

Integrated Resource Planning in Canada: The Rationale and The Roadblocks

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Introduction

At the 1992 Earth Summit in Rio

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Convention On Climate Change. The objective of the Convention is to stabilize concentrations of greenhouse gases in the atmosphere:

"achieve...stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system. Such a level should be achieved within a time frame sufficient to allow ecosystems to adapt naturally to climate change, to ensure that food production is not threatened and to enable economic development to proceed in a sustainable manner."¹

According to the Intergovernmental Panel on Climate Change, stabilization of greenhouse gas concentrations in the atmosphere will require a reduction in global carbon dioxide emissions of 50% or more.

As first steps towards the achievement of the Convention's ultimate objective the Government of Canada is committed to: i) stabilizing Canada's non-CFC greenhouse gas emissions at their 1990 level by the year 2000; and ii) reducing Canada's carbon dioxide emissions by 20% by 2005.² In addition, the Ontario Round Table on Environment and Economy has recommended that Ontario reduce its carbon dioxide emissions by 70 to 80% by 2030.³

Integrated Resource Planning (IRP) is a cost-effective and politically attractive option to reduce Canada's greenhouse gas emissions. Unfortunately, IRP is often not in the corporate self-interest of our electric and gas utilities if it entails a reduction in their sales of electricity or gas. In this paper I will use Ontario as a case study of: i) why IRP

is often not in the self-interest of electric and gas utilities; and ii) how the implementation of IRP could be aligned with utility self-interest.

Why IRP Is Contrary to the Self-Interest of Ontario's Gas and Electric Utilities

i. Gas Utilities

As a result of the Ontario Energy Board's (O.E.B.'s) rate-making principles, there are at least two reasons why the promotion of energy conservation by Ontario's gas utilities (Centra Gas, Consumers' Gas and Union Gas) could be contrary to the financial self-interest of their shareholders.

First, between rate cases, a gas utility's earnings are linked to its natural gas throughput volumes. That is, the higher are its throughput volumes the higher are its earnings and conversely, the lower the volumes, the lower the earnings. This is true whether or not the throughput volumes are above or below their forecast levels. As a consequence, a gas utility is financially penalized if it promotes energy conservation, since conservation by definition reduces throughput volumes, and therefore earnings, from what they otherwise would have been.

Second, in the long run, a gas utility's earnings are linked to its rate base. That is, everything else being equal, in the long run the total earnings of a gas utility are directly related to its total rate base. Furthermore, and more importantly, as long as a gas utility's O.E.B.-approved return on equity exceeds its bare-bones cost of equity, a rise in its rate base will lead to a rise in its earnings per share even if its O.E.B.-approved return on equity remains constant. This result is illustrated in Table 1.

Table 1Initial Situation

Investors' committed capital = \$400,000.

Outstanding stock = 10,000 shares at \$40 per share book value.

Earnings = \$40,000 per year = 10% = \$4.00 per share.

New Project

Additional capital investment = \$100,000. Additional earnings = \$10,000 per year = 10% as initially.

The situation after making the new investment: capital investment = \$500,000; annual earnings = \$50,000 per year; return = 10%.

	Number of Shares New Financing	Price Per Share	Total Shares	Earnings Per Share
Scenario A	2,000	\$50	12,000	$\frac{50,000}{12,000} = \4.17
Scenario B	2,500	\$40	12,500	$\frac{50,000}{12,500} = \4.00

Source: Paul H. Jaynes, Profitability and Economic Choice (Ames Iowa: Iowa University Press; 1968), p. 19.

Under Scenario A, the utility's allowed rate of return on equity, 10%, exceeds its bare-bones cost of capital and hence its price per share, \$50, exceeds its book value, \$40. As a result, if \$100,000 of rate base growth is financed by issuing new shares, its earnings will rise from \$4.00 to \$4.17 per share. [Needless to say, the growth in earnings per share would be even greater if some or all of the rate base growth is financed by retained earnings.]

Under Scenario B, on the other hand, the utility's allowed rate of return on equity,

10%, equals its bare-bones cost of capital and hence its price per share equals its book value. As a result, if \$100,000 of rate base growth is financed by issuing new shares, its earnings per share will not rise.

In short, if a gas utility's allowed return on equity is greater than its bare-bones cost of capital (the typical situation in Ontario), an energy conservation measure that reduces its rate base growth will also reduce its growth in earnings per share. Needless to say, there are many cost-effective conservation options that would reduce the rate base, and hence earnings, growth of Ontario's gas utilities.

ii. Ontario Hydro

Ontario Hydro sells electricity to over 300 municipal electric utilities. In addition, Ontario Hydro sells power directly to rural customers.

Ontario Hydro, unlike Ontario's gas utilities, is a publicly-owned corporation and hence its corporate self-interest is not maximizing earnings per share. On the contrary, Ontario Hydro's corporate self-interest is identical to the self-interest of its management and employees.

To the extent that IRP entails reduced electricity sales, IRP will often be contrary to the self-interest of Ontario Hydro for one or more of the following reasons.

First, electricity conservation measures will reduce the amount of electricity Ontario Hydro is required to produce. Hence conservation programmes will reduce the employment opportunities for Ontario Hydro employees whose skills are related to the generation and transmission of electricity.

Second, since Ontario Hydro has surplus capacity, its marginal revenue from an

incremental sale exceeds its marginal costs. For example, Ontario Hydro's net marginal revenue (marginal revenue - marginal cost) from an incremental electricity sale to a municipal utility is approximately 2 to 2.8 cents per kwh. As a result, electricity conservation programmes will require Ontario Hydro to raise its rates or reduce its costs in order to balance its revenue requirement. Neither option is in the self-interest of Ontario Hydro. To be specific, raising rates would be politically unpopular and would further undermine public respect for Hydro employees. Reducing costs would require further layoffs and/or wage cuts.

iii. Municipal Electric Utilities

Ontario's municipal electric utilities are publicly-owned and hence their corporate self-interest, like Ontario Hydro's, is synonymous with the self-interest of their management and employees.

Ontario's municipal utilities distribute the electricity that they purchase from Ontario Hydro. Everything else being equal, there are economies of scale in the distribution of electricity. As a result, a municipal utilities marginal net revenues from an incremental sale can be as high as 9 cents per kwh. As a result, electricity conservation programmes will typically require municipal utilities to raise their rates or reduce their costs in order to balance their revenue requirements. As we have noted above with respect to Ontario Hydro, neither option is in the self-interest of the employees of a publicly-owned utility.

The Empirical Significance of the Utility IRP Disincentives

Utility executives often argue that the above noted IRP disincentives are merely theoretical and have no impact on the real world decision-making processes of utilities.

Unfortunately, the empirical evidence in Ontario does not support their claims.

For example, the 1995 energy conservation programmes of Consumers' Gas will reduce its natural gas throughput volumes in the year 2000 by only 28/100ths of 1%.

Ontario Hydro has recently reduced its conservation budget. In addition, it has introduced discount rates to encourage its customers to consume more dirty coal-fired electricity.

Finally, Ontario's municipal electric utilities have no significant programmes to promote electricity conservation (i.e., reduce electricity sales).

Removing the Roadblocks to IRP

In the remaining sections of this paper we will outline regulatory, institutional and legal measures which can be implemented to align IRP with the corporate self-interest of our energy utilities.

i. Gas Utilities

There are at least three important actions that the Ontario Energy Board (OEB) can take to ensure that Centra Gas, Consumers' Gas and Union Gas will aggressively and cost-effectively promote energy conservation.

First, the OEB can reduce a gas utility's allowed rate of profit if it fails to aggressively and cost-effectively promote conservation.

Second, the OEB can adopt an accounting mechanism which decouples the link between a utility's short-run profits and its gas sales. Under a decoupling mechanism if a utility's gas sales and hence profits exceed/(fall short of) the forecast level, the excess/(deficient) profits will be returned to/(collected from) the customers in the following

year via a temporary rate reduction/(increase). In short, a decoupling mechanism will ensure that a gas utility is not financially penalized when it saves energy.

Third, the OEB can establish shared savings incentives for the gas utilities. Under a shared savings incentive a utility would be eligible for a financial bonus that is directly linked to the net savings (total incremental savings minus total incremental costs) that flow from its conservation programmes. For example, if a conservation programme provides a total net financial saving of \$1 million, 10% of the savings (\$100,000) could be passed on to the utility's shareholders and 90% (\$900,000) to the utility's customers.

The California Public Utilities Commission has adopted the above noted regulatory reforms. As a consequence the Pacific Gas and Electric (PG&E) Company has become the world's largest private investor in energy efficiency programmes.⁴

ii. Ontario Hydro

The Government of Ontario could make the aggressive promotion of conservation more consistent with Ontario Hydro's long run corporate self-interest by simply prohibiting Hydro from building new electrical generating stations. Under this scenario, Hydro would have two fundamental options to balance electricity supply and demand. First, it could purchase electricity savings from the municipal utilities and other sources (e.g., energy service companies, electric equipment manufacturers, gas utilities) or expand its conservation programmes. Second, it could purchase electricity from private sector corporations and municipal utilities. (Ontario Hydro is presently purchasing 2% of its electricity supply from private sector corporations and municipal utilities).

At the present Ontario Hydro has surplus generating capacity. As a result,

prohibiting Ontario Hydro from building new electricity supply would not provide it with an incentive to promote conservation in the short run. However, the aggressive promotion of energy conservation would be in the short-run corporate self-interest of Ontario Hydro if the Government of Ontario combined a ban on new Ontario Hydro generating stations with a carbon dioxide control order which required Ontario Hydro to reduce its carbon dioxide emissions by 2% per year. For energy conservation is Ontario Hydro's least-cost carbon dioxide reduction option.

iii. Municipal Electric Utilities

Conservation could be aligned with the self-interest of the municipal electric utilities if Ontario Hydro were to pay them for each kwh of electricity that they save. That is, a Hydro conservation payment per kwh saved could ensure that a municipal utility's rates would fall when it saves electricity. To be precise, a municipal utility's rates would fall if the conservation payment per kwh saved exceeds the utility's net cost of saving a kwh and the utility's foregone net revenue as a result of a reduction in its sales by one kwh.

If Ontario Hydro provides adequate conservation payments, the municipal utilities would be under pressure from their ratepayers and political masters to aggressively and cost-effectively save electricity. For, everything else being equal, the municipal utilities which achieve relatively large reductions in sales, at relatively low cost, will experience the greatest rate declines.

Endnotes

1. United Nations Framework Convention On Climate Change, Article 2.

2. Letter from the Honourable Sheila Copps, Deputy Prime Minister and Minister of the Environment to Louise Comeau, Sierra Club, February 10, 1994.
3. Ontario Round Table on Environment and Economy, Restructuring For Sustainability, (September, 1992), p. xiv.
4. Pacific Gas and Electric Company, 1992 Summary Annual Report, p. 4; Natural Resources Defense Council and Pacific Gas and Electric Company, "Energy Efficiency in the National Energy Strategy: NRDC and PG&E Find Common Ground", The Electricity Journal, (October, 1990), p. 41.