

**"Restructuring of Ontario's electricity supply system:  
an analysis of the proposals"**

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## "Restructuring of Ontario's electricity supply system: an analysis of the proposals"

### **Abstract**

In November 1995 the Government of the Province of Ontario (Canada) created an independent commission, the Macdonald Commission, to analyse Ontario's electricity industry and provide proposals for a transition to a competitive market. We present an overview and analysis of the proposals. We conclude that two principles are key to the success of the restructuring initiative: vertical separation of generation and transmission and robust competition in generation.

### **1. Introduction**

Restructuring/privatisation activities are now widespread in traditional regulated utilities. Following the lead of the UK and Chile entire systems have been, or are in the process of being, restructured and/or privatised in a host of countries.<sup>1</sup> In the world's largest electricity market, the United States, restructuring is moving forward in several states (most notably California, New York and Massachusetts) and planned in many other jurisdictions. Restructuring of electricity markets invariably involves substantial financial, structural and regulatory changes, all with the hope of increased economic efficiency. Though each case is different and analysis of the successes and failures of restructuring should be informed by historic information and the relevant political context, a better understanding of a wide range of restructuring experiences will benefit policy analysts and decision makers. This paper hopes to contribute to the ongoing debate.

In late 1995, the Government of the Province of Ontario (Canada) created an independent commission, the Advisory Committee on Competition in Ontario's Electricity System, to propose a general framework as well as specific policies for restructuring the Ontario electricity system. The Advisory Committee (AC)

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<sup>1</sup> See Gilbert and Kahn (1996) for recent surveys of some of the major restructuring initiatives in electricity markets world-wide. Jaccard (1996) and Belland (1996) provide descriptions of two restructuring initiatives in Canada.

was chaired by the Honourable Donald S. Macdonald, and became known as the Macdonald Commission. The prime motive for restructuring cited by the government was the need for a more competitive electricity system in order to meet the industrial and commercial challenges of the next century.

This paper describes the Macdonald Commission's recommendations, delivered in May 1996, and analyses the proposals in light of Ontario Hydro's current organisational and regulatory structure, and recent experiences in restructuring elsewhere. The paper is organised as follows. The next section presents a very brief history of the development of Ontario Hydro since its creation, including a description of its current structure and regulatory environment. Section 3 sketches some of the pressures for restructuring. Section 4 outlines the major proposals for restructuring, which are critically examined in section 5. The final section offers some concluding remarks.

## 2. Ontario Hydro in brief

In this section we describe Ontario Hydro's current structure and organisation. This description will help focus attention on both the mounting pressures for restructuring and the major areas of Ontario's electric industry targeted by the restructuring proposals.

The electricity industry in Canada developed largely along provincial lines. This was due to the fact that the *British North America Act* of 1867 (the act of the British Parliament which created Canada, and was until 1982 the Canadian Constitution) assigned the jurisdiction of electricity regulation to the provinces. Additionally, geography contributed to the development of relatively isolated provincial utilities with minimal connections to neighbouring utilities. Even today the Canadian electrical system is much less integrated than in most western countries.

Ontario Hydro is a publicly owned corporation, created in 1905 as the *Hydro-Electric Power Commission of the Province of Ontario*. The hydroelectric potential of Niagara Falls played an important role in the early interest in electricity development in southern Ontario. As will be seen in section 4, the symbolic nature of Niagara Falls continues to play an important part in the analysis of Ontario Hydro, most notably as a constraint for restructuring. Ontario Hydro's current status as a government-owned vertically integrated utility is consistent with developments elsewhere in Canada.

True to its name and original focus Ontario Hydro's generation capacity was exclusively hydroelectric until the 1950's. With less hydroelectric potential than the neighbouring provinces of Québec and Manitoba, which even today are both almost totally hydroelectric systems, Ontario began installing thermal generation units (mostly coal) in the 1950's. This trend continued unabated until the mid 1970's when nuclear generation entered the production mix. At this point, before the addition of nuclear units, generation capacity was 37% hydroelectric and 63% thermal. Between 1974 and 1994 Ontario Hydro built five nuclear stations, all based on the Canadian heavy-water nuclear technology. Though no further expansion of nuclear capacity is planned (in Ontario or anywhere else in Canada) the existing mix of generation technology indicated in Table I highlights Hydro's reliance on nuclear generation.

	Winter 1993-1994 generation capacity (MW)	1993 Energy production (GWh)
hydro	7,240 (21.5%)	40,693 (28.4%)
steam	11,258 (33.4%)	22,123 (15.4%)
nuclear	14,164 (42.1%)	78,498 (54.7%)
other	1,007 (3.0%)	2,075 (1.4%)
total	33,669 (100%)	143,389 (100%)

**Table I: Ontario Hydro production statistics**

As will be seen, recent developments in the nuclear division of Ontario Hydro (mostly related to the tariff impacts of cost overruns) have played a pivotal role in the push for restructuring. It will also come as no surprise that the outcome of the nuclear units remains a thorny issue in the restructuring debate.

The final element necessary for a complete - though admittedly summary - description is an overview of Ontario Hydro's organisational and regulatory structure. The corporation is a vertically integrated utility which provides generation, transmission and distribution services throughout the province of Ontario. Except for a limited amount of industrial self-generation and non-utility generation Hydro is the only electricity generator in Ontario. Hydro also owns and operates the province's transmission grid and interties with

neighbouring utilities in Manitoba, Québec, Michigan, Minnesota and New York.

The distribution of electricity in Ontario is organised in one of two ways. Seventy five percent of all customers, representing seventy percent of power sold in Ontario, receive distribution services from a municipal electric utility (MEU). There are over 300 MEUs in Ontario, of widely varying size, both in terms of number of customers and geographic scope. Each MEU purchases energy from Ontario Hydro, at what are referred to as wholesale rates. The MEUs are municipally owned, not for profit organisations which install and maintain their distribution networks (the wires) and hold the monopoly on distribution of electricity in their service territories. Customers not served by MEUs (generally in more remote and less densely populated areas) receive distribution services from Ontario Hydro Retail, the distribution business unit of Ontario Hydro. The difference between the two organisational forms of distribution is largely irrelevant for customers.

The regulation of Ontario Hydro by the provincial government can best be described as relatively loose. There is no *public utility commission* with regulatory oversight, as is familiar in the United States. Ultimately, Ontario Hydro is answerable to the government, which guarantees Hydro's debt and is the residual claimant to Hydro's profit. For this reason (among others), provincial government approval is necessary for construction of new facilities. However, government intervention does not extend to operational involvement nor to the sensitive subject of rate approval. Ontario Hydro sets three different rates: 1) the rate for wholesale power sold to the municipal distributors (MEU); 2) the retail rate for Hydro's retail customers; and 3) the rates for large industrial customers connected directly to the transmission grid. These rates are proposed by Ontario Hydro management and approved by the Ontario Hydro Board of Directors without direct government involvement. The Ontario Energy Board (OEB), which also regulates natural gas distribution in the province, examines Ontario Hydro's rates and may make recommendations concerning these rates to the provincial cabinet (and of course to Hydro itself). However these recommendations are not binding.

### **3. Impetus for restructuring**

Over the last decade pressure for some type of restructuring of Ontario's electricity system has grown. This pressure led to the decision by the Government of the Province of Ontario to create an independent commission,

the Advisory Committee on Competition in Ontario's Electricity System (AC), to analyse Ontario's electricity industry and make recommendations on restructuring. The Advisory Committee received its mandate in November of 1995 and began its work shortly thereafter.

The AC's report (Macdonald 1996) describes the circumstances which lead to pressures for restructuring. At a general level, increased integration of the world-wide economy and increased competition in global markets are seen as unshakeable forces to which Ontario's electricity system must be prepared to respond. Restructuring of other electricity markets was going to reduce, or in some cases had already reduced, the competitive advantage once enjoyed in Ontario. More importantly, restructuring in the US, especially in contiguous markets, was going to provide a direct threat to some of Ontario Hydro's markets in the future. From the Government's perspective, the introduction of *competition* into the industry is seen as the best way to make the industry *competitive*.

Equally important to the restructuring debate, if not more so from the perspective of political pressure, is the recent history of rate increases in Ontario. Average rate increases for Ontario Hydro customers were 8.6% in 1991, 11.8% in 1992 and 7.9% in 1993. Cost overruns at the Darlington nuclear station, Hydro's last nuclear facility to come on line, were partly responsible for these hefty increases. In an unfortunate turn of events these rate increases coincided with a particularly hard recession which harshly impacted Ontario's manufacturing sector. The negative impact on demand aggravated Ontario Hydro's financial woes, which only served to maintain pressure on rates. It is this rate spiral which sticks out as a central element in the pressure for restructuring of the industry.

The bottom line in understanding the pressure for restructuring in Ontario is that a host of conditions lead many stakeholders to the conclusion that increased competition was necessary in Ontario's electricity market. This conclusion was predicated on the belief that increased competition will ultimately lead to lower electricity prices.

#### **4. Restructuring proposal**

This section surveys, without analysing, some of the key recommendations contained in the AC's report. The focus of the recommendations is the introduction of competition in Ontario's electricity market. Consistent with

other North-American initiatives (California for instance) competition is introduced gradually, first at the wholesale level and later at the retail level.

It is recommended that competition be introduced into the generation sector, ending Ontario Hydro's current monopoly. "Competition" will however be tempered by continuing government ownership of some generation resources. Specifically, it is proposed that nuclear facilities remain under public ownership, although the AC does suggest the creation of four nuclear entities to operate the plants independently (i.e. competitively). It is recommended that private equity be introduced into the fossil fuel and hydroelectric generation assets currently owned by Ontario Hydro. This privatisation could extend to all thermal units. Some constraints are suggested for the hydroelectric resources. First it is recommended that hydroelectric stations be grouped along river systems in order to allow for co-ordination of river flows and operational efficiencies. Second, because of the strong public sentiment alluded to earlier, the AC suggests keeping the hydroelectric generation stations along the Niagara river under public ownership.

The proposals for the transmission network are fairly standard. Most importantly, the AC recognises that greater competition in generation is predicated on open, non-discriminatory access to the transmission grid. The first step of the recommendations is that the current assets of the transmission network of Ontario Hydro be spun off as an independent entity, the Transmission Grid Company (TGC). In order to guarantee a climate of competition and open access, the owner of the Grid Company should be separate from any generation or distribution company. In addition, the operation of the Grid (load balancing, etc.) will be assured by an independent organisation, the System Operator (SO). The system operator will not own any part of the transmission system.

Recognising that transmission pricing is extremely complex and controversial, the AC makes the following recommendations. It recommends the use of "constraint-related" charges for generators, in order to reflect system-related costs of transmission (location, distance, etc.). On the other hand it recommends that consumers continue to see "postage-stamp" rates for transmission. Finally, it recommends the use of congestion-related charges in order to facilitate the planning of new transmission resources.

At the distribution end the Advisory Committee recommends that Ontario Hydro relinquish its role in electricity distribution. In order to achieve this the activities and assets of Ontario Hydro retail should be absorbed into the local

distribution system. Further, in order to increase efficiency, it is recommended that the number of distribution utilities be reduced. Finally, in order to prepare for further introduction of competition at the retail level, the distribution utilities will be directed to separate their monopolistic "wires" from their (potentially) competitive marketing functions (electricity sales and energy services activities).

The introduction of competition, and the restructuring of generation, transmission and distribution, all rest on the creation of what is called a "marketplace for electricity". All electricity (i.e. physical) transactions, sales and purchases, will be conducted through the marketplace. Participants in the marketplace will be generators, energy service companies, purchasers, agents, brokers and marketers. Conceivably, energy suppliers and purchasers from outside the province will also have access to the marketplace through authorised agents. The Electricity Exchange (EX) will set the price of electricity based on bids (supply and demand) and will be responsible for the "settling-up" function of the market. The actual dispatch will remain a separate and independent activity of the System Operator.

We note that the AC suggests the use of bilateral financial contracts (contracts for differences) and other financial instruments as mechanisms for smoothing price volatility and increasing trade. It is however suggested that bilateral physical contracts be prohibited.

Finally, it should be noted that the scope of the AC's recommendations extend further than the above points and touch on many other issues related to Ontario Hydro's current activities - technological development, international activities, environmental issues, public policy issues (aboriginal issues, labour issues, etc.) as well as the transition process to competition.

## **5. Analysis**

The programme of reform put forward by the Macdonald Commission is only one of a range of alternatives which might have been proposed. It corresponds in its essentials with that recommended to, and adopted by, the Thatcher government in the UK by the Littlechild Report a decade and a half earlier. Those essentials can be summarised threefold: (i) vertical separation of generation from transmission, (ii) injection of competition (of one form or another) into generation and (iii) transference of a substantial portion of the whole of the sector from public to private ownership. The small-print will

inevitably differ to reflect local political, economic and technological realities; the underlying economic principles - at least as argued - are the same. Such a model for the industry contrasts with the Japanese or current American model of vertically integrated regional monopolists.

To assess how appropriate any package of reform would be for the electricity sector in Ontario it is necessary, first, to specify what we are trying to achieve. The objectives of Provincial politicians - balancing the interests of various and varied constituents - will not necessarily coincide with those of a dispassionate social planner, and it is the perspective of the latter that we adopt here.

There are a number of criteria according to which the economic efficiency of the electricity sector in any jurisdiction can be judged. Key, from an economic perspective, are;

- Productive efficiency - how low are unit costs (of generation, distribution and transmission) driven? In the short-run how efficiently will existing capacity be operated and sequenced? In the longer-run will the business-environment created by restructuring create the right incentives for the development and location of new plant?

- Allocative efficiency - for given industry costs, how appropriate will the equilibrium configuration of tariffs be? How closely will prices faced by consumers of different types and in different locations properly reflect the marginal cost of the service provided?

- Dynamic efficiency - what incentives will reform provide for the development and adoption of new technologies in the sector, and the improvement of existing ones?

The third is particularly important when a long-run view is taken, as it must be in fixing a plan for the development of such a key industry well into the next century. Other considerations (province-wide security of supply, for example) should not be forgotten, but these three criteria are the economically fundamental ones and it is these that we will adopt - in what follows - as indicators of policy success in thinking about each component of the AC's recommendations.

## **[5.1] Vertical separation of generation from transmission and distribution**

Electricity transmission, a classic network activity, is a natural monopoly - the unit costs of transmission fall (and most evidence suggests fall quite rapidly) with volume. There is therefore a strong presumption in favour of having only a single grid operator.

The idea, however, that generation should be split fully from transmission - with responsibility for transmission across the whole province being placed in the hands of a single, self-standing Grid Company - is more contentious and is fundamental to the whole package of reform proposed in *A Framework for Competition*. Not only are there sound business reasons for separation in its own right, but such partitioning of roles is a necessary (though not sufficient) precondition for introducing meaningful competition upstream (see 5.2). Vertical separation of this sort was integral to the restructuring of electricity in the UK in the 1980's.

Breaking things up vertically makes good economic sense. There is no evidence that economies of scope exist between the two activities of transmission and generation (not, at least, significant ones) and so there are unlikely to be negative cost implications. Such a configuration prevents any firm from using market power in one part of the industry (transmission) from developing market power in another (generation). At least in theory accounting separation combined with a requirement of non-discriminatory access pricing to the transmission network could have the same affect. There are a variety of reasons, however, why accounting and structural separation are not equivalent (see, for example, Hardt (1995)) and experience of attempts to put accounting "walls" inside firms have not worked well. When British Gas was privatised in 1986, for example, its transportation function was placed into a self-standing subsidiary - TransCo - but this has led to endless conflict between Ofgas (the regulatory agency) and the privatised corporation over the terms of access that the gas grid offers to its parent vis-à-vis competitors.

There will still be scope, of course, for vertical collusion between players in the sector but such behaviour is likely to be much harder to sustain - and much easier to police - than anti-competitive behaviour taking place within a vertically integrated utility.

Whilst the costs associated with transmission constitute a comparatively small part of the total cost of delivered electricity (around 10%) control of the

transmission network confers potentially considerable strategic power. The operation of the Transmission Grid Company (TGC) must itself, then, be subject to regulatory control and economic theory offers a number of insights into efficient network access pricing (these are excellently reviewed by Gilbert and Kahn (1996: 211-222)).

From the point of view of not hampering the establishment of meaningful competition upstream the key requirements of the regime is that it ensure equal access, on equal terms, to all users. From the point of view of ensuring appropriate incentives for investment, for location of generation, etc. it is also important to ensure that access prices are correctly calibrated and not just equitable.

Assuming - as seems implied by Section 7 of *A Framework for Competition* - a system of centrally mandated access charges, how should these be set? If a system is not congested (i.e. it has sufficient capacity to meet all demand in the foreseeable future) then the economic cost of transmission is simply the cost of line losses and the other operating costs directly attributable to the user's demands. If it is congested - and assuming the transmitter is required to maintain some predetermined minimum level of system reliability - then the economic cost must include the present value of additional capital cost associated with the additional service provision. The information required to estimate the latter are considerable, requiring, as it would the estimation of a transmission costing model which could be used to forecast the total present value of building and maintaining alternative transmission configurations.

Pricing access at long-run incremental cost (LRIC) has been argued to be a "compromise" solution to the type of problem that will face any future regulator of the TGC under the AC's proposals (Gilbert and Kahn (1996: 216)). In most situations, however, one would expect the actual cost that a user of transmission services imposes on a network to be less (perhaps much less) than the cost of expanding the network to satisfy that user's demand. This would mean that LRIC-pricing could be expected to be inefficiently high which would lead to under-use of the system. Such pricing also fails to generate the correct incentives for network expansion and would place an additional burden on the regulator to determine and mandate grid development in the province.

A framework for access pricing that could, theoretically, generate efficient signals for investment in generating capacity if not in the transmission network is that of "node pricing" (recently developed by Caramanis, Bohn and Schweppe (1986) and extended by Hogan (1992)). Assuming efficient dispatch, the

economic value of the transmission of a unit of power between two points ("nodes") in the system is simply the difference in the cost of generating that unit at each of the points. In its extreme "textbook" form the informational requirements for operating such a system would be formidable. Hogan (1992), however, has proposed a simplified version of the model in which node prices are computed ex post (with users not knowing tariffs in advance but being billed on the basis of "ex post" prices at the end of each accounting period). Implementation of such a pricing regime would be innovative indeed.

## [5.2] Competition in generation

Assuming (ambitiously) that legislative reform is able to establish a vertically-separated transmission company offering open access to users (generators) at approximately efficient tariffs, what view should a reforming provincial government take on issues of structure and competition in the generating sector?

Electricity generation is not, unlike transmission, a natural monopoly (see Christensen and Green (1976) for an early analysis of cost curves in the US). There are substantial economies of scale to be reaped at the plant level, and these are likely to be particularly pronounced when the energy sources used are nuclear or hydro (which account for over 80% of electricity currently generated in Ontario). It is the nature of these economies that will determine plant level average cost conditions and, by implication, the optimal size of a particular generating unit. The majority of available evidence suggests, however, that there are few additional economies to be reaped at the multi-plant level.

The implication of this is fairly straight-forward: provided each plant is large enough to exhaust all available plant-level economies (and this places a lower bound on how small each "small" power producer can be), any number of firms is compatible with sectoral productive efficiency. The absence of significant multi-plant economies of scale does not, it is important to note, lead to the conclusion that reductions in concentration in generation *should* be encouraged, merely that such reductions could be allowed without necessarily compromising productive efficiency. To make a positive case in favour of a more structurally competitive set-up - as the Macdonald Commission's Report seeks quite explicitly to do - requires that other arguments be introduced.

So what are the supposed gains from competition, how real are those gains and how should it be introduced?

Conventional textbook analysis allows us to compare prices under monopoly with prices under perfect competition. The former are higher - in the absence of Schumpeterian cost differentials - because whilst competition ensures output is sold at marginal cost, the monopolist sells at average revenue which exceeds marginal cost by virtue of the market demand curve being downward sloping. Perfect competition ensures allocative efficiency - the market power of the monopolist generates not only a redistribution of surplus from buyers to seller but also dead-weight (i.e. social) loss. Though monopoly and perfect competition are caricatures of real-world market structures the more general inference is an important one: increased competition will yield prices closer to marginal cost - i.e. lower ones. Since the primary motivation for reform in the province is concern over the continued upward trend in electricity prices, installing competition in generation - through breaking up Ontario-Hydro and/or allowing new entry - would seem to deliver what is wanted without further ado.

This may, however, be overly optimistic. Installing *structural competition* into the sector (i.e. ensuring the existence of several players) is likely to be considerably more straight-forward than installing and maintaining *effective competition*. The economics of the linkage between structure and conduct is not nearly as clear-cut as many political commentators would have us believe. Even if Ontario-Hydro's capacity were split between two or three firms of approximately equal size the scope for tacit collusion between those firms in the wholesale market would likely be great. Furthermore there is an increasing realisation that multiplant operation makes for strategic behaviour in the electricity spot market, the operation of which underpins claims of the gains from restructuring.

Green and Newbery (1992) have found convincing evidence that Powergen and National Power retain significant market power in the UK electricity "pool" - the spot market for power which is the equivalent to the "Electricity Exchange" (EX) envisaged by *A Framework for Competition*. Under such a system generators submit, each day, prices for each generating set along with capacities available for the following day. The grid operator then uses a complex algorithm to calculate the operating schedule that will meet the forecast levels of demand at least cost. All generating sets in each half-hour then receive the System Marginal Price (SMP) which is the bid of the most expensive set in normal operation during that half-hour.

An owner of a single power station operating in such an environment maximises profit by bidding at marginal cost. A multiplant utility, however, takes account of pecuniary interplant externalities - when such a utility raises the bids of some of its stations it realises that whilst those stations have a lower probability of being called upon to supply, the expected SMP is raised and so its remaining stations (those that do supply) will be more profitable. Bolle (1992) applied Klemperer/Meyer-type supply function techniques (Klemperer and Meyer (1989)) to the Pool in the UK and showed that the model implied equilibrium power prices substantially higher than true marginal cost. Green and Newbery (1992) estimated that the dead-weight losses associated with the pursuant distortion to be £340m (US\$ 560m) per annum - a very substantial figure.

In addition to this sort of strategic distortion thrown up by the existence of multiplant operation, there is also scope for tacit collusion *between* big players. The major utilities realise that the price they each get in a particular thirty minute slot depends upon the supply decisions of the other. They also realise that they will all (in the British case "both") be "playing" the same game in the same market 48 times a day every day for the next number of years. The incentive and scope for tacit price-fixing in this type of setting are likely to be irresistible (Bolle (1992)). This sort of manipulation of the spot market could, at least in theory, be dealt with under existing competition law. Theory is one thing, practice quite another, and experience of trying to substitute competition for regulation suggests that it is likely to be easier said than done.

Green (1996) uses an empirical model developed under the ESRC's "Impact of Privatisation on British Energy Markets" project to simulate the effectiveness of alternative approaches to increasing effective competition in electricity supply in the UK. He finds that partial divestiture (OffER's chosen policy) should lead to a substantial reduction in dead-weight losses (increase in efficiency). He goes on to argue that "(S)plitting up the dominant firms would have more effect, but is unlikely to be politically feasible, while encouraging competitive entry "in advance of need" would tend to reduce welfare" (Green (1996: 205)). The political infeasibility of breaking the existing generator into smaller morsels may not apply in Ontario and so that could be a preferred option according to Green type of analysis. It is important to note, however, that such empirical results are likely to vary according to context - the application of similar computational techniques to the Ontario-case would be useful input to the decision-making process.

It is not apparent from the AC's proposals how many generators, and of what sizes, we could expect to co-exist in a post-reform world. The non-nuclear components of Ontario-Hydro's capacity - with the probable exception of the Niagara group, the sale of which would certainly be politically sensitive - will be privatised, though it is not apparent whether this will be in one piece. Meanwhile existing nuclear capacity (about 42% of total generating capacity) will be kept in public hands. The role to be played by the nuclear sector in a post-reform industry is a significant uncertainty in policy analysis. A number of concerns make the private ownership or operation of the nuclear plants at Darlington, Pickering and Bruce politically intractable. Though not recommending privatisation the AC does suggest the creation of four nuclear entities to operate plants independently. Thinking about the likely scope for strategic behaviour by large (and, in particular, multiplant) operators in the EX this is clearly preferable to creating a single nuclear "monster". Insofar as such separation could be assured this would create four competitors each of significant size.

New entry will also be permitted, though any observer has to be sceptical about how many private financiers will be queuing up to join an industry with such firmly-established incumbents, and even more sceptical about the extent to which such entrants would be able to provide meaningful competition.

Whatever the post-reform horizontal structure of the industry the most important determinant of the rates faced by customers of all types will be the regulatory regime put in place. The AC does not arrive at firm proposals for regulation, but this is a key issue. Insofar as effective competition can be engineered into the sector it will have to be managed. In the UK a system of ratchetting price caps was put in place at privatisation, and it is these that have ensured that power prices have increased by a factor of  $x\%$  less than retail price inflation (Littlechild and Beesley (1989)). Whilst alternative regulatory structures do exist (and there has been debate as to how far price cap regulation represents a genuinely "new" type of regulation, rather than just a special case of long-used rate of return regulation (Liston (1993))), the success with which price caps have been operated in the UK - not just in electricity but also in the regulation of the privatised British Telecom, British Gas and elsewhere - mean that any such alternative should not expect to receive much more than passing consideration. Price caps work, both in theory and in practice.

### **[5.3] Privatisation**

Much of the media coverage of the work of the Macdonald Commission and the broader issues of recasting the electricity industry in Ontario has focused on the privatisation question - "should Hydro be privatised?" (see, for example, Terry Weber's article "Ontario-Hydro Eager to Follow British Example" in the March 19th *Financial Post*).

In many ways this - from an economist's perspective - is one of the least important questions that must be answered. There is no *inherent* reason why Ontario-Hydro with public shareholders should not operate in exactly the same way as it would with private shareholders, provided the former act as the latter would. It is how managerial, market and regulatory incentives are structured that will be key to determining performance, regardless of patterns of ownership. There is no particular reason why, for example, "public" shareholders should not install managerial bonus schemes and profit-sharing arrangements of the sorts now found throughout the recently privatised utilities in the UK (unless, that is, there is some political constraint which prohibits governments being seen to condone the sort of "fat cat" payments that such schemes regularly seem to throw-up).

A number of authors have examined the systematic differences in the way in which privately versus publicly-owned utility industries (not just in the power sector, but also in telecommunication and so on) have operated in the UK. Haskel and Szymanski (1993) studied the effect of the privatisation and liberalisation programme in the UK on employment and wages in the affected sectors. They show it to be substantial - with substantial labour-shedding having taken place - but go on to show that to be explained by the programme of deregulation rather than privatisation *per se*. Pint (1991) asks how far privatisation of a large-firm can be expected to reduce "x-inefficiency" and finds that the result is qualitatively ambiguous.

There exists some empirical evidence of the impact of ownership on productive performance. Erlich et. al. (1994) use panel data to show that, *ceteris paribus* (adjusting for regulatory restraint, commercial conditions, etc.) state ownership lowers the long-run annual rate of total factor productivity growth in an industry by between 1.6 and 2.0%, but does not significantly impact productivity levels in the short-run. In other words, they conclude that the gains in productivity are dynamic ones. Their analysis also implies that looking at these phenomena using cross-sectional data, as many earlier studies did, is likely to be misleading. These results work, of course, in favour of privatisation. The strength of the argument in any particular industry (e.g. electricity) must be

thought of in terms of dynamic effects - e.g. the scope for endogenous technological improvement - rather than static ones.

It is important, in weighing up the ownership options - which bits of the industry should be transferred to private ownership, and on what terms - to clearly identify legislative objectives. In the UK in the early 1980's the Thatcher administration had an unashamed ideological preference for private ownership. There existed a presumption in favour of privatisation with the onus always being put on opponents to show why a particular piece of state-owned capital should *not* be privatised. This implied that when there was uncertainty over the form of ownership which would best achieve other objectives, private ownership would be preferred ( - "when in doubt, farm it out"). In the UK the entire process of reform has delivered cheaper power and a profitable industry and, in that sense, the reformers can be deemed to have been vindicated. Nonetheless considerable doubt must remain over the role - good, bad or indifferent - that large-scale privatisation *per se* played in the achievement. In Ontario the call for reform has - apparently at least - been underpinned by pragmatism (the observation that current arrangements in the sector do not seem to be working well) rather than ideology and it is not necessarily the case that the province should prefer private to public ownership as its "null state" or default position.

#### **[5.4] Other issues**

A number of other interesting issues - some specific to the Ontario case, some more general - arise in considering the Macdonald Commission's report in its fuller context. Without being able to give more than a mention here it is nonetheless useful to flag a few of these.

i) Environmental issues: Any major change in the electricity industry must come to grips with environmental concerns. In the era of a single vertically integrated utility integrated resource planning (IRP) provided one approach to the problem. A more competitive environment will offer new challenges and call for innovative solutions - perhaps based on newly-developed property-rights and market-based instruments.

ii) Electricity exports: At the current time exports to neighbouring markets is not a major strategic issue for Ontario Hydro. However, a successful transition to a more efficient industry structure in Ontario would appear to be a

necessary condition for successful entry into any future regional electricity markets.

iii) Stranded assets: It is interesting to note that the stranded asset problem is a little different in Ontario than in the US since the starting point in the former is 100% government ownership. In fact, the problem could be renamed "stranded debt", or "stranded taxpayer debt". The AC's report is optimistic in its analysis of the prospect for reduction of Ontario Hydro's heavy debt (and related stranded asset charges) over the next 10 years. Only the future will tell if the AC is overly optimistic. However, it should be pointed out that in terms of economic efficiency the best solution to accumulated debts will (likely) be for the government to write them off in a once-and-for-all/lump sum way, rather than have them affect future incentives (e.g. by the government trying to claw back some part of the value by special taxes or other means).

iv) Security of supply: Security of future supply and reliability of the system are only two of the many issues that will have to be dealt with in new ways under the proposed changes to the industry. Only with appropriate incentives and markets will these issues be resolved in a competitive environment.

## 6. Conclusions

In this paper we have attempted to highlight some of the difficult but important questions related to restructuring of Ontario's electric industry. Lessons from experience in other countries - in particular the radical privatisation and deregulatory programme in the UK - are neither as unambiguous nor as straight-forward to interpret as many commentators have suggested.

We suggest that two of the elements of the Macdonald Commission's proposals must be guarded at all costs. The first is *effective* and sustained vertical separation of generation and transmission. Second is robust price-based regulation of generation. In the latter case we believe that it is infeasible at the present time to rely on natural competitive forces - "managed competition" is the name of the game. A number of other issues of secondary significance - even though politically high-profile (e.g. patterns of ownership, treatment of accumulated debt) - will also have to be resolved, though these issues appear less critical to the ultimate success of restructuring.

Is the package suggested the right one? Fortunately there may be several "right" answers to this problem. The best first step however will be for the Government to accept the importance of the basic principles ensuring robust vertical and horizontal competition.

## References

- Belland, Roger G. (1996), "Lessons From Alberta's Electric Industry Restructuring", *Proceedings of the 17th Annual North American Conference of the US Association for Energy Economics*, October 27-30, 1996, pp 184-193.
- Bolle, F. (1992), "Supply Function Equilibria and the Danger of Tacit Collusion: The Case of Spot Markets for Electricity", *Energy Economics*: 94-102.
- Brennan, Timothy J., Karen L. Palmer, Raymond J. Kopp, Alan J. Krupnick, Vito Stagliano and Dallas Burtraw (1996) *A Shock to the System; Restructuring America's Electricity Industry* Resources for the Future, Washington, DC.
- Caramanis, M., R. Bohn and F. Schweppe (1986) "The Cost of Wheeling and Optimal Wheeling Rates", *IEEE Transactions on Power Systems* 1: 63-73.
- Christensen, L., and W. Greene (1976) "Economies of Scale in U.S. Electric Power Generation", *Journal of Political Economy* (84): 655-676.
- Duncan, Ian and Alan Bollard (1992), *Corporatisation and Privatisation: Lessons from New Zealand*, Oxford University Press, Oxford, UK.
- Erlich, I., G. Gallais-Hamonno, Z. Lui and R. Lutter (1994) "Productivity and Firm Ownership: An Analytical and Empirical Investigation" *Journal of Political Economy* 102(5): 1006-1038.
- Gilbert, Richard J. and Edward P. Kahn (1996), Eds., *International Comparisons of Electricity Regulation*, Cambridge University Press, 500 pages.
- Green, Richard (1996), "Increasing Competition in the British Electricity Spot Market", *Journal of Industrial Economics* (XLIV): 205-216.
- Green, Richard and David M. Newbery (1992), "Competition in the British Electricity Spot Market", *Journal of Political Economy* (100): 929-953.
- Hardt, M. (1995), "On the Non-equivalence of Accounting and Structural Separation", *Telecommunications Policy* XX.
- Haskel, Jonathan and Stefan Szymanski (1993), "Privatisation, Liberalisation, Wages and Employment", *Economica* (60): 161-182.
- Heyes, Anthony G. (1996), "Lessons for Ontario-Hydro's Reform from the UK", *Policy Options Politiques*, 17(5): 49-54.
- Hogan, W. (1992), "Contract Networks for Power Transmission" *Journal of Regulatory Economics* 4: 211-242.
- Jaccard, Mark (1996), "Reforming the Electricity Industry: A British Columbia Perspective", *Policy Options Politiques* 17(3): 21-25.

- Klemperer, Paul D. and Margaret A. Meyer (1989), "Supply Function Equilibria in Oligopoly Under Uncertainty" *Econometrica* 57:1243-1277.
- Liston, C. (1993), "Price-Cap versus Rate-of-Return Regulation" *Journal of Regulatory Economics* 5(1): 25-48.
- Littlechild, Stephen and Michael Beesley (1989), "The regulation of privatised monopolies in the UK", *RAND Journal of Economics* 20: (454-472).
- Macdonald, Donald S. (1996) (chairman) *A Framework for Competition* The Report of the Advisory Committee on Competition in Ontario's Electricity System to the Ontario Minister of Environment and Energy, Queen's Printer for Ontario.
- Newbery, David M. (1995), "Power Markets and Market Power", *The Energy Journal* (16): 39-66.
- Pint, Elena (1991), "Nationalisation vs Regulation of Monopolies: The Effects of Ownership on Efficiency", *Journal of Public Economics* (44): 131-163.
- Waverman, Leonard and Adonis Yatchew (1996) "Regulation of electric power in Canada", pages 366-405 in Gilbert and Kahn (1996).
- Weber, T. (1996) "Ontario-Hydro Eager to Follow British Example", *Financial Post*, March 19, page 6.