*Energy utility industries in the United States and Canada, and the regulation of them, have changed dramatically in the past decade. This paper describes the forces driving regulatory change in the electricity and natural gas industries and considers the roles of demand-side management and integrated resource planning. The issues involved in defining an appropriate role for the regulator are discussed and possible future developments in energy regulation are suggested.*

*Au cours des dix dernières années, les changements dans l'industrie des services publics en énergie, aux Etats-Unis et au Canada, et les règlementations les concernant ont été spectaculaires. Cet article expose les forces qui poussent à modifier la réglementation relative aux industries de l'électricité et du gaz naturel et examine les rôles de la gestion touchant la demande et de la planification intégrée des ressources. Les implications qui découlent de la redéfinition du rôle qu'il convient d'attribuer aux organismes de réglementation sont discutées et les développements possibles en matière de réglementation énergétique future sont envisagés.*

# Regulation of Energy Utilities in Canada: Where Do We Go From Here?

MARK JACCARD

## 1. Introduction

The last decade has seen a dramatic change in the energy utility industry, most notably with the emergence of electricity demand-side management and the deregulation of natural gas supply and transmission contracting. These kinds of changes have in part been driven by government policy but primarily by utilities and their utility commissions. While some of these developments have been initiated in Canada, most innovation has originated in the US.

It may seem unnatural to put in the same sentence the words utility commissioner and excitement, but for utility commissioners these are exciting times. The rules of the game are changing rapidly in both the gas and the electric utility businesses, in large part for different reasons. Now utilities and their regulators are exploring the extent to which developments in one sector will carry over to the other sector. As we head into the 90s, all participants are interested in peering into the future of energy

Mark Jaccard is Chair and Chief Executive Officer of the British Columbia Utilities Commission and is on leave from the School of Resource and Environmental Management at Simon Fraser University.

utility regulation. Will the deregulation trends in natural gas supply be extended to electricity? Will the demand-side management and least cost planning trends in electricity be extended to natural gas? How will emerging environmental concerns impact on regulation? Will other issues, such as risk and social impacts, be incorporated into the energy planning process?

Regulation of the energy industry is not simply the mandate of utility commissions, especially in Canada. In this country, energy regulation is equally the responsibility of government ministries, given that electricity markets in most provinces are dominated by publicly owned electric monopolies that enjoy varying degrees of independence from regulatory agencies.

The rapidity of energy utility regulatory developments in recent times has not been without confusion for all participants in the regulatory game: regulators, regulated, the public and policy makers. The objective of this paper is to help reduce that confusion. The paper summarizes the driving factors of recent regulatory change in both the electricity and natural gas industries. Then it surveys and contrasts alternative interpretations of the mandate of energy utility regulation. These alternative visions of regulation are then explored in order to present the range of possible futures for energy utility regulation. There is no assumption of exactly what the regulatory future will look like. But clarity about the key options and the key issues should help participants to prepare themselves for responding to and helping to shape that future.

## 2. Electricity and the Path to Integrated Resource Planning

The crisis in the US electric industry in the early 1980s contributed to — indeed some say caused — the development of demand-side management and ultimately integrated resource planning. Demand-side management — utility programs to reduce or shift load — gained credence among upper management as a legitimate response to dramatically rising supply costs and demand uncertainty. Utilities began to look to influencing demand rather than simply accepting it as forecast. Of course, this does not mean that demand-side management (DSM) is always the preferred option; a strong debate continues. Some argue that once DSM savings are rigourously evaluated and all utility costs are incorporated, DSM will prove to be much less lucrative (Joskow and Marron, 1992). Yet, it is amazing how quickly DSM has become accepted as a legitimate utility activity. Thus, while DSM activities will undoubtedly be more carefully scrutinized and perhaps sometimes rejected, DSM is here to stay.

One question is how one measures and evaluates the gains from utility DSM efforts (Hartman and Doane, 1987). An equally important question concerns the mechanisms, if any, that utilities and their regulators should use to ensure the appropriateness of investment in DSM. Some utility commissions have begun to experiment with various options for providing financial incentives to utilities to pursue DSM. For example, utilities could be allowed to include DSM investments in rate base, perhaps even earning a higher rate of return on these.

Independent power production (IPP) has been on the scene for some time in the US, largely as a result of the federal Public Utility and Regulatory Policies Act of 1978 that required utilities to purchase electricity from certain types of lower cost generators. The IPP trend has evolved to partly resemble parallel deregulation efforts in natural gas supply. An increasing number of utility commissions are requiring electric utilities to establish bidding procedures in which diverse independent power producers compete to meet load growth.

The notion of bidding follows standard economic logic that lowest cost is achieved by a tendering process. For electric utilities, the rationale is that while electricity transmission and distribution are still obvious natural monopolies, the same cannot be claimed for electricity supply. Thus, small and large projects can equally compete for new supply.

More recently, the logic of bidding for supply is being extended to include DSM in-

vestments. Integrated resource planning focuses on the services provided by energy, allowing equal consideration to supply and DSM investments to provide such services at lowest possible cost. While some utilities and their commissions argue that this integration of supply and demand is best left to internal resource selection by the utility, others are instead considering the extension of supply-side bidding to include supply and DSM bidding, in processes regulated by utility commissions (Kahn and Berman, 1989).

These diverse developments create considerable uncertainty. Perhaps the only certainty is that the functions and expertise required of utility regulators will continue to change. This change will require some retraining of staff with a greater emphasis in the near term on economics relative to accounting (Hirst, 1988).

## 3. Natural Gas and the Path to Integrated Resource Planning

The developments in electricity have had significant implications for gas utilities. The same regulators who have been involved in dramatic changes in electric utility regulation are now turning toward gas utilities and asking themselves if, and to what extent, there are analogous lessons for gas regulation.

Of course, in terms of dramatic regulatory changes, gas need not take second place to electricity, for the implications of deregulation in natural gas have been tremendous. Natural gas companies that had formerly been vertically integrated from the production field through to distribution have had to segregate their transportation and marketing operations. Pipelines have been opened up, allowing customers to purchase directly from producers, with prescribed payments for pipeline access. Indeed, as this process continues, regulatory agencies face the dilemma of how far it should be allowed to go. The gas requirement of individual direct purchase customers is increasingly segregated into a complex array of fixed and commodity charges, while core market customers are enticed by the benefits offered by market aggregators. Regulators must ask themselves if there is a point at which unbundling imposes more costs and risks than can be justified in terms of widening the range of services available to the consumer.

These deregulation issues in natural gas have, in part, carried over to electricity, as electric utilities and their regulators begin to examine the possibilities of following parallel initiatives. In the opposite direction, from electricity to gas, the term DSM is beginning to emerge among gas utilities. Initially, gas utilities seemed to be especially excited at the opportunity to use DSM to promote increased gas sales, gas often being the cheapest end-use option for the consumer. But, increasingly, gas utilities and their regulators are following the precedents set by electric utilities, i.e., looking comprehensively at DSM in order to examine all of the consumer's options, including efficiency improvements, load shifting and interfuel substitution.

If the precedent of electricity continues to be followed, natural gas utilities should soon see themselves deeply involved in integrated resource planning (Etter, 1992). For example, capacity expansion or storage investment would be compared directly with DSM investments that shift or reduce peak gas demand. And new supply contracts would be compared to efficiency investments.

Of course, although the IRP rationale can be equally applied to gas, there are differences between electricity and gas that will result in regulatory differences. For example, the long run avoided cost of gas is more problematic, and gas utilities have different industry structure and different planning horizons (Samsa, 1992).

## 4. Probing the Outer Limits of Gas and Electricity IRP

As this review of developments among electric and gas utilities suggests, the trend is toward integrated resource planning. The paths differ, but in many respects the end points appear similar. However, because energy utility regulation is still undergoing such dramatic

change, a vision of the future requires an additional analytical step. I now turn to examine some of the factors driving the movement toward integrated resource planning. The intent of this analysis is to probe the realm both of the possible and of the likely in energy utility regulation.

By their natural monopoly character, electricity and gas utility markets are markets in which intervention is accepted, be it primarily utility regulation as in the US or some combination of crown corporations and utility regulation as in Canada. The move to integrated resource planning represents a further intervention in energy markets. In effect, one could say that now not just the investments of the energy supplier are under prudence review, but also the investments of the energy consumer. Of course, utility managers point out a significant difference. If utility investments are shown to be imprudent, utilities and their shareholders must absorb the costs. However, if the investment behaviour of consumers is found to be imprudent, consumers are rewarded with a subsidy — in the form of a DSM grant — to make a more prudent investment next time. The analysis gets more confusing in the context of Canadian electric utilities, where the consumers are frequently also the shareholders.

Whatever the logic, it is now fair to say that utilities and regulators have extended their purview from supply investments to all energy-related investments, be they energy producing or energy consuming. This can imply prudence review of virtually all major household expenditures — house, car, appliances — and all industrial capital equipment.

It is important to note that up to this point the rationale for intervention in energy utility markets has not been based on environmental concerns. Often this is misunderstood. First, energy utility markets are regulated because of their natural monopoly character. Second, the extra market interventions of DSM and IRP have been motivated by their attractiveness to utility management and utility regulators from an economics and risk perspective. This is because there are market failures and barriers to demand-side investment that, if they can be overcome, provide favourable investment opportunities from the customer's perspective; these include different perceptions of otherwise identical risk and asymmetrical access to capital and information.[1] There are also risk reduction benefits in that DSM can reduce the uncertainty associated with forecasting demand, and thus the uncertainty of large investments with long lead times (Ford and Geinzer, 1990).[2]

Thus, environment need not be in the equation as a rationale for regulation of utility integrated resource planning. Indeed, perhaps the key question today is, "should the environment enter the regulatory equation at all?"

Here is the rationale for including the environment. The attached flow model (Figure 1) depicts the potentially unsustainable character of our economic system. Resources of energy and matter are extracted from the surrounding environment and flow from the left to the production sphere where they are transformed into consumption products. Both the production and consumption of products involves the generation of wastes which are emitted back to

---

1/ For example, the risk of getting a certain return on an investment to increase insulation of a house is the same regardless of whether the utility or the householder makes the investment. However, the utility can safely assume that it will be around long enough to recoup such investments. The householder has the added private risk that other conditions may require selling the house sooner than expected. Since new buyers face the same uncertainty (in addition to a lack of understanding of the economic benefits of a better insulated house and a lack of capital to pay the extra cost) the house selling price is unlikely to reflect the added value of the insulation, thereby preventing the seller from recouping the initial investment and thereby increasing the risk. Sutherland (1991) provides much needed clarity to an issue that has been confusing to many

2/ This latter benefit is relevant to residents of Ontario, where the wisdom to build a nuclear plant in 1976 depended upon accurate forecasting of energy market conditions (demands, supply costs) in the 1990s.

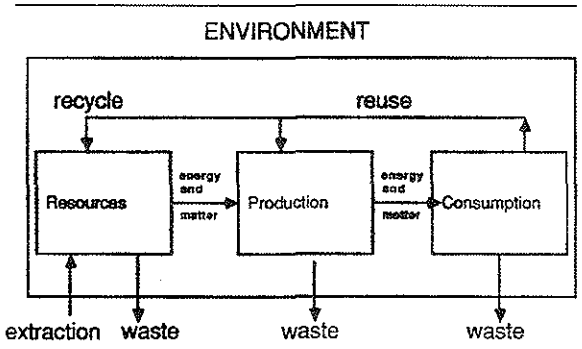


**Figure 1**: Flow Model — Resources and Economic Activity

the environment. While energy is always degraded in this transformation process, some matter is reused and recycled.

This flow model differs dramatically from the traditional model used by economists to describe the circular flow, between households and firms, of money, labour, goods and services. The model suggests that the system may have at least two unsustainable links. First, resources may be exhausted. Second, the receiving environment may be overwhelmed by wastes. If either of these is possible, society has an interest in reducing flows, both of resources and waste. In the 1970s, there was a fear that rising oil prices foreshadowed impending resource scarcity. But as economists argued at the time, this simple flow model ignores the price feedback effect. Price increases, in the case of oil, led to (1) improved efficiency of oil using technologies, (2) successful search for more oil, and (3) substitution of oil by other products. The resource box in the graph may ultimately be a limiting factor, but it is not yet, as we seem to be discovering with natural gas supply.

In the 90s the weak link is increasingly seen as the waste assimilating capacity of environment. The perception of crisis has evolved from one of too little energy of any kind to too much energy of the dirty kind. The material and energy flows of our system, by virtue of their pressure on the environment, may render our economic system unsustainable. Moreover, there is not the same potential for correction by feedbacks in the market system, because key components of the ecosystem — air and water — tend to be non-priced common property resources. At some future time, economists will argue, clean air and water will command a price. But this may be too late, after irreversible damage to ecological sustainability.

This fear that markets cannot in isolation address the sustainability question has led to calls for greater market intervention, by any agency that is in a position to act, be it government, public regulators or others. Utility commissions have been especially targeted with this concern because, as noted, market intervention is already the norm in energy utility markets. Moreover, many of the issues of economic sustainability centre on the flows of energy and its wastes in our economy. Thus, it is not too difficult to argue that truly integrated utility resource planning should also include concern for environment and sustainable economic activity.

If regulators were to incorporate environmental sustainability into their regulatory mandate, what would this imply? We have examples to guide us because an increasing number of utility commissions have begun to address this issue.

For evaluating new resource acquisitions, environmental adders are percentage cost premiums that are added to the life cycle cost of energy resource alternatives in order to reflect their relative environmental disbenefits. The values of these adders are intended to reflect a rough estimate of relative magnitudes without giving the impression of precise knowledge. A more advanced step — affecting not just new resources but also dispatch from existing facilities — is to establish cost estimates of the damages caused by each pollutant and then incorporate these into the market price of energy. If energy prices are adjusted to incorporate environmental costs, consumers will then face the costs to society of their energy consumption decisions. However, as noted, the DSM research suggests that, because of other market failures and barriers, price adjustments are necessary but not sufficient to instigate socially cost-effective energy efficiency investments. Thus, price adjustments to incor-

porate environmental externalities will not remove the need for DSM. Utilities may still require direction or incentives to motivate them to pursue measures that are in society's interest, especially because these may lead to reduced utility sales. This is the rationale behind exploration of utility rewards for energy efficiency investments, for example, by inclusion in rate base and perhaps with a preferential return to equity (Bower, 1992).

The ultimate effect of these measures is to reduce society's throughput of energy from what it would otherwise be. In some cases, the demand for energy services would decrease, as consumers would now face full incremental costs of production plus environmental costs (an example might be transportation). In other cases, the same level of service may be obtained, but equipment will be more energy efficient (an example might be lighting). Returning to the graph, the energy and waste flows of society would be less even in cases where society received the same level of service.

For some, however, the incorporation of environmental externalities is just the tip of the iceberg. Environmental costs are only one component of full social cost accounting. Additional factors need to be included. What are the relative risks of alternative energy investments? What are the relative social impacts? What are the relative employment effects? If these and other factors are to be included in the resource selection process, they must either be converted into monetary values or else situated within a multiple accounts decision framework. It gets complicated.

Some utilities and their regulators have moved in this direction with the development of new resource bidding schemes — that include supply and DSM — in which competing bids earn points for cost, risk, externalities, employment, etc. It is perhaps obvious to point out that if this is the eventual end-point of the integrated resource planning revolution, the role of utility commissions, and the expertise required of their staffs, will face a period of continuous and dramatic change.

Indeed, for some it is exciting to think of public utility commissions as lead agencies in the drive to a sustainable economy. Through their regulatory innovations, public utility commissions provide experimental models for the kinds of market rule changes that are required if our economy is to achieve a path in which profits are disconnected from energy and material throughput (Andrews, 1990).

## 5. Critique of Extended Public Utility Intervention in Energy Markets

The regulatory scenario that I have just described is a dream for some, but not for others. There are those who argue that utility commissions have betrayed their mandate in pursuing demand-side management, integrated resource planning and social costing of resource options, that the level of market intervention far exceeds the justification of natural monopoly.

Certainly, it is true that the original mandate of public utility regulation was to ensure that (1) utilities charged rates that reflected cost plus a normal return to investment, and (2) did not imprudently invest. For some, extension of this mandate is a perilous enterprise. The argument goes as follows.

First, there is no guarantee that public utility commissions and the utilities they regulate have better foresight and better judgement than consumers in determining the relative risks and merits of demand-side management investments. For all its failures, the market is still more reliable than interfering utilities and their regulators.

Second, public utility commissions generally regulate the electric and natural gas industries. But the energy market is a complex interplay of diverse energy sources, sectors and submarkets. There is no guarantee that intervention in only part of the market will move society closer to economically or socially desirable outcomes. Failures or distortions in other parts of the energy market may be intensified by intervention that is restricted to the markets of electricity and natural gas utilities.

Third, if there are concerns about the overall efficiency and sustainability of energy markets, these should be the concerns of govern-

ments not utilities and their regulators. Governments can set efficiency regulations, provide additional information or even award grants in order to offset investment asymmetries. Governments can set pollution taxes or allocate pollution permits (tradeable or otherwise) to deal with environmental costs. Governments can encourage initiatives to foster economic growth. Governments can improve public involvement in the evolution of energy and other resource markets. Governments can assess and redress social impacts of energy production, transportation and consumption.

## 6. Concluding Comments: What is Likely?

The recent trends in energy utility regulation have indeed been dramatic. Seen from the perspective of "sustainable development," these trends have some exciting attributes. (1) They can contribute to a sustainable economy by helping to correct asymmetries between supply and efficiency investments. (2) They can contribute to a sustainable economy by integrating environmental impacts into decisions of resource selection and dispatch. (3) They can contribute to a sustainable economy by improving public awareness and involvement in the ways in which adjustments to functioning markets can lead to reduced flows of energy and matter without reducing levels of physical well-being.

However, these developments in energy utility regulation are not without their challenges and dangers. There is a legitimate concern that utility commissions will overstep their mandate, venturing into issues that are best dealt with at the broader level of government policy direction. As energy regulators continue to make the incremental decisions that determine the regulatory future, they must exhibit foresight and judgement in balancing these exciting opportunities against the myriad of potential pitfalls.

But, at least in the near future, there are some trends that can be predicted with a fair degree of confidence. In particular, gas utilities will be expected to follow generally the path of electric utilities. This will include, above all, the use of analytical tools that allow regulators to determine the accuracy and fairness with which the gas utility is integrating demand and supply options within a least cost framework. These analytical tools for both gas and electricity will also require the utility and its regulators to address asymmetries in the treatment of risks and in the development of demand and supply side resources. Finally, these tools must also be accessible to the public, as innovative non-hearing techniques of public involvement will continue to be advanced and incorporated into standard regulatory practice.

## References


Andrews, C. (1990) *Spurring Inventiveness by Analyzing Tradeoffs: A Public Look at New England's Electricity Alternatives,* Working Paper, (Boston: Massachusetts Institute of Technology).

Bower, R. (1992) *Revenue Decoupling: Aid or Impediment to Utility Regulation?* , Proceedings of the National Association of Regulatory Utility Commissions Integrated Resource Planning Conference, Vermont.

Etter, C. (1992) *Steps and Issues in Gas Integrated Resources Planning,* Proceedings of the National Association of Regulatory Utility Commissions Integrated Resource Planning Conference, Vermont.

Ford, A. and J. Geinzer (1990) 'Adding Uncertainty to Least Cost Planning,' *Energy Policy,* 40:331-39.

Hartman, R. and M. Doane (1987) 'Taking the Con Out of Conservation Program Evaluation,' *Resources and Energy,* 9:187-207.

Hirst, E. (1988) 'Integrated Resource Planning: the Role of Regulatory Commissions,' *Public Utilities Fortnightly,* September 15: 34-42.

Joskow, P. and D. Marron (1992) 'What Does a Negawatt Really Cost?' *The Energy Journal,* 13:4:41-74.

Kahn, E., Goldman, C. and D. Berman (1989) *Evaluation Methods in Competitive Bidding for Electric Power* (California: Lawrence Berkeley Laboratory).

Samsa, M. and W. Hederman (1992) 'Gas Utili-

ty Resource Planning: How Far Does the Electric Analogy Go?' *Public Utilities Fortnightly*, October 1, 40-42.

Sutherland, R. (1991) 'Market Barriers to Energy-Efficiency Investments,' *The Energy Journal*, 12:3:15-34.