as efficient investment of capital, let alone low fuel prices for industrial and private consumers. Probably not; prices are too high. Even if goals related to environmental quality, conservation, or transportation led us to favour discouraging oil consumption through higher prices, there would still be a presumption in favour of lower-cost supply, with the difference going to the public in tax revenue. So far as I know there has been no recent comprehensive review of this policy, nor does any agency appear to accept the responsibility of reviewing alternatives and considering the public interest.

Turning to natural gas, Canadian export policy is administered under principles laid down in the National Energy Board Act. In approving export licences the Board must be satisfied that:

- (a) the quantity of gas or power to be exported does not exceed the *surplus* remaining after due allowance has been made for the reasonable foreseeable *requirement* for use in Canada having regard to the trends in the discovery of gas; and
- (b) the price to be charged by an applicant for gas or power exported by him is *just* and *reasonable* in relation to the public interest. (my italics)

Such guidelines could only have been translated by the Board into a workable economic policy by a combination of imaginative analysis and good luck.

Examination of the National Energy Board's decisions on gas export permits, suggests that the surplus criterion has not been developed and applied in the context of a comprehensive economic analysis of the supply and demand for natural gas.⁵ Some of the difficulties become apparent if we consider the meaning of the term: surplus is the opposite of shortage, gas that has no Canadian buyers at the current price. A surplus of natural

⁵ These comments are preliminary conclusions from a study I currently have in progress on N.E.B. regulation of natural gas exports.

gas was understandable before markets were developed and when the gas was produced as a joint product with crude oil. Now drillers seek non-associated gas, and it requires a large amount of investment to discover and develop reserves. A large surplus would be an expensive anomaly.

The reserves considered in the N.E.B.'s calculations are the result of past drilling activity. When fields are found that will not yield profits if developed at the prevailing price level, they are shut in to await higher prices. Gas in these fields may be surplus in a physical sense, but such quantities have little economic meaning. Supply information must indicate the quantities available at particular price levels. There is another and perhaps more significant problem involved in planning future supplies. Exploratory drilling is induced by the prospect of economic reward, and expectations are based on projected sales at a forecast price. If the price level is expected to rise, exploratory drilling will be attractive, and new fields will be found. Again, consideration of price cannot be neglected if useful analysis of future supplies is to be accomplished.

Faced with determining the "just and reasonable" price, the Board has looked to cost of service, that is, all operating costs and an allowable rate of return on capital. This can lead to some curious situations in competitive markets, so the Board has applied additional tests such as that the export price should be at least as great as that paid by nearby Canadians and, on a visionary note, that the price to foreign buyers should not be materially less to those buyers than they would pay to alternative suppliers. Historically, the Board's procedures don't give us great confidence that it has the authority or inclination to sort out the economic questions posed by different possible natural gas export deals with the United States.

In western Canada we not only feel as consumers the effects of the government's activities in the energy sector, but we also see the effects on the producing industries. Hence, we are particularly concerned over the policies that will be developed in response to current energy controversies. The question of exports to the United States is the most visible, but it cannot be dealt with in isolation from existing policies and their implications.

I will conclude by summarizing the picture as I see it. The federal government and the provincial governments are committed to intervention in one form or another in all the industries that provide basic energy sources. This intervention extends to regulation of production as well as control of exports and imports. Particular policies have been developed in response to particular pleas, notably those of distressed producers seeking relief and, to a lesser extent, of conservationists and nationalists. There is

no evidence now of any government effort to inquire into the proper goals of energy policy as a prerequisite to harmonizing the policies of existing agencies. Unless remedied this deficiency will handicap the Canadian delegates in any negotiations with the United States, because they will have to try to relate the export question to a piecemeal set of domestic policies.

An enormous amount of attention is being given to continental trade, and it is reasonable to suppose that the Americans would like to obtain some definite agreements. Negotiations over the export of fuel resources can be expected to be complex, not only because of the competing interests of domestic groups, but also because of the uncertainties involved, in particular, in regard to resource stocks and to new technologies for extraction, utilization, and creation of substitutes. It will pay Ottawa to give careful study to some hard economic questions like these:

1. What information is available about Canadian reserves and prospective reserves, applying different assumptions about price level?
2. What information should we be gathering? How responsive to price is American demand for crude oil and natural gas likely to be, given the alternatives of investing in processes for coal gasification, crude oil recovery from the shale deposits, and nuclear power generation? In what ways might existing energy use patterns be modified in order to improve environmental quality? Under the present tax structure and with the existing degree of foreign ownership, who are the direct beneficiaries from the sale of resources for export?

If the federal government fails to analyze its objectives or to explore its options, it could make some very bad bargains. Even more serious, it could be pushed into more comprehensive and far-reaching arrangements than are desirable. We began by noting that "crisis" properly applies to a decisive moment or turning point. Perhaps it is when we consider the formulation and implications of Canadian energy policy that we see the ingredients of a true crisis.