BEFORE THE
RÉGIE DE L'ÉNERGIE

IN THE MATTER OF:
HYDRO QUÉBEC

Demande relative à la détermination du coût du service du Distributeur
et à la modification des tarifs d'électricité
Pour les années 2002 et 2003

DEMANDE R-3492-2002

Prepared Report of:
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On Behalf of:
L'association québécoise des consommateurs industriels d'électricité (AQCIE)
L’association des industries forestières du Québec (AIFQ)

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1.0 Introduction

Industrial Economics, Incorporated (IEc) was retained by L'association québécoise des consommateurs industriels d'électricité (AQCIE) and L'association des industries forestières du Québec (AIFQ) to review the filing of Hydro Québec Distribution (HQD) regarding the allocation of costs to the various classes of domestic consumers, and to evaluate the methodology proposed by HQD for implementing the legislated requirements for maintaining cross subsidies. This report presents the results of IEc’s review and analysis. IEc’s review of the cost allocation methodologies focuses on the methodologies for allocating generation and transmission costs.

To prepare this report, IEc reviewed the HQD filing, drafted information requests on behalf of AQCIE/AIFQ, and reviewed HQD's responses to those interrogatories.

IEc anticipates that this report will be introduced by AQCIE/AIFQ as expert evidence in the referenced proceedings. This report has been prepared by and under the direction of Mr. Robert D. Knecht of IEc. Mr. Knecht’s curriculum vitae and a schedule of his appearances before regulatory authorities are attached to this report as Exhibit IEc-1.

As an introductory matter, IEc observes that this proceeding is fundamentally different than typical utility regulatory proceedings that involve issues of cost allocation and determination of rate class revenue requirements. In a typical rate case, the utility's overall revenue requirement is allocated amongst the various rate classes using a cost allocation study (sometimes referred to as a cost of service study or COSS). In its filing, the regulated utility will generally propose a cost of service methodology, and the various intervenors may propose modifications to that methodology, usually with the aim of reducing costs allocated to their constituencies. The regulator's job is to determine which cost allocation methodologies are appropriate for the utility in question.

Once a cost allocation study is performed, the allocated costs for each rate class are used as one factor for determining what each rate class should contribute toward the utility's revenue requirement. Typically, this process begins by comparing the class-specific cost results from the cost allocation study to the revenues that the utility expects to receive from the rate class under existing rates. This comparison can take a number of different forms, but the "revenue-cost ratio" (R/C) measure is fairly common in Canada. That is, the ratio of existing revenues to allocated costs is determined for each rate class.

With revenue-cost ratios derived for "existing rates," the utility and the various hearing participants will then typically develop proposals for class revenue requirements that move the revenue cost ratios closer to unity (100 percent), subject to consideration of the other familiar rate design criteria. In addition, utility regulators often set target ranges for class revenue-cost ratios, such as 95 percent to 105 percent, as goals for reasonable class revenue requirements.

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In some circumstances, the regulator's choice of a cost allocation methodology is influenced by the results of the cost allocation study. For example, an electric utility rate class that contains mostly rural customers, such as a farm class or an oilfield class, may show a revenue-cost ratio that is well below unity, as a result of the relatively high cost of distribution lines needed to provide service. For public policy reasons, regulators may wish to avoid large rate increases for rural customers, but they may also be concerned about the public perception that rural customers are heavily cross-subsidized\(^2\) by urban customers. Thus, regulators may be tempted to reflect these public policy considerations implicitly in their choice of a cost allocation methodology, rather than explicitly acknowledging the policy when setting class revenue requirements.

In this matter, however, the guiding legislation not only anticipates a cross-subsidy, but explicitly precludes express consideration of reducing the cross-subsidy in developing class revenue requirements. §52.1 of the *Loi sur la Régie de l'énergie* (the Act) states in part:

"The Régie shall not modify the rates applicable to a class of consumers in order to alleviate the cross-subsidization of rates applicable to classes of consumers."

While this legislated constraint is not terribly specific, it makes this case very different from the typical utility regulatory proceeding. Under this constraint, the goal of setting the revenue requirement for each class will not be to move revenue requirements closer to costs. The goal will be to establish revenue requirements that recognize and maintain some historical level of cross-subsidy.

In addition, because this is the first proceeding that involves regulatory review of Hydro Québec Distribution's cost allocation study, there is no need for intervenors to try to advocate for cost of service methods that reduce costs assigned to their constituencies, nor is there need for the Régie to be concerned about the impact of a particular cost allocation methodology on the eventual need for higher rate increases for any individual rate class. Any change in cost allocation methodology that causes a reduction in a class' allocated cost will simply increase the "base" cross-subsidy level provided from that class, or reduce the "base" cross-subsidy level provided to that class.

For example, HQD proposes that most distribution plant costs be allocated using a minimum system methodology for "classifying" these plant costs between demand-related and customer-related components. While the minimum system approach is one method that is used in other jurisdictions, cost allocation experts also advocate a variety of other methods for classifying distribution plant costs. Such other methods include demand-only classification, demand-energy classification (the "peak and average" method), and a demand-customer

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\(^2\) As discussed in more detail below, IEc uses the term cross-subsidy in this paper to reflect the over-recovery of allocated costs from one class to allow for under-recovery of allocated costs in other rate classes. This definition, while widely used in utility rate proceedings, is generally not consistent with a theoretical economics definition of a cross-subsidy.
classification based on "zero-intercept" analysis.\(^3\) The choice of methodology can have a large impact on the distribution plant costs allocated to particular rate classes. Typically, the demand-customer classification methods such as minimum system or zero-intercept will result in allocating relatively more costs to classes with relatively small, low-load factor customers than demand-only or demand-energy classification schemes. Thus, experts representing the residential class tend to advocate methods which have little or no customer component to costs, while advocates for small and mid-sized businesses favor demand-customer classification methods.\(^4\)

However, in the current proceeding, the goal will be to establish a cost allocation methodology that determines the level of the cross-subsidy that will be maintained. If a demand-customer methodology such as minimum system is adopted, the level of cross-subsidy to the residential class will be higher than it would be if a demand-only classification method is used. However, because that subsidy is fixed by the legislation, the small and medium business classes gain no particular "advantage" by the use of a minimum system methodology -- the method simply sets a higher "base" level of cross-subsidy from the commercial rate classes than would exist if an alternative methodology were used. The Act appears to require that, whatever level of cross-subsidy is defined, that the Régie may not establish a rate design goal of reducing that cross-subsidy in future rate proceedings.

Similarly, to the extent that the minimum system methodology implies a significant cross-subsidy to the residential class, the Act's requirement that this cross-subsidy be maintained implies that the residential class need not expect above average rate increases to bring revenues in line with allocated costs. Therefore, the Régie and the intervenors do not need to be concerned that any particular cost allocation methodology will imply above average rate increases for the residential class. In IEc's view, these conditions mean that the Régie's review of the cost allocation study can focus only on cost causation principles and sound cost allocation methodologies, without concern for the impact of the methodology on future class rate increases.\(^5\)

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\(^3\) IEc was recently involved in a proceeding in Alberta in which Aquila Networks Canada, Ltd. proposed to allocate the costs for specific individual components of actual distribution lines, transformers and other plant to each customer class that was served by each component, for a sample of the utility's distribution feeders. A decision is now pending in that matter. (Alberta Energy and Utilities Board, Application 1250392)

\(^4\) Large industrial customers generally do not take an advocacy position regarding distribution plant, since most large industrial customers are served at transmission voltage and therefore do not use the distribution system.

\(^5\) It is not completely clear whether this legislated mandate regarding the level of cross-subsidy reduces the flexibility normally accorded a utility regulator. Because the level of cross-subsidy is fixed, the Act could be interpreted to indicate that the only criteria that the Régie may use to set class revenue requirements will be allocated cost and the base period cross-subsidy measure. However, §52.1 of the Act suggests that the Régie may apply criteria other than "moving rates closer to costs" in developing class revenue requirements. Thus, IEc interprets the Act to require that some "base" cross-subsidy level be added to each class' allocated cost in each rate proceeding for determining the "adjusted cost basis" for establishing the revenue requirement.
Overall, IEc recommends that the goals of this proceeding should include the following:

- Develop a cost allocation methodology for HQD's transmission and distribution costs;
- Determine how cross-subsidy should be defined for regulatory purposes;
- Set a date at which the "base" levels of cross-subsidy are established; and,
- Develop a methodology by which "base" levels of cross-subsidy are maintained in future rate proceedings.

Before addressing these issues, IEc takes note that opportunities to change the cost allocation methodology after the base level of cross-subsidies is established may potentially be used by parties in regulatory proceedings to try to "game the system." For example, if a minimum system methodology is used to allocate distribution wire and transformer costs in the "base" period, parties may attempt to change that methodology in subsequent proceedings while retaining the historical base level of cross-subsidy, to thereby obtain an economic gain. While IEc cannot offer a legal opinion, we note that such gamesmanship does not seem to fall within the spirit of the Act. Unless a change in cost allocation methodology is caused by some fundamental change in the way HQD incurs costs, IEc recommends that any new methodologies be applied to both the "base" and current cost of service studies. Or, in short, "apples should be compared to apples."

2.0 Defining Cross-Subsidy

2.1 Theoretical Economics Definition

Economics theory provides a reasonably specific definition of cross-subsidy, although there are various permutations around the basic definition. This report only briefly describes the theory, primarily because IEc believes it has very limited relevance to utility rate proceedings.

In short, economists believe that a cross-subsidy exists for a class of customers when that class does not provide sufficient revenues to recover the incremental cost incurred by the utility to provide service. The incremental cost of providing service is defined as the cost that the utility would avoid if it did not have to serve that class of customers. This definition of cross-subsidy has a parallel and equivalent condition. That is, a cross-subsidy exists when a group of customers pays more than the stand-alone cost of providing service to that class.

A diagram depicting a simple two-class example explains these definitions. In Figure 1, the circle labeled "A" denotes the costs incurred by a utility to provide service to rate class A on a stand-alone basis. Similarly, the circle labeled "B" denotes the stand-alone costs to serve class B. The utility revenue requirement consists of the total area covered by circles A and B. Because the circles overlap, the cost incurred by the utility to serve both classes is less than the
sum of the stand-alone costs. In effect, the cost of serving both classes is less than the sum of serving each individually, meaning that economies of scale or scope exist for providing this service.

As defined by economists, the incremental cost of providing service to class A is that portion of the circle A that does not overlap with circle B. Incremental cost is therefore the cost of serving both A and B (algebraically, A ∪ B) less the stand-alone cost of B. Incremental cost to serve A can also be described as the stand-alone cost of serving A, less the overlap in costs between A and B (algebraically, A ∩ B, denoted "joint cost" in Figure 1). Similarly, the incremental cost of B is that portion of circle B that does not intersect with circle A. Note that the incremental cost of A plus the incremental cost of B is less than the total cost of providing service.

Figure 1

In the economist's definition, rate class A is cross-subsidized only if its revenues are less than the incremental cost of serving rate A, namely the portion of circle A that does not overlap with circle B. Similarly, rate class B is not providing a cross-subsidy unless its revenues are greater than the stand-alone cost of providing service to B, namely the entire circle B. Therefore, in the economist's world, there are many different combinations of revenue requirements for A and B that result in no cross-subsidy. As long as the revenue requirement for A is greater than its incremental cost, and the revenue requirement for B is greater than its incremental cost, no cross-subsidy occurs. In essence, the economist recognizes that the costs incurred in the intersection of circles A and B are "joint costs," i.e., they are caused both by rate class A and rate class B and that there is no theoretically perfect method for allocating those costs between the two classes.
While this definition of cross-subsidy has significant theoretical merit, it is IEc's experience that it is rarely used in utility rate proceedings, particularly those that focus on rate recovery of transmission and distribution wires costs. Because there are significant economies of scale in networked wires functions, the short-run incremental cost of serving any particular rate class is relatively low, and therefore the joint costs of serving all the classes are relatively high. Moreover, such an approach requires the development of an incremental (or "marginal") cost of service study, which can be subject to even more debate than the more common practice.

Thus, typically, electric utility regulators rely on a fully allocated cost of service study, which assigns all costs to rate classes based on cost causation principles and other allocation techniques. In effect, a fully allocated cost of service study allocates the "joint cost" overlap of costs between the circles in Figure 1 to Rate classes A and B. For example, joint overhead costs are often allocated in proportion to plant or labor costs, even though overhead costs do not necessarily vary with customer demand.

In a fully allocated cost environment, cross-subsidy is more commonly (if less accurately) defined as some measure of the relationship between revenues and fully allocated costs.

2.2 Alternative Definitions of Cross-Subsidy

Hydro Québec Distribution proposes to use revenue-cost ratios as its measure of cross-subsidy. In effect, HQD proposes to establish base revenue-cost ratios for each rate class and then set class revenue requirements in subsequent rate proceedings based on an updated cost allocation study and the "fixed" revenue cost ratios. As detailed further below, this methodology requires an adjustment to revenue-cost ratios as part of each rate proceeding to force total class revenues to equal the overall utility revenue requirement.

HQD's proposal has three other significant features for defining cross-subsidies. First, HQD proposes that it aggregate revenues and allocated costs for groups of rate classes, rather than developing "fixed" revenue-cost ratios for each individual rate class. Because several rate classes are very small and specialized, and because this approach provides more flexibility for rate design for specialized classes, IEc considers this aggregation to be a reasonable proposal. Second, HQD measures its revenue-cost ratios on the basis of total generation, transmission and distribution costs. IEc takes no exception to this proposal.

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6 This theoretical model is used in regulatory proceedings involving cost unbundling, when certain joint costs must be assigned to different functions. For example, utility overhead costs that support both a competitive generation and monopoly wires functions must be assigned in some manner. This model is often cited as a basis for that cost assignment and avoidance of cross-subsidy between functions. However, the model is not generally used for considering cross-subsidies between rate classes. See, for example, Transmission Pricing and Stranded Costs in the Electric Power Industry, Baumol and Sidak, The AEI Press, 1995.

Third, HQD proposes to exclude the special contracts rate class from the computation of revenue-cost ratios and cross-subsidies relating to the industrial rate class group. While IEc does not object to this proposal per se, we note that this exclusion may have implications if industrial customers switch from the special contracts class to Rate L. This issue is discussed further below.

As a general matter, IEc confirms that revenue-cost ratios are widely used in Canada as a measure of how fully a customer class is recovering its costs, particularly for measuring the progress achieved toward cost-based rates in a base rate proceeding. As HQD reports, the revenue-cost ratio approach is not identical to the method specified in the Merrill Lynch report, although the quantitative implications of the two methodologies are similar. Moreover, in IEc's view, the revenue-cost ratio metric is preferable to the "relative rate of return" approach used in some jurisdictions. However, as detailed above, the revenue-cost ratio measure is not typically used to define cross-subsidies, but rather serves as an indicator of how well a proposed scheme for setting class revenue requirements succeeds in moving class revenues toward costs. As detailed further below, the revenue-cost ratio approach has various drawbacks as a measure of cross-subsidy in the context of Québec's Act.

Because revenue-cost ratios are not traditionally used to establish a fixed level of cross-subsidy, IEc has prepared a series of illustrative quantitative examples, showing the impact of a "fixed" revenue-cost ratio metric on revenues required from each rate class group. These examples compare HQD's fixed revenue-cost ratio proposal to two other potential methods: a fixed dollar cross-subsidy and a fixed per-MWh subsidy. These examples are presented in the attached Exhibits IEc-2 through IEc-6 and are explained further below.

The examples presented in these exhibits consist of four components: a base scenario, and a future scenario evaluated under each of the three cross-subsidy definitions. Each example presents revenues, costs, and cross-subsidies for three rate class groups, namely residential,

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8 The Merrill Lynch report uses a cross-subsidy measure that is the difference between allocated costs and revenues divided by current revenues. In algebraic terms, that measure can be defined as (C-R)/R, where C is fully allocated costs and R is class revenue. This measure can therefore also be written as C/R - 1, or simply the "cost-revenue ratio" minus one. In essence, Merrill Lynch used a cost-revenue ratio centered around zero, rather than a revenue-cost ratio centered at unity as proposed by HQD. For relatively small differences between revenues and allocated costs, the two measures produce very similar results. For example, if a rate class has a revenue-cost ratio of 98.0 percent, it will show a positive receipt of subsidy in the Merrill Lynch index of 2.0 percent. However, as costs and revenues diverge, the differences become larger. A revenue-cost ratio of 90.0 percent implies a M-L subsidy of 11.1 percent, and a revenue-cost ratio of 80.0 percent produces a M-L subsidy of 25 percent.

9 For example, Pennsylvania electric utility rate filings report a "relative rate of return" measure for each rate class, a measure that is defined as the ratio of a particular class' return on allocated rate base to the utility wide return on rate base. Thus, for example, if a particular class produces revenues that are sufficient to provide a return of 8 percent on the rate base allocated to that class while the utility as a whole has a 10 percent return on rate base, the "relative rate of return" is 0.8. As with revenue cost ratios, reducing cross-subsidies is interpreted by moving the relative rate of return to unity. However, IEc considers the revenue-cost ratio approach to be superior because it measures revenue performance relative to all costs and not simply capital costs. The relative rate of return method can produce unreliable results, particularly for rate classes that have fairly low levels of allocated plant.
commercial, and industrial. In each exhibit, the base levels are the same and the numerical values used are loosely based on HQD revenue and cost results for the 2002-2003 fiscal year. However, to simplify the examples, we assume that base period revenues equal the full revenue requirement. In that way, the adjustment necessary to bring existing rates in line with costs does not distort the impacts of the various methodologies.

2.3 Discussion of Illustrative Examples

This section of IEc's report discusses the first example in detail as shown in Exhibit IEc-2, and then reviews general findings based on the other examples shown in Exhibits IEc-3 through IEc-6.

Base Period (Exhibits IEc-2 through IEc-6)

The base period information establishes base allocated cost levels, and assumes that revenue-cost ratios for the three classes are 80 percent for residential, 127 percent for commercial and 118 percent for industrial. Under those conditions, the residential class receives a subsidy of $880 million ($16.00 per MWh), from the commercial class ($594 million or $14.85 per MWh) and from the industrial class ($286 million, or $6.36 per MWh).

Constant Revenue-Cost Ratio Method (Exhibit IEc-2)

The example presented in Exhibit IEc-2 consists of an assumed increase in both energy and allocated costs for the residential class of 10 percent. Thus, in this scenario, unit costs for all rate classes are identical to the base scenario. Three "future period" results are then evaluated, depicting the implications for rates and subsidies under the three alternative subsidy definitions identified above.

The first "future period" analyzed is based on HQD's "constant" revenue-cost ratio proposal. Under HQD's proposal, the first step would be to apply the base revenue-cost ratios to the new cost information. Thus, for example, the base residential R-C ratio of 80 percent is applied to the new cost value ($4,840 million), to produce "unadjusted revenues" of $3,872 million. Similar calculations are performed for the commercial and industrial classes, and the three values are summed.

Unfortunately, in the HQD approach, the total unadjusted revenues are not equal to the utility revenue requirement. (In this example, unadjusted revenues are $8,572 million compared to the revenue requirement of $8,660.) Thus, the HQD method requires another adjustment, in which each rate class group's revenues is adjusted upward proportionately, to produce total revenues of $8,660 million. This necessary adjustment results in rate increases for the commercial and industrial rate classes, essentially in order to provide the new residential load with the same cross-subsidy received by the existing residential load.

Note that, in this scenario and under HQD's proposal, commercial and industrial customers face rate increases despite the fact that they have experienced no change in load or allocated costs. As such, the HQD proposed method produces rate changes that are unrelated to
cost causation, and which can be interpreted as being inequitable for the commercial and industrial rate classes.

**Constant Dollar Cross-Subsidy Method (Exhibit IEc-2)**

In contrast to the HQD proposal, the constant dollar subsidy approach produces different results. In this approach, each class keeps the dollar value of the cross-subsidy from the base case. Thus, for example, the residential class received a cross-subsidy of $880 million in the base case. Revenues for the residential class in the future scenario consist of the allocated costs of $4,840 million less the $880 million cross-subsidy, or $3,960 million. Revenues for the other classes are unchanged from the base case, because costs and cross-subsidies are held constant.

The end result of this scenario is that commercial and industrial customers are not required to absorb rate increases to provide a subsidy to new residential load as well as to existing residential load, but they do continue to provide the same historical cross-subsidy to the residential class as a whole. Average rates for residential load increases, as the historical cross-subsidy to that class is spread over a larger volume.

**Constant Per-MWh Cross-Subsidy (Exhibit IEc-2)**

This method, like the HQD proposed method, requires a two-stage computation of revenues. In the first stage, an unadjusted revenue value is computed by taking allocated costs and applying the base period per-MWh cross-subsidy to all future period volumes. For example, the residential unadjusted revenues equal the future period allocated costs ($4,840 million) less the historical per-MWh cross-subsidy of $16.00 per MWh applied to the future period residential volumes of 60.5 TWh, resulting in unadjusted revenues of $3,872 million. However, because of the growth in residential demand that is eligible for the per-MWh cross-subsidy, an adjustment to revenues is necessary. With a proportionate revenue increase, this method produces the same pattern as the HQD proposal, with the same economic distortions. However, as shown below, this methodology does not always produce results that are identical to the HQD proposal.

**Residential Cost Growth (Exhibit IEc-3)**

Exhibit IEc-3 depicts the implications of a 10 percent increase in costs allocated to the residential class, with no energy consumption changes or other cost changes. In effect, the residential load simply becomes more expensive to serve in the future scenario.

As in the case of the residential load growth example, the HQD constant revenue-cost ratio proposal produces anomalous and inequitable results. Because the cost basis for the residential class increases, a constant revenue-cost ratio methodology requires that the value of the cross-subsidy to the residential class increase, in both dollar and per-MWh terms. The subsidy to the residential class rises from $880 million in the base case to $928 million under the

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10 Note that the Act does not require that cross-subsidies to individual customers be maintained; the Act focuses on cross-subsidies to "classes of consumers."
HQQD proposal, or from $16.00 per MWh to $16.88 per MWh. Rates for commercial and industrial customers must increase to fund this increased subsidy, despite the fact that neither class experienced any change in load or allocated costs. Again, HQD's proposal is inconsistent with cost causation.

Thus, for example, under HQD's proposal, industrial customers could face rate increases associated with increases in the cost of distribution plant, despite the fact that industrial customers generally do not use the distribution system.

In the constant dollar subsidy method, however, commercial and industrial customers are unaffected by the increase in costs to the residential class. In effect, the full amount of the residential cost increase is borne by the residential class.

In contrast to the results for the residential load growth example, the constant per-unit subsidy method does not require rate increases for the commercial and industrial rate classes. Thus, in this example, the constant per-MWh cross-subsidy approach produces the same results as the constant dollar value method. Because volumes have not changed, no adjustment to revenues is necessary to accommodate a revenue variance. Thus, residential customers continue to receive the $16.00 per MWh subsidy, and commercial/industrial customers continue to contribute the per-unit subsidy from the base case.

Industrial Load Growth  (Exhibit IEc-4)

Exhibit IEc-4 shows the implications of a 10 percent increase in load and associated cost for the industrial rate class group. This example parallels the residential load growth example, except that the growth applies to high R-C ratio class. As in the residential load growth scenario, the HQD proposal and the constant per-unit cross-subsidy method produce the same results.

In this scenario, the HQD proposal requires the industrial class to increase the dollar value of the cross-subsidy, from $286 million to $307 million. However, because the load growth applies to a high R-C ratio class, the necessary revenue adjustment is downward, and all classes are assigned a small rate decrease on a per-MWh basis. This effect causes the subsidy benefit to the residential class to increase, and the subsidy cost from the commercial class to decrease. In effect, the residential and commercial classes benefit from the industrial load growth, despite the fact that neither class experienced a load or cost change.

By way of contrast, the constant dollar cross-subsidy approach leaves the residential and commercial classes unaffected by industrial load growth.

Note that this example could envision the transition of a special contracts customer to Rate L, under HQD's proposal to exclude the special contracts class from the cross-subsidy measure. By requiring the customer who switches from the special contracts class to Rate L to provide benefits to the other rate class groups, the HQD proposal will tend to discourage customers from switching.
Industrial Load Decline (Exhibit IEc-5)

Exhibit IEc-5 shows a virtually identical scenario to that of Exhibit IEc-4, except that industrial load declines rather than increases. In this example, rather than benefit from factors that are unrelated to their load or costs, the residential and commercial customer classes face rate increases under HQD's proposal. Further, as in the previous example, the constant dollar subsidy approach leaves the residential and commercial classes unaffected by the decline.

Industrial Cost Increase (Exhibit IEc-6)

Exhibit IEc-6 depicts a scenario involving a 10 percent cost increase for the commercial class, with no changes in class loads. This scenario is conceptually similar to that in Exhibit IEc-3, except that the cost increase applies to the high revenue-cost ratio class.

Under HQD's proposal, because the commercial class is required to provide a cross-subsidy that is related to its base revenue-cost ratio, an increase in commercial costs results in an increase in the required subsidy. In addition to being inconsistent with cost causation, this aspect of HQD's proposal is particularly inequitable. As shown in this exhibit, under HQD's proposal, commercial class costs increase by $220 million, while the adjusted revenues required from the commercial class rise by $258 million. In effect, commercial customers are not only required to pay for the cost increase that they cause, they are required to increase the subsidy to the residential class and reduce the subsidy burden on the industrial class because their own costs increase. Since an increase in costs for the commercial class could be related to distribution costs, it is particularly unclear why the industrial class should benefit from such a cost increase.

Under either the constant dollar approach or the constant per-MWh subsidy approach, the commercial customer class is required to pay only for the cost increase that it causes, and no additional benefits need be transferred to the residential and industrial classes. As such, both methods produce results that are more consistent with cost causation and are more equitable than HQD's proposal.

2.4 IEc's Recommendation

Although the revenue-cost ratio measure is a useful tool in traditional utility rate proceedings for measuring the progress toward cost-based rates that is embodied in a class revenue-requirement proposal, the examples detailed above indicate that it can produce results that are consistent neither with principles of cost causation nor with equity in the unique context of Québec. As shown, consumption or cost shifts in one rate class group result in changes in rates and cross-subsidies in other classes.

IEc recommends that the Régie adopt a constant dollar cross-subsidy approach. As shown, this approach produces sensible results under a variety of scenarios, and it does not cause any of the peculiar cost and subsidy-shifting effects of either the HQD proposal or the constant per-MWh subsidy method.
In practice, IEc envisions the following procedure. A "base" year for developing cross-subsidy dollar values is established, and a cost allocation study is performed for that year using Régie-approved cost allocation methods. Cross-subsidy dollar values are then set for each rate class group based on the difference between allocated costs in the base period and revenues from each class in that year. IEc recommends that, in making this calculation, revenues be adjusted proportionately to be consistent with the overall HQD revenue requirement as approved by the Régie for that year.

In subsequent rate proceedings, the "adjusted cost target" for each rate class would be the allocated cost plus the base period cross-subsidy dollar value. With this cost-target, the Régie could then apply other sound ratemaking principles in determining the final revenue requirement for each rate class, without running afoul of the legislation. Consistent with the practices of other jurisdictions (but adjusted for the specific legislation in Québec), the Régie may wish to establish a target range for revenue requirements. For example, the Régie may decide that each class' revenue requirement should be within (plus-or-minus) five percent of the cost target, where the cost target is set at allocated cost plus base subsidy.

3.0 "Base" Date for Establishing Cross-Subsidy

As noted above, §52.1 of the Act specifies that the Régie may not modify rates to alleviate cross-subsidization of rates for the various rate classes. However, the Act is silent as to the starting point from which the cross-subsidy may not be alleviated. The relevant portions of the Act were adopted and came into force on 16 June 2000. HQD appears to propose that the base level of cross-subsidy be established on a test-year basis, for the year 2004-2005.

IEc observes that divining the intent of the legislature with respect to the base period of cross-subsidy is an issue of law and judgment, and is one that is not particularly susceptible to economic analysis. However, one interpretation of the Act is to set the base cross-subsidy level at the level in place at the time of the passage of the Act.

AQCI/AIFQ asked IEc to review the changes in cross-subsidies between the time when the Act went into effect until the present. The only cost allocation analysis of HQD available to IEc near the time when the Act was adopted was that presented in the "Merrill Lynch report," dated 14 January 2000, some five months prior to the date when the Act went into effect.¹¹ For the reasons detailed in the introduction section of this report, IEc notes that for the Merrill Lynch report to be a useful starting point for measuring cross-subsidies, it must be based on the same cost allocation methodology as that adopted by the Régie in these proceedings. While IEc cannot anticipate what cost allocation methodology will eventually be adopted by the Régie, it is IEc's understanding that the methodology presented in the current filing is reasonably similar to

¹¹ "The Québec Electricity Supply Rate and Options for the Introduction of Competition in Electricity Production," Report to the Ministry of Natural Resources, Government of Québec, Merrill Lynch, 14 January 2000. Note that the Merrill Lynch report also identified an average generation cost of 2.79 cents per kWh (at an 18 percent return on equity) for Hydro Québec for 2001, a value that was subsequently incorporated into the Act. See page 27 and Table 2 at page 28 of the Merrill Lynch report.
that used in the development of the costs reported in the Merrill Lynch report.\textsuperscript{12} Thus, a comparison of cross-subsidies in the Merrill Lynch report with those presented by HQD in the current proceeding is likely to be a reasonable indicator of the changes in cross-subsidy between then and now, even if a different cost allocation methodology is adopted.

Exhibit IEc-7 to this report presents the detail of IEc's comparison, and the results are summarized in Table 1 below.\textsuperscript{13} In short, between the time of the Merrill Lynch report and the present, the cross-subsidy to the residential class has increased by nearly $130 million, and this increase in subsidy is provided by the commercial classes (nearly $50 million) and industrial classes (around $80 million).

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<td><strong>Comparison of Cross-Subsidies Between the Merrill Lynch Report and the HQD Filing</strong></td>
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<td><strong>Revenue Cost Ratios</strong></td>
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<td>M-L Report</td>
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<td><strong>Adjusted Cross Subsidies ($mm)</strong></td>
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Based on the information presented in Exhibit IEc-7, it appears that the primary factor causing the significant increase in the subsidy to the residential class from the Merrill Lynch report to the current filing is the increase in overall distribution costs and an increase in the share of distribution costs related to the residential class. Thus, under HQD's interpretation of the Act, this increase in costs caused by the residential class should be rolled into the "base" subsidy

\textsuperscript{12} See Exhibit HQD-10, Document 4, pages 12-13, response to AQCIE/AIFQ-HQD-4(b).

\textsuperscript{13} Direct comparisons between HQD's filing in this proceeding and the Merrill Lynch report are complicated by lack of detail in the Merrill Lynch report and different aggregations of customer classes in the two studies. For that reason, Exhibit IEc-7 uses two different approaches for comparing the two studies. Exhibit IEc-7A compares the four general rate class groups as reported by Merrill Lynch with the HQD categories as proposed. Exhibit IEc-7B shows a separate rate class group for the "other" categories for both the Merrill Lynch report and the HQD filing. In addition, cross-subsidies are computed in both exhibits on both an "unadjusted" and adjusted basis, where "unadjusted" refers to subsidies that include both cross-subsidies and overall revenue under-recovery, and adjusted refers to cross-subsidies that would exist if the full revenue requirement were achieved. Overall, however, the results from all of these analyses show the same basic patterns.
levels provided by the business classes. However, if the date the legislation was enacted is used as a basis for determining the subsidy, then future rate proceedings can be used to adjust rates to the base subsidy levels that the legislature was aware of when the Act was passed.

As noted above, IEc's comparison analysis assumes that the same cost of service methodology was used in the Merrill Lynch report as that used in the present filing. If the date of the passage of the Act is adopted as "base" for defining cross-subsidies, IEc recommends that the Régie require HQD to file a cost of service study based on the methodology approved in this proceeding, using test-year cost data for 2001.

4.0 Generation and Transmission Cost Allocation Methods

4.1 Generation Costs

ACQIE/AIFQ asked IEc to review the generation cost methodology used by HQD in the current proceeding with that approved by the Régie in R-3477-2001. While HQD did not provide workpapers regarding its generation cost allocation, IEc's estimates from the information available indicate that HQD has consistently applied the approved methodology.

4.2 Transmission Costs

HQD proposes to allocate all transmission costs between the various rate classes on a single coincident peak (1 CP) basis.

In a restructured environment, an electric distribution utility simply pays the transmission utility for transmission service. Thus, the issue of cost causation for the distribution utility relates only to the causation factor for how it incurs transmission costs, namely through transmission utility billing determinants. For example, if the transmission utility charges for transmission services on an energy basis, then the distribution utility should allocate transmission costs to the various rate classes on an energy basis. If the transmission utility charges for services based on a single measure of demand, such as contract demand or metered peak, then a single coincident peak method is appropriate. However, if the transmission utility charges for services on a location-by-location demand charge basis, the problem becomes somewhat more complicated, and the distribution utility needs to develop an allocator that reflects non-coincident peak transmission billing demand levels at the transmission interface.

In Québec, HQD purchases transmission services from TransÉnergie. The level of costs incurred by HQD is determined by TransÉnergie's overall revenue requirement and the methodology by which transmission costs are allocated between HQD and the other services offered by TransÉnergie (network integration service and long-term point-to-point service). In Decision D-2002-95 (R-3401-98), the Régie tentatively approved Hydro Québec's proposal to allocate costs between these services on a single coincident peak (1 CP) basis. However, the Régie ordered Hydro Québec to:
... file, within one year of issuance of this decision [30 April 2002], a cost allocation study that reflects the Régie's concerns and includes the following three components:

- cost functionalization, considering the 10 functions listed by the Provider with two added distinctions: on one hand, lines used exclusively for connections to generating plants and on the other hand, the interconnection with Churchill Falls;

- cost classification;

- cost allocation between rate classes, here equivalent to transmission services, for each function used"\(^\text{14}\)

Thus, HQD's proposal for allocating transmission costs in its current filing is consistent with the manner in which it incurs those costs, namely a 1 CP basis. To the extent that this methodology is revisited in a subsequent filing by Hydro Québec pursuant to the Régie's order, this methodology should be revisited.

In IEc's report in R-3477-2001, we agreed that, in light of Hydro Québec's pronounced winter peak load pattern, the single coincident peak method represented a reasonable allocator for bulk power demand costs. However, we expressed disagreement with two aspects of how Hydro Québec computed the 1 CP allocators. In short, IEc concluded that Hydro Québec incorrectly used average loss factors rather than peak period loss factors in computing the 1 CP allocator, because the capacity needs to be sized to meet peak losses and not average losses. In addition, IEc concluded that Hydro Québec improperly included interruptible demand in developing the 1 CP allocator, because capacity is not sized to meet interruptible demand.\(^\text{15}\)

While we re-iterate our concerns about Hydro Québec's methodology, the relevant issue for this proceeding is only what method was approved in R-3401-98. Thus, under the hypothesis that HQD has not changed the method by which it computed 1 CP allocators in this proceeding relative to R-3401-98, HQD's proposal for transmission costs is appropriate for this filing.


5.0 Summary of IEc Recommendations

Overall, IEc offers the following recommendations in this matter:

1. Because of the legislated constraints regarding maintaining historical cross-subsidies, the Régie can and should evaluate cost allocation methodologies strictly on cost causation merits, without concern for longer term rate implications.

2. Production and transmission cost allocation methods should be consistent with how costs are passed through to HQD. HQD's proposal in its filing appears to be consistent with prior decisions by the Régie with respect to these costs, although the Régie anticipates a more detailed review of transmission cost allocation methodology in the future.

3. The Régie should adopt a method for defining cross-subsidy between the various rate classes. HQD's proposal to use a "constant" revenue-cost ratio method will produce rate shifts that are inequitable and inconsistent with cost causation. IEc recommends that a "revenue-cost difference method" be adopted instead, in which cross-subsidy be defined as the dollar value difference between base period allocated costs and revenues.

4. The Régie should define the base period to which the historical cross-subsidy anticipated in the legislation refers. This decision is primarily one of judgment and of law. HQD proposes the 2003-2004 test year, which is well removed from the effective date of the legislation. IEc's analysis demonstrates that cross-subsidies have shifted considerably since passage of the legislation. If a date prior to the 2002-2003 test year is chosen for a base, IEc recommends that a cost allocation study be prepared for that period, using the cost allocation methodology approved by the Régie in this proceeding.

5. Once base historical cross-subsidy dollar values are determined, these values should be added to cost allocation study results in future rate proceedings, to serve as the "adjusted cost basis" for each rate class. The Régie can then incorporate this adjusted cost basis into its deliberations regarding the appropriate level of revenue requirement for each rate class.

Report Prepared By and Under the Direction of:

________________________________________        _____________________
Robert D. Knecht                      Date
EXHIBIT IEc-1

CURRICULUM VITAE AND APPEARANCE SCHEDULE

ROBERT D. KNECHT